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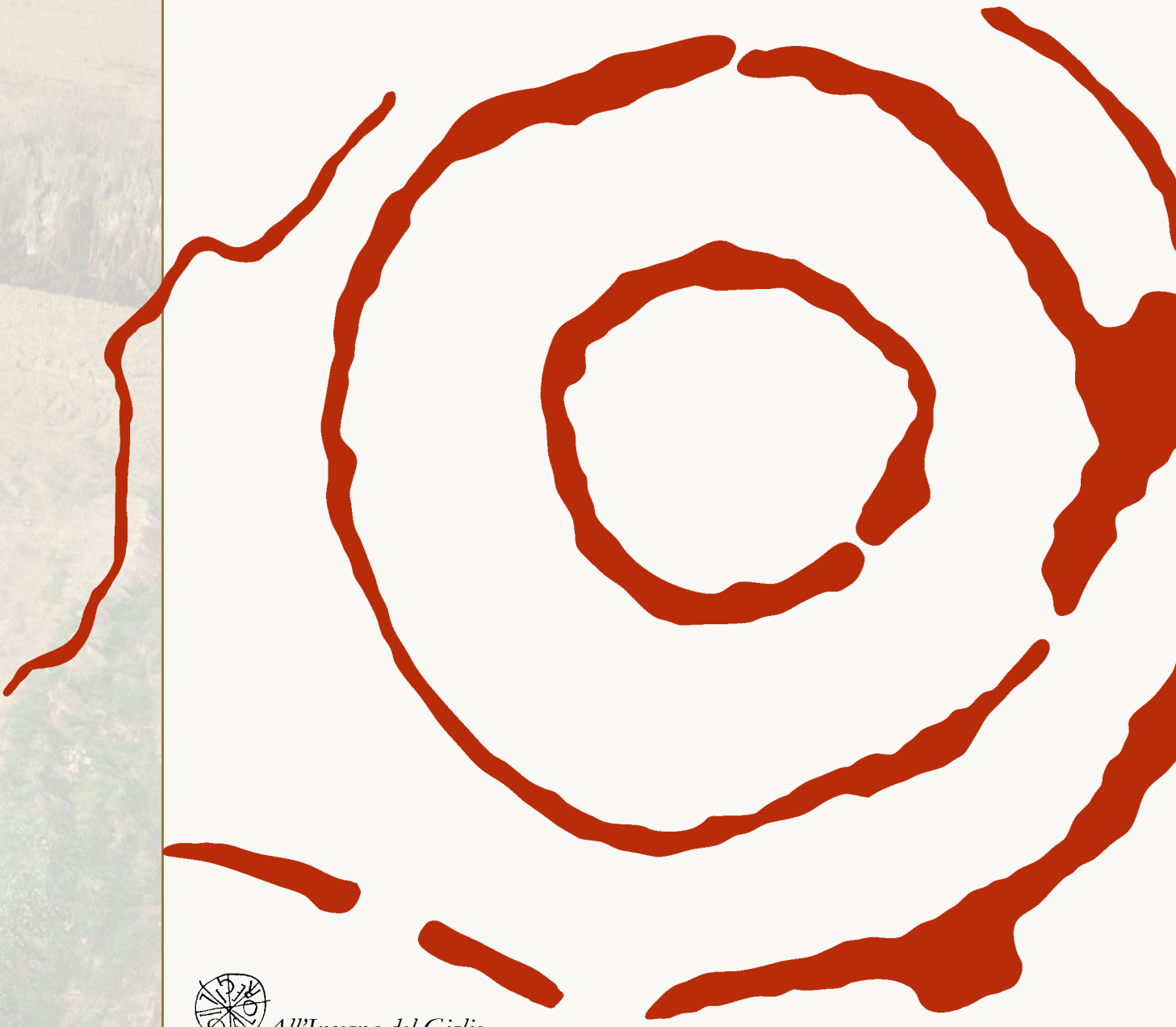
Origins of a new economic union (7th-12th centuries)

Preliminary results of the nEU-Med project: October 2015-March 2017

edited by
Giovanna Bianchi, Richard Hodges



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Cover: Aerial view of excavations at Vetricella (Scarlino, GR) (photo ATS s.r.l.).

Unless otherwise specified, all photos are by the authors of the individual articles.

Italian to English translation: Gavin Williams

English to Italian translation for 'Towards a new Mediterranean narrative for Early Medieval Tuscany' by Richard Hodges: Alexander Agostini

This volume has been subjected to double-blind peer review.

This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement n. 670792)

ISSN 2035-5319
ISBN 978-88-7814-879-6
e-ISBN 978-88-7814-880-2
© 2018 All'Insegna del Giglio s.a.s. – Firenze

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Printed in Florence, October 2018
Tecnografica Rossi

CONTENTS

ITALIAN ABSTRACTS

Giovanna Bianchi, Richard Hodges

INTRODUCTION

The nEU-Med project is part of the Horizon 2020 programme, in the ERC Advanced projects category. It began in October 2015, and will be concluded in October 2020.

The project, funded with €2.5 million, has the University of Siena as its host institution, and is being conducted at the Department of History and Cultural Heritage. Owing to its highly interdisciplinary nature, also taking part in the project are the Department of Biotechnology, Chemistry and Pharmacy, and the Department of Physical Sciences, Earth and Environment, with teaching staff belonging to the senior team.

In the last thirty years, Medieval archaeology has provided much information that is capable of changing the canonical interpretation of the history of Europe after the fall of the Roman Empire until the middle centuries of the Medieval period. Recently, important overviews have been produced for northern Europe, especially, which, unlike southern Europe, saw major, homogenous economic growth between the 7th and 9thc. It was only as of the 9thc that some parts of southern Europe, such as Italy, were caught up in similar transformative processes. This led to the gradual formation – as of the 12thc – of a more balanced economic scenario, the prelude to a more wide-scale, unified system of trade and cultural exchange between northern and southern Europe. The form and the timeframe of this initial, fundamental growth in the western part of the Mediterranean, which took place between the 7th and the 12thc, are however yet to be understood in their entirety. The nEU-Med project sets out to understand these processes by a careful analysis of the changes in human settlements, and in the natural and farming landscapes, in relation to the exploitation of resources, and the implementation of differing political strategies.

In order to address such historical questions, the nEU-Med project chose to investigate one part of the northern Maremma, between the Colline Metallifere hills, the valleys of the Cornia and Pecora rivers, respectively, and the coastal area, stretching from the Gulf of Follonica to the Gulf of Piombino (*fig.* 1). Here a system of lagoons and marshes was present in the Medieval period, associated with a number of important harbours, such as *portus Scabris* (in what is now the Gulf of Follonica) and the port of Falesia (situated in the Gulf of Piombino). The variety of natural environments and resources located in this area (salt, cereal farming, woodland, ore deposits etc) therefore make this local geographical area a standard type of territory in the western Mediterranean, being representative of other contexts with similar features.

Moreover, a considerable amount of information is already available for this territory, the result of previous archaeological and documentary investigations carried out in the last 30 years by the University of Siena, and commenced under the coordination of Riccardo Francovich[1].

Eight castles have been excavated in or close to the territory investigated by the nEU-Med project, four of which have been excavated on a large scale (Rocca S. Silvestro, Francovich 1991; Donoratico, Bianchi 2004; Cugnano, Bruttini, Fichera, Grassi 2009; Rocchette Pannocchieschi, Grassi 2013). Of these eight castles, seven have Early Medieval phases, and three (Rocca San Silvestro, Rocchette Pannocchieschi, and Cugnano) are also linked to the exploitation of silver-bearing minerals. In addition, there have been limited excavations at two early medieval and late medieval monasteries (S. Quirico di Populonia, Bianchi, Francovich, Gelichi 2006; S. Pietro a Monteverdi, Francovich, Bianchi 2006), at one rural canonical complex, S. Niccolò in Montieri (Bianchi, Bruttini, Grassi 2012) and in the centre of Piombino (Berti, Bianchi 2007), the location of the original castle. The first investigations at the site of Vetricella (Marasco 2013a) also belong to this previous research period. Alongside the excavations, fieldwalking surveys have covered six municipalities (Campiglia, Scarlino, Piombino-Populonia, Massa Marittima, Montieri and Monterotondo M.mo) in this sub-region (Francovich, Dallai 2005; Dallai *et al.* 2009).

The information deriving from this research work forms a valuable point of departure, and makes the projected goals of the 5-year project actually achievable.

This volume brings together the articles presented on the occasion of the first nEU-Med workshop, held in Siena on 11 and 12 April, 2017. Participating at this event, as discussants, were colleagues who include members of nEU-Med's scientific board[2].

[1] In addition, as part of the activities linked to the dissemination of the project, an exhibition was organized in Siena dedicated to the life and work of Riccardo Francovich, marking the 10th anniversary of his death. The success of the project, and its real feasibility, is, indeed, very much linked to the research carried out in the past by this well-known and important archaeologist, whose multi-faceted activities were illustrated in this exhibition. The exhibition, entitled *Riccardo Francovich. Conoscere il passato, costruire la conoscenza*, was displayed at the Department of History and Cultural Heritage, from 30 March until 26 May 2017, before then travelling to other locations in Tuscany.

[2] In this regard, our warm thanks go to Marie-Christine Bailly-Maitre (CNRS Aix-Marselille), Marc Bompaire (Ecole Pratique des Hautes Etudes, CNRS Orleans), Luc Bourgeois (Université de Caen), Michael McCormick (Harvard University), Sauro Gelichi (Università Ca' Foscari, Venezia), Alessandra

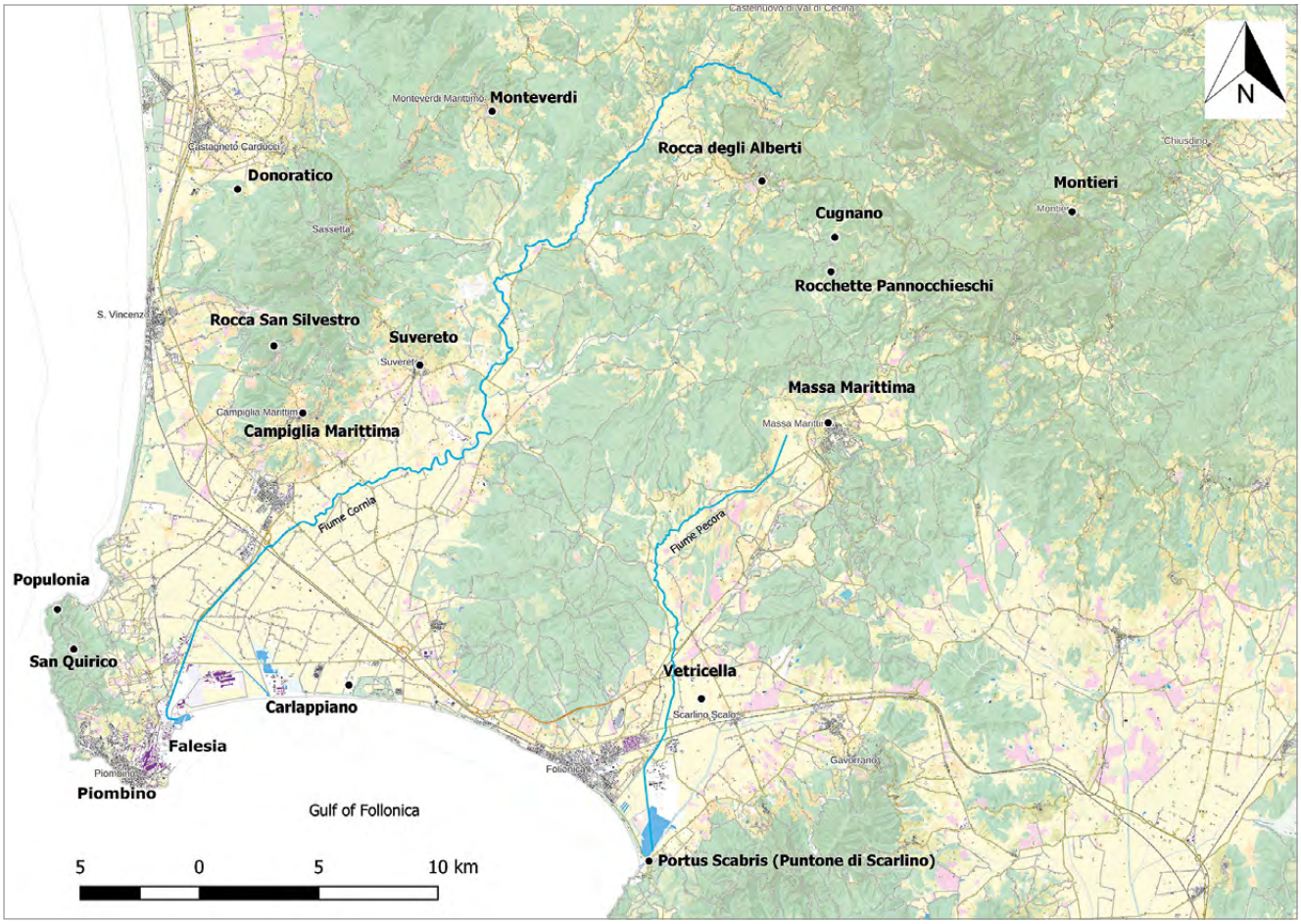

fig. 1 – The sample territory analyzed in the nEU-Med project and location of some sites mentioned in this article.

The aim of the workshop was to draw up an initial survey of research and other work on the project, one and a half years on from its inception.

In this space of time, in line with the objectives which we set ourselves, a large number of young researchers, from different academic backgrounds, have been involved in the various research studies[3].

In the execution of the nEU-Med project, and on the basis of its objectives, in-depth research in the sample area is involved; this will enable specific questions to be formulated, which can then point in the direction of appropriate comparisons with other parts of Tuscany, and further afield, linked to this part of the western Mediterranean.

In the first year and a half of work, a decision was made to start by making a study of the coastal, before turning to the hinterland (*fig.* 1). This decision was determined by a series of associated causes:

a) The so-called Tuscan model, linked to settlement dynamics between the early and the Late Medieval periods, previously drawn up by Francovich, was predominantly based on research at hilltop sites located immediately inland from the coast, or in the hinterland itself (Francovich 2002; Francovich, Hodges 2003; Francovich 2008), while the coastal area had never been analyzed systematically. Therefore it was important to intervene in this area, especially in view of timely investigations carried out in the recent past (especially Marasco 2013b), from which its huge potential for providing information could clearly be seen, a potential which could thus confirm, or supplement, Francovich's Tuscan model.

b) As stated in the first article in this volume (Hodges, see below), studying the issue of economic growth in this part of the Mediterranean also requires a study of the system of trade and commerce by sea. Beginning the project investigations from the coast would make it possible to add to the information gathered thus far, from previous research into the various harbours which were a feature of this stretch of coast in the Medieval period, verifying the real scale and characteristics of trade.

c) In this coastal territory stood two of the three key sites in the project: Carlappiano and Vetricella. Launching large-scale investigations in these contexts would make it possible to understand how sites of this sort, located in a lagoon-type landscape system, could function both as a lynchpin between inland areas and the sea, and also as centres for the exploitation/management of specific, important resources: the salt from the salt-works around the Piombino lake, attested with certainty as of the 11thc at least; and ore deposits present in

Molinari (Università degli Studi, Roma Tor Vergata), and Chris Wickham (University of Oxford) for their participation, and for the useful suggestions given during discussion of the contributions.

[3] For details of the number of young researchers involved, and their activities, see the project's website: www.neu-med.unisi.it

the immediate hinterland, the exploitation of which, at least in the Early Medieval period, must have been linked to the institutional and political contexts which looked to Lucca as the centre of regional power.

Linked to this research strategy is, therefore, first and foremost, the commencement of investigations carried out in the past on the Baratti-Populonia promontory (Piombino), reworked for this occasion with a specific eye to the results of the research conducted in the framework of the nEU-Med project[4].

On the other hand, the choices made in connection with this volume set out from the fact that the project is composed of several research units. Each of these units covers an aspect of the interdisciplinary research underpinning the nEU-Med project, each with their own methodology. For this first volume of results, it was decided not to give an account of all the work carried out within all the units, but to select those lines of investigation which, at the end of the first year and a half since the start of the project, have made it possible to gather sufficiently complete data to offer ideas for research necessary for articulating, and developing further, the research strategy in the immediate future.

While the first article in the volume (Hodges, see below) aims to place the historical issues dealt with by the project within a broader Mediterranean, and also north European, context, in the two subsequent articles, written by several authors (Marasco *et al.*; Dallai *et al.*, see below), the focus is once again on the geographical sample area, by means of an initial account of the results of the first extensive archaeological investigations, still under way, conducted at the sites of Vetricella and Carlappiano in the summer and autumn of 2016.

The surrounding territories associated with these sites were analyzed using an approach which is not just purely archaeological (survey; various kinds of diagnostics etc), but which also features geomorphological, archaeobotanical and chemical analyses. These contributions illustrate the results acquired thus far for the Pecora valley (Pieruccini *et al.*, see below), setting the context for Vetricella close to its western limits. Continuation of the research will make it possible to collect an equal amount of important data for the area further inland in this fluvial corridor, as well as for the area immediately bordering it, through which the river Cornia and its tributaries flow.

In addition, it was decided to present below the findings relating to the study of some classes of finds, particularly pottery. The articles contained in the volume refer to two specific investigations: *portus Scabris* (Vaccaro, see below), the main port in the modern-day Gulf of Follonica, where the lagoon formed, on the margins of which the site of Vetricella was located; and the territory further inland (Briano *et al.,* see below). The study of the pottery from *portus Scabris* has therefore made it possible to trace an important picture, through time, of the characteristics and volume of commerce, and the possible trade which characterized this and other maritime ports along this stretch of the Tuscan coast. Meanwhile, analysis of pottery classes circulating only in inland areas is starting to shed light on locally-made wares, linked to an economic system that was perhaps more complex than was thought in the recent past.

While pottery finds illustrate everyday material culture, albeit within different systems of trade and production, the article devoted to Lucca and its court in the Early Medieval period (Tomei, see below) focuses on the complex systems of self-representation, and, more or less directly, on the circulation of goods designed for the dominant social classes. This aspect is significant in the framework of a research study aimed at defining economic systems which are also centred upon the specific production of luxury goods, which could make use of raw materials from areas outside Lucca, relating to the extensive lands which politically looked to this urban centre.

Additionally, a project which has the study of economic growth as its goal could not overlook the aspect linked to the production and circulation of coinage (Benvenuti *et al.*, see below). This is also due to the presence, in our sample territory, of important veins of ore-bearing rock, from which raw materials for the production of silver coins might be extracted. Much is known about the exploitation of these mineral deposits in the Early Medieval period, thanks to previous research (Benvenuti *et al.* 2014). Whereas initially, while the project was being designed, the suggestion that these metals used for coinage were mined as of the Early Medieval period was thought to be well-founded, the article devoted to this subject, which presents the results of initial archaeometric analyses of a sample of coins datable to between the 10th and 11thc, opens up new and important scenarios.

The final article (Bianchi, Collavini, see below) sets out from the observation of a chronological similarity of many of the material finds studied so far, which are partially presented here, and which locate important transformations as taking place especially in the 10thc. By means of a dialogue between the written and material sources, an attempt is therefore made to focus on the historical context in question, and on possible comparisons between some sites in this area and also in other areas, starting with Vetricella itself, in order to obtain a better understanding of the political, economic and social dynamics connected to these changes.

It would be impossible to summarize, in this brief introduction, what will be the key points in the future research agenda, due to their large number and complexity. Suggestions forming part of this agenda, including large themes, are present in each of the articles presented here, in reference to the various different lines of investigation. Continuing research is already adding to this agenda, and more and more questions are emerging, as new and sometimes unexpected discoveries are made.

These findings will be presented at the next workshop, due to be held in 2019, which will be the starting-point for the final conclusions of the nEU-Med project.

[4] This is the volume entitled *Un monastero sul mare. Ricerche archeologiche a S. Quirico di Populonia (Piombino, LI) / A Monastery by the sea. Archaeological research at San Quirico di Populonia (Piombino, LI),* edited by G. Bianchi and S. Gelichi, published in March 2017 by All'insegna del Giglio, in its Biblioteca di Archeologia Medievale series. The volume published in open access can be downloaded for free at the following link: https://www.insegnadelgiglio.it/prodotto/un-monastero-sul-mare-ricerche-a-san-quirico-di-populonia/

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*Richard Hodges**

TOWARDS A NEW MEDITERRANEAN NARRATIVE FOR EARLY MEDIEVAL TUSCANY

«There is not one Mediterranean. Attempts at single definitions always end up fracturing into different ideas, and imploding from within»
(Forty 2017, p. 27)

«The conception of patrimomy or heritage that became hegemonic in the wake of the rural exodus of Tuscany …dismissed the contradictory histories landscape told and called for the redemption of its incongruous features. This approach to patrimony was first of all about the recognition of a lineage that linked past, present and future so that conflicts and discontinuities had to be downplayed or even ignored in the name of long-term continuities. In this sense, the myth (or cult) of patrimony can be understood as a way of exorcising a society's fear or rootlessness and loss of direction»
(Gaggio 2017, p. 195).

1. IN SEARCH OF A MEDITERRANEAN NARRATIVE

The nEU-Med project is entitled: 'Origins of a new economic union (7th to 12thc): resources, landscapes and political strategies in a Mediterranean region'. The project builds upon the thirty years of archaeological research by the late Riccardo Francovich in the Maremma, investigations taken forward since his untimely death in 2007 by Giovanna Bianchi and her colleagues from the universities of Siena, Firenze, Pisa, and Naples. Few sub-regions of Medieval Europe have been as well studied by archaeologists as area embracing the Colline Metallifere and the coastal littoral from ancient Populonia and its medieval successor, Piombino as far south as Grosseto. The project aims to show how one slice of the Italian littoral reaching inland to the Colline Metallifere engaged with the Mediterranean in the post-classical period.

A Mediterranean perspective is important. Early Medieval Tuscany has to be reconstructed in terms of its wider relations – those connected by the Mediterranean and those connected by arterial routes up and down the Italian peninsula. A Mediterranean perspective, of course, is far from unusual. Populonia had been an important emporium for the Etruscan period that engaged in maritime trade with points north and south. Roman cabotage trade along the Tuscan coast is now well-documented at Cosa, Albarese, *Portus Scabris*, Falesia-Populonia and, of course Pisa. Likewise connectivity in the High Medieval period is now well-known from Piombino (Berti, Bianchi 2007) as well as the University of Siena's excavations and associated studies of the Maremma's villages (Bianchi 2015a, 2015b). Soon after the turn of the millennium, Pisan mercantilism played a significant part in the life of this region.

Mediterranean connectivity in the period AD 600-1100 along the Tyrrhenian coast is little known. The textual sources are minimal and the archaeological evidence has yet to be presented in a coherent narrative. Were the metal-bearing hills of the Colline Metallifere abandoned? Were there small-scale and incisive initiatives to exploit the silver, copper, lead and iron? Was there any Mediterranean commerce connecting these assets to the political centre in northern Tuscany at Lucca? Most of all, the question remains at the moment, was this region of Tuscany revived after the classical period by the agency of Mediterranean traders or political forces emanating from the north, the Carolingian or Ottonian realms?

These open questions exist because the post-classical archaeology of trade and commercial activity around the Tyrrhenian Sea barely exists. Let us put this into perspective. The archaeology of North Sea trading activity is extremely well understood after fifty years of research, and like that from the Baltic Sea in this period is now the subject of forensic enquiry (Hodges 2012, 1-18; Sindbaek 2013). Medieval archaeology of Mediterranean trade has been slow to evolve. Arguably our understanding of the Adriatic Sea region is the most advanced, thanks to Sauro Gelichi and his ground-breaking research at Comacchio at the seaward mouth of the river Po (Gelichi 2007, 2010). A thin, largely historically determined narrative (unlike the North Sea) exists for much of the remainder of the Mediterranean Sea in this era. In essence, this means that our understanding rests upon the historical texts, which as I have shown in the case of the Adriatic Sea must be interpreted critically (Hodges 2016a, 2017).

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Fundamentally, the textual narrative of the Mediterranean has been reduced to two binary opposite views: on the one hand Fernand Braudel's thesis based upon the eternal trinity of a homogeneous Mediterranean characterized by wheat, olives and grapes (Braudel 1949, pp. 236, 441-445), and now Horden and Purcell's opposite view of extreme ecological variability based upon micro-regions that do not reliably provide subsistence to their populations but rather produce unpredictable scarcity and excess. According to Horden and Purcell, ecological uncertainty prompts constant redistribution and shifting patterns of exchange, a possibility facilitated by access to the sea (Horden, Purcell 2000, pp. 123-78). Seaports are the lynchpins of their Mediterranean interconnectivity. Horden and Purcell acknowledge (Horden, Purcell 2000, p. 367) there is no obvious way in their model to explain a relationship between localized exchange and long-distance trade except through the existence of ports. To mediate this issue critical for the immediate post-classical period, Cyprian Broodbank's (Broodbank 2013) admirable review of the prehistory of the Middle Sea offers important pointers. He argues for an understanding of the basin based upon riverine corridors which function in small-scale directed exchange between regions. Broodbank paints a picture of the Mediterranean before it became a cockpit of monotheistic world religions and the imposed gridiron of national identities and peoples (Broodbank 2013, p. 51). This reveals, he contends, a tapestry of traditions as opposed to – to cite Jack Davis – «a platter of simplistic models of culture history that has passed as common table fare in much popular archaeological prose» (Davis 2000, p. 90). Nuanced in the absence of individuals, as opposed to places, with connectivity taken for granted, it is a clarion call for any history of the Tyrrhenian Sea region between the 7th and 12th c.

Of this Mediterranean post-classical picture (in which the role of seaports is a major factor) Horden and Purcell wrote as follows: «And we are interpreted as portraying the (Henri) Pirenne period as 'only' a depression, as 'a slight dip', even though we explicitly characterize the period as one that makes audible the 'background noise' of Mediterranean connectivity when the 'strident commercial networks' are silenced. If we use 'depression' and 'abatement' in portraying the period, this should not be taken to mean that we treat such phenomena as mere blips. It means simply that – to change metaphor – our 'degree zero' of Mediterranean exchange is a little higher than that of most other students of the period…» (Horden, Purcell 2005, pp. 351-2).

What do Horden and Purcell mean exactly? Are they contending that seaports continued to exist in parts of the Mediterranean [as incidentally David Abulafia implies in his monumental *The Great Sea* (Abulafia 2010, pp. 246-257)]? Of course, seaports continued to exist on a much reduced scale around much of the Mediterranean during the 7th c and were never to disappear in the (Umayadd-Abbasid-Fatimid) eastern Mediterranean. This begs the question about Mediterranean connectivity between c. AD 700 and the rise of the great maritime cities of Pisa and Venice and the concomitant extension of East Mediterranean traders into the central Mediterranean documented by the Geniza archives (cf. Goldberg 2012). Specifically, as it affects this Tuscan coastal project did seaports simply disappear as active market places in the 7th to 9th-10th c and with them maritime trade?

Based upon my earlier archaeological research in southern Italy and in the Adriatic Sea region, I have contended that market-based urban communities and ports ceased to exist after c. AD 700 in most of Italy (cf. Hodges 2015). In a Tuscan context, therefore, Pisa between the 7th and 10th c should be interpreted as a small dendritic central-place, possibly no bigger than many periodic and seasonal landing-places (or Type A periodic emporia) in the North Sea regions at this time (cf. Hodges 2012, pp. 96-100). Similarly, I would contend, the ancient Etruscan and Roman sanctuary town of Populonia was reduced to little more than an elite household – an estate centre – of some kind by the 9th c (Gelichi 2017a). Further south, the small Roman cabotage port at the mouth of the Follonica lagoon known as *Portus Scabris* was also reduced to a miniscule level of maritime activity after the early 7th c. Looking beyond Tuscany, to make this point, Rome, in my view, was an exceptional polyfocal sanctuary, a solar central-place redolent with memory of its Mediterranean importance but serving only its own community before significant urban changes in the early to mid 9th c (cf. Hodges 2012, pp. 4-6; also pp. 23-25; p. 37 for a discussion of Carol A. Smith's anthropological definition; Id. 2015). The southern Tyrrhenian port of Naples, on present evidence, was similarly reduced to a modest settlement before for mid 9th c. Geographical and cultural diversity, function and size all matter in this new archaeological mapping of the Mediterranean.

This is not the place to compare and contrast sizes. My simple point is that our nEU-Med project has begun by grasping that the available archaeological evidence shows that a monolithic eternal (post-classical) Mediterranean is simply misleading. The Mediterranean after the Roman empire was as fragmented around networks as it was before classical antiquity. Our task, then, is to discover how our riverine corridor running from the Tyrrhenian Sea to the Colline Metallifere re-engaged with the Mediterranean after late antiquity without an obvious seaport – if it ever did before the rise of Pisan hegemony in the later 12th/13th c, and also what part, if any, did north European political intervention play in the evolution of this sub-region?

2. CONTEXTUALISING nEU-Med. REFLECTIONS ON THE ARCHAEOLOGY OF CENTRAL ITALY

Piecing together this regional picture of Italy between the 7th and 12th c merits a few observations as we embark upon the nEU-Med project. Site and landscape categories have been often obfuscated and sublimated to the textual narrative as the archaeology of post-classical Tuscany has lost its innocence. Like the archaeologies of many regions of post-classical Europe, a period in which the excavated and material remains have now been succeeded by a new period in which the history is increasingly defined in terms of a

Date	North Sea	Baltic Sea	Mediterranean Sea
c700	Types A & B emporia Long distance trade based on agrarian production	Emporia (A & B) Long distance trade based upon agrarian production	Emporia only in east Mediterranean Regional exchange based on trade partnerships
c800	Emporia based upon investment in agrarian secondary products & commodities	Emporia based upon prestige goods & secondary products & commodities	Emporia in east Mediterranean. Trade based upon partnerships enlarged by selective Carolingian interventions in Italy
c.850	Regional markets (first towns) based upon secondary products & commodities	Emporia based upon prestige goods & secondary products & commodities	Emporia in east Mediterranean. Introduction of secondary products & commodities
c1000	Inter-regional trade based upon ports as well as regional markets established	First towns replace emporia as inter-regional trade based on markets established	Towns and ports established in Italy based upon regional markets
c1025-50	Revival of European wide trade	Revival of European wide trade	Revival of Mediterranean & European wide trade
c1100-1200	Integrated European economy	Integrated European economy	Integrated European economy

tab. 1 – A schematic economic history of European seas: c700-c1200.

reflexive discourse between the texts and the archaeology (cf. Francovich, Hodges 2003). Each component part of this integrated history, however, is based upon limited chronological fixed-points and as a result many assumptions. Let me review these component parts by way of introduction to the nEU-Med project.

Economic context

Coins are virtually absent between the 7th and 11thc and rare before the 12thc (cf. Rovelli 2009). In essence, this was not a monetary economy in the sense that coinage formed an active element in Middle and Late Saxon England, the Frankish territories and southern Scandinavia. Indeed, the telling absence of hoards, in comparison with the Baltic Sea and Irish Sea regions suggests that ingots and other forms of moveable values were highly restricted, if not largely absent. This absence may well explain the limited material culture. Wheel-made pottery production continued after the 7thc, but on a small scale at highly localized kiln-sites (see Vaccaro 2011, pp. 168-231). It is tempting to compare later 7th-to mid-9th-century production levels to those in Middle Saxon England or the Merovingian territories but this needs to be confirmed by well-dated deposits. Put another way, the explosion of material culture that is evident from the second quarter of the 9thc in Italy – in ceramics, metalwork and church furniture bears witness to the mediated adoption of Carolingian cultural influences (from dining to agrarian practices) and, significantly, may be obfuscating the minimal scale of 8th to early 9thc materialism (Hodges 2016b). For example, 8thc Rome and the dated Benedictine monastery of San Vincenzo al Volturno show an emphasis upon monumental investment before a 9thc switch to materialism. Only the Po port of Comacchio reveals any emphasis upon material remains in the entire Italian peninsula in this period. From the mid 9thc until the turn of the millennium, as a result, there is increasing investment in the Italian landscape, gradually or episodically emulating the pre-800 agrarian circumstances of north-west Europe (Hodges 2012). By the later 10thc, with the rise of Arab influence in the Tyrrhenian Sea region and the steady revival of Byzantine interests (since the mid 9thc), Tuscany's ports swiftly took a new shape. The millennial beginnings of Medieval Mediterranean connectivity served equally to reinforce economic transalpine connections to the dramatically expanding Ottonian economy.

Ports, towns and trade

Long-distance trade in the central Mediterranean collapsed in the earlier half of the 7thc, following a half-century or so of steady, if episodic decline. Rome sustained some of its maritime connections into the early 8thc, but this should not be exaggerated. Other ports – Ravenna amongst them – suffered the same economic evisceration. Tuscany was no exception. The absence of coinage of any kind must surely be highly indicative of the limited scale of commerce and accordingly we must envisage early prehistoric levels of coastal trade until at least the mid 9thc. The study of the ceramics from *Portus Scabris* plainly confirms this picture. A few sherds of Early Medieval date were found in the salvage excavations implying small-scale coastal trade on occasions. There was no Type B emporium of the kind found at Comacchio at the mouth of the Po river and best known in their planned form in North-West Europe from the later 7thc onwards. Pisa, for example, was only re-established in the later 10thc and initially on a small scale as a Tyrrhenian emporium (Meo 2013). Quite what form Amalfi, Gaeta, Naples and Salerno took from the 9thc remains to be determined, but none of these certainly matched the immense scale of economic activity of North Sea emporia such as Dorestad or London, and their best parallel may be the more limited, though managed emporia in the western Baltic at Haithabu, Kaupang and Ribe. This, therefore, begs the question of so-called landing-places/Type A emporia – coastal embarkation sites occupied on an episodic, periodic or seasonal basis. The textual sources indicate the existence of Type A emporia as properties of aristocratic/royal/monastic households (cf. McCormick 2001, p. 420; Petralia 2005; Marazzi 2014). As no landing place has been excavated in Italy, it is a matter of hypothesis whether these were for occasional long-distance trade in certain products, or for specific operations such as the acquisition of sea-fish to serve monastic dietary culture (cf. Hodges forthcoming a).

Change came in the later 10thc. Metropolitan Palermo surely made a major impact upon Tyrrhenian Sea commerce after c. AD 900, but the economic revival is still difficult to define closely (Molinari 2015). The excavations at Butrint in the southern Adriatic Sea region provide a cornerstone for Byzantine investment in maritime trade and urban renewal. In the later 10thc the Byzantine coastal administrative centre

outside the old town was abandoned in favour of the town with renewed fortifications. Centralized investment followed by stages during the early 11th c, marking a key moment in the Empire's effort to reassert its political and mercantile authority in the central Mediterranean (Hodges 2016).

Rural settlement

Much has been written about Early Medieval Italian rural settlement, especially in Tuscany (cf. Francovich, Hodges 2003; Bianchi 2015a). Some essential facts are emerging. First, the early Middle Ages in Italy as in most parts of western Europe was characterized by severe demographic decline in the 6th to 7thc and gradual population growth thereafter, accelerating from the turn of the millennium onwards. The causes of the decline – civil unrest, economic, climate perturbations, plague – are the subject of continuing debate. Concurrent with this decline was the transformation of large tracts of the countryside into what Devroey colourfully described as a green ocean (Devroey 2003, pp. 28-32). Palynological studies are showing that this 'ocean' was rolled back by stages from the later 9th or 10thc onwards. Second, very little is known about the archaeology (as opposed to the art and architectural history) of elite or rural administrative settlements. A number of monasteries in Italy has been excavated which show a consistent pattern (cf. Gelichi 2017b; Gibson *et al.* 2017; Hodges, Leppard, Mitchell 2011). These were small nucleated settlements with minimal material culture before, in certain cases, with royal patronage they became proprietary monasteries, investing in monumental grandiosity in the late 8th or early 9thc. During the early to mid 9thc these settlements shifted strategy to invest in production, engaging donors in their support in order to expand their territorial footprints (cf. Hodges 2012, pp. 81-89). The 'intermezzo', as Joachim Henning called it, ended in the later 9thc, after which monasteries competed with secular forces (Henning 2007, p. 21).

Third, many peasant settlements have been investigated in Italy. The pattern of their post-classical evolution remains to be refined, but is generally clear. In Tuscany as in many parts of Italy there was a shift to hillside and hilltop settlements in the later 6th to 8thc, deserting low-lying ground. These new villages comprised simple post-built structures on terraces with few other associated structures. Village sizes were probably small, restricted to four to six dwellings before the mid 9thc. Although poorly dated by early iterations of carbon 14, it seems likely that the material culture comprised small amounts of ceramics including portable ovens and minimal quantities of iron or other commodities. This model has now been mediated by the discovery of small, single dwellings in western Tuscany (cf. Vaccaro 2011, pp. 168-231; Id. 2015, pp. 223, 225). Change occurred in the mid to later 9thc as Giovanna Bianchi (Bianchi 2015a) has demonstrated in western Tuscany, for example, often with the creation of village fortifications, the frequent insertion of seigneurial dwellings, the presence of silos (storage pits) and granaries for storage and the gradual presence of more commodities (Bianchi, Grassi 2012). Dating this transformation of village life merits more precision using carbon 14 samples as coins are absent. Nonetheless, it is evident that at some point after the mid to later 9thc the management of agrarian production altered significantly. Eighth-century villages like Miranduolo (Valenti 2008) and Montarrenti (Cantini 2003), as best can be defined, practised a primitive subsistence economy which was overhauled in the 9thc with the probable introduction of crop rotation for cerealization that had been a driving force on Carolingian estates, and a concomitant secondary products revolution (Hodges forthcoming b). This agrarian reform, possibly taking its elemental form from the late 8thc Carolingian reforms (the '*correctio*') (Hodges 2012, pp. 131-36), clearly pre-dated the text-based phase of *incastellamento* of the period c. 925-1000 when many Italian village communities were granted leasehold rights. The texts appear often to confirm pre-existing settlements in legal language as the productive capacity of the villages had become sustainable. Villages then evolved by stages over the following two centuries, with hierarchies of settlements bound increasingly to elite estates yet with peasant households able to construct fine dwellings and amenities by the 12thc.

3. CASE STUDY: THE SIENA PROJECT IN THE MAREMMA (*fig.* 1)

The Siena University archaeological project in the Maremma needs no introduction thanks to the many publications of Riccardo Francovich and Giovanna Bianchi as well as their students. The nEU-Med project (2015-20) builds upon past research and brings together a combination of new research by archaeologists, environmentalists, metallurgists and historians to focus upon this 20 km. long corridor between the metal-bearing Colline Metallifere behind the 11th-century commune of Massa Marittima and the Tyrrhenian Sea at *Portus Scabris*. This sub-region is characterized by primary resources, such as woodlands, pasture, lagoon and coastal salt-works, and in addition is noted for the presence of metal-bearing deposits rich in mixed sulphides that can be mined for silver and was indeed used for minting coins by the late 12thc in the principal town of this sub-region, Massa Marittima.

The nEU-Med projects comprises three inter-connected investigations:

– The environmental history of the Pecora and the Cornia valleys and associated sites
– Three excavations – primarily, Vetricella, close to the line of the ancient Via Aurelia, Carlappiano – a (salt-working) site on the coast, and the deserted medieval mining village of Cugnano in the Colline Metallifere. In addition, a study has been made of the *Portus Scabris* ceramics found in underwater salvage excavations.
– The metallurgy of silver coins from northern Italy (principally Tuscany) between the 9th and 12thc to determine the source of their silver.

In 2016 we undertook two months of extensive excavations at Vetricella following earlier small-scale trenching which was previously considered to be a proto-castle (cf. Marasco 2009, 2013).

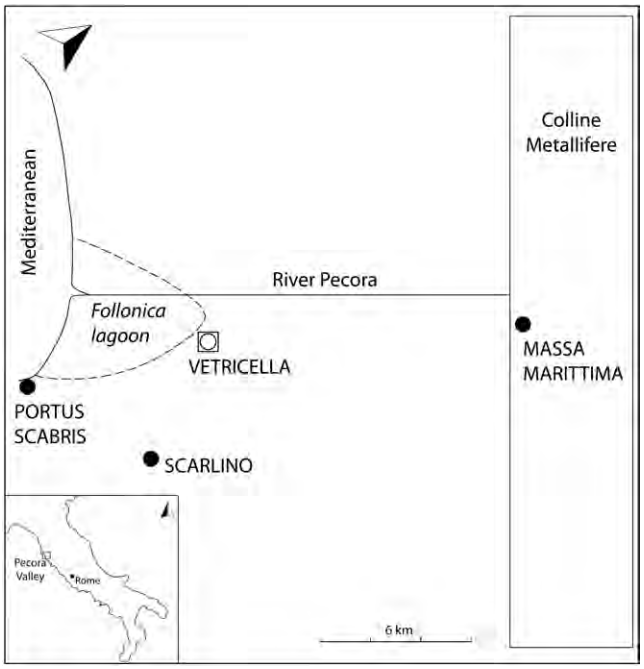

fig. 1 – A schematic plan showing the location of the nEU-Med research are, the riverine corridor of the Percora and the principal sites mentioned.

The new excavations (2016) show that Vetricella had (at least) four major periods and many minor periods of activity. The preliminary interpretation of these periods is as follows:

– A Lombard and perhaps an early Carolingian period coastal site.
– A central tower enclosed by three compass-created concentric triple ditches dating to the late 9th and 10thc.
– A 10th-century stone tower but no longer surrounded by ditches. Cemetery and iron forges were established.
– Early 11thc: small timber structures. Was the tower still in use or demolished? Cemetery and forges still being used.

This volume reviews preliminary reports on each of these new archaeological and environmental initiatives.

The new evidence raises a number of questions which will prompt further investigations over the next three years. These can be summarized as follows:

1. Environmental research shows that the Pecora valley experienced a significant transformation between the later 9th and 11thc. The river was probably canalized in this period and concurrently new crops including chestnuts and olives were introduced. These changes appear to have begun with the creation of an elite or administrative site at Vetricella, lying between the line of the Via Aurelia and the inner, east site of the Follonica lagoon.

2. The settlement pattern experienced several iterations between the 7th and 12thc (*fig.* 2). First, *Portus Scabris* appears to have largely vanished as a cabotage port during the 7thc. Second, it appears likely that Vetricella was established as a small 'landing-place', but its purposes are yet to be defined. The absence of globular amphorae and other imported goods are noteworthy. Third, later in the 9thc (defined by carbon 14 dates) Vetricella became an elite administrative

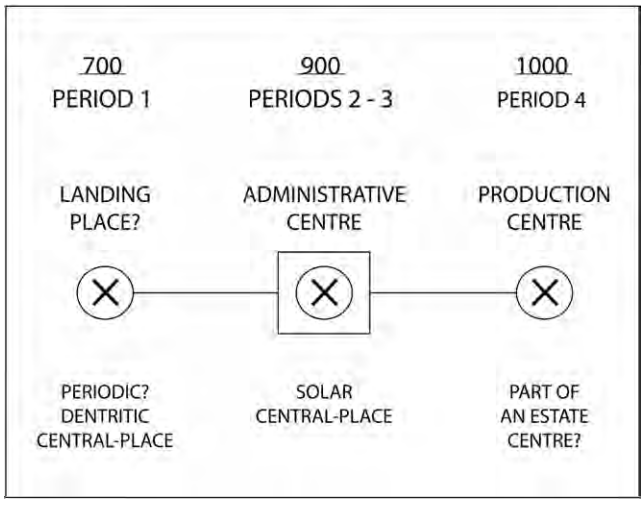

fig. 2 – A model proposing the changing functions of the site of Vetricella.

site with an unusual and distinctive architectural form. The apparent absence of associated buildings, such as accommodation for a retinue, workshops, a church, as was found in the contemporary Byzantine lagoon-side regional administrative centre at Butrint (Greenslade, Hodges 2013), suggests its purposes were more limited. Its likeliest purpose was to administer, at a transport nexus, metal productive and processing activities in the immediate area, although it cannot be ruled out that it was a toll station of some kind (cf. Middleton 2005). The subsequent architectural transformation of the administrative site with the associated presence of numerous coins is intriguing. The material culture, exceptionally rich as it is, offers almost no hint of any Mediterranean connection. Globular amphorae and *pietra ollare* are absent, for example. Indeed, given the proximity of the Tyrrhenian Sea, imported finds are notably few. The first forges appear to have been established on the north side of the site in this period, while on the south side a cemetery was created, possibly close to a small mausoleum. The forges are presumed to have produced the voluminous amount of metalwork (knives, horse-gear, tools, locks, etc) found during the excavations. Fourth, Vetricella in the early 11thc, with the revival of Mediterranean maritime trade, the rise of Pisan sea-power, the expansion of urban functions in neighbouring Massa Marittima and increasing village productivity, took a new form which lasted for a generation or possibly two. It is not yet clear whether the earlier administrative buildings were demolished or removed and replaced by undistinguished post-built structures. The forges and cemetery continued to be in use. The shift from a limited administrative central-place to a production site needs to be explained. It is equally unclear how this relates to evolution of neighbouring hilltop villages like Scarlino (Marasco 2008). By the mid 11thc, a place now three to four hundred years old was abandoned.

3. The metallurgical study of the coinage has finger-printed several difference sources for the silver used in northern Italy's early medieval silver coins, including Harz Mountain sources, but none appear to have been using Colline Metallifere silver.

4. AIMS FOR nEU-Med

Over the next three years the opportunities provided by these important discoveries should be the platform for much more detailed research. Some aims, however, are already evident:

1. The chronology of excavated sites in this region needs refining based upon c14 dates. Multiple carbon 14 dates from single contexts with a Bayesian statistical analysis are now needed.
2. The Roman impact on this region needs to be reviewed. Was there an imperial estate occupying this area, as some have suggested? If so, what was its history? What were the topographic relationships between *Portus Scabris*, the main Roman port and the Via Aurelia?
3. Vetricella begs many questions. Establishing its stratigraphical and structural history is extremely important to the nEU-Med project, as well as its changing sub-regional contexts. Several historical questions can then be asked. What were its functions? Was it a 'landing place' and if so, controlled by whom? Was it an administrative centre managing metal-processing or tolls or no more than an unusual transit site? How is its unusual architectural rhetoric in period 2 to be explained? What was its relationship to the Mediterranean and how can its connections to the Colline Metallifere be demonstrated? Only stratigraphic excavations with precise dates will answer these questions. Once defined, careful textual analysis will be required to situate this place in a larger historical narrative.
4. Plainly more information is needed about the mining practices of the Colline Metallifere villages, and equally distinctive trace elements of the minerals acquired there must now be defined.
5. On a larger scale, there remains an intriguing range of questions to be asked about extra-regional forces – either from northern Europe or from the Mediterranean. These questions call for more understanding of data acquired over the past decades at key centres like Lucca and Pisa, as well as of the pattern of coins and hoards from all areas – including Corsica and Sardinia – around the Tyrrhenian Sea.

What remains clear after the first two years of this project is the scope for reviewing major narrative themes in Mediterranean history using multi-disciplinary archaeological and environmental means. While cautioning ourselves that much of the micro-histories about the rise of lordship in this region is about to be re-appraised, nonetheless, if we can finally identify precise chronologies the project will not only provide a window on the Mediterranean and the Tyrrhenian Sea, in particular, but also substantially do justice to Riccardo Francovich's vision of rewriting the early history of Tuscany.

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Abstract

This article offers an introduction to the nEU-Med project, situating it within the context of the archaeology of Early Medieval Italy. It provides a model for the changing function of the sites in the Pecora and Cornia valleys between the 7th and 12thc, following the first season of field research in 2015-16.

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CHANGING LANDSCAPES IN THE COLLINE METALLIFERE (SOUTHERN TUSCANY, ITALY): EARLY MEDIEVAL PALAEOHYDROLOGY AND LAND MANAGEMENT ALONG THE PECORA RIVER VALLEY

1. INTRODUCTION

One of the most important aspects of geoarchaeological research is the modelling of the landscape evolution in the past (Van Andel 1994; French 2003). Landscape changes are investigated coupling the paleoenvironmental signal coming from geological records such as sediments and soils, and the biological signal coming from the proxies found within the geological record itself. Finally, stratigraphy and geochronology provide the sequence of events which occurred both before, during and/or after the settlements.

Therefore, sedimentology, stratigraphy, geomorphology and palaeopedology are the main branches of earth science that provide sets of information about palaeoenvironmental settings and their evolution through time and space.

This kind of analysis area is a useful archaeological tool as well, providing the information needed for a more extensive geoarchaeological approach at the regional and site level. In fact, archaeological observations are usually limited to a site environmental approach with little regard to meso- and macro-scale landscape dynamics (French 2003; Rapp, Hill 2006; Goldberg, Macphail 2006).

In this context, river valleys have strongly influenced the strategies of the populations for exploitation of the inland slopes and valley floors, the latter being a natural migration, commercial and communication paths or due to factors such as the availability of water, favourable topography, presence of "soft" soils and suitable areas for settlements and productive activities.

The Pecora river offers a unique chance to reconstruct the fluvial landscape before and during the Early Middle Ages in this Mediterranean area and to evaluate the influence of human impact on the environment of the river basin due to its proximity to the medieval archaeological site of Vetricella (Marasco *et al.* this volume). The importance of this area is also marked by the presence of fiscal and public estates from the mid-9thc AD network of earlier settlements (Hodges, Bianchi; Collavini in this volume). A new environment became suitable for productive large kernelled crops as well as fruit tree growing, serving the landlords' will to achieve the highest production of any possible lands and to optimize surpluses from their estates (Buonincontri *et al.* 2015, 2017).

Thus, the main objective of this work is the reconstruction of the changes which occurred to the alluvial environments and dynamics, including channel patterns, at the scale of the river basin. As explained further on in this work, the investigations carried out in the distal reach provide strong constraints for the evaluation of the changing dynamics in the mid- and upper reaches of the Percora valley. Therefore, unravelling the changes in the landscape and river dynamics at such macro-scale, that is the whole valley system, provides information about the effects of and relationships between human behaviour (land use) and environment.

2. STUDY AREA AND ENVIRONMENTAL BACKGROUND

2.1 Geological and Geomorphological background

The Pecora river basin extends between the towns of Follonica to the SW and Massa Marittima to the NE with a catchment of about 250 km² (*fig.* 1). The bedrock of the basin is mainly made of Cretaceous marine shales and limestones belonging to the Ligurian lithostructural Units ("Argille a Palombini Fm.", Ispra 2002) that rest uncomfortably on the massive Triassic limestones belonging to the Tuscan lithostructural Units ("Calcare Cavernoso Fm.", Ispra 2002). The unconformity is related to the eastward migration of compressional tectonic movements until the Early Miocene. At the end of the Miocene the area underwent a vertical uplift and the onset of continental conditions are testified in the area by the presence of thick alluvial fan conglomerates of the Messinian age ("Conglomerati di Monte Bamboli Fm", Ispra 2002). Marine transgression occurred during the Pliocene, although in the Pecora basin the associated sediments ("Argille Azzurre Fm.", Ispra 2002) are not present due to erosion.

The area is known also as part of "Colline Metallifere", a mining district exploited in the last three thousand years (Lattanzi *et al.* 1994 and ref. therein) for ore deposits of pyrite, Fe, Cu-Pb-Zn, Ag, Sb, Hg, Sn and Au. Their occurrence is related to hydrothermal fluids circulating along extensional faults that affect the bedrock following the emplacement of Plio-Quaternary magmatic bodies (Benvenuti *et al.* 2009).

The definitive emersion of the area is recorded during the Quaternary period with the deposition of a complex of continental Unconformity Bounded Stratigraphic Units including

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alluvial fan, fluvial and Calcareous Tufaterraces and barrages (Benvenuti *et al.* 2009). The present-day hilly landscape is mainly controlled by selective erosion and fluvial dynamics with formations of steeper slopes on the harder pre-Miocene and Miocene bedrock and wide, flat alluvial and Calcareous Tufa terraces along the valleys. Moreover, karst processes deeply influenced landscape evolution as indicated by the presence of wide coalescent doline depressions, karst springs (i.e. "Le Venelle" and "Aronne", *fig.* 1) and related depositional environments. The evolution of the present-day drainage network is controlled by tectonic uplift coupled with Quaternary climatic changes through alternating phases of fluvial incision and aggradation, river captures and terrigenous and carbonate deposition (Benvenuti *et al.* 2009). The historical and present-day slope and river dynamics are mainly controlled by land use and hydraulic regulations (*fig.* 1). In this paper we focus on the early medieval fluvial landscape evolution including continental carbonatic depositional environments. The latter is characterised by Calcareous Tufa (CT from now on) sediments characterized by physio-chemical and microbiological carbonate precipitation by fluvial and spring-fed fresh and cool water carbonates, generally restricted to localized karstic areas (Ford, Pedley 1996; Pedley 2009; Capezzuoli *et al.* 2014). The typical landscape associated with the deposition of CT is formed by terraced flat palustrine environments bound by barrages and waterfalls. Such landscapes were widely present along the Pecora and the Le Venelle-Ferriere tributary (*fig.* 1). CT deposition is usually associated with the presence of carbonate-rich waters and humid and warm phases since CO_2, necessary for $CaCo_3$ dissolution and precipitation, is normally enriched under forest cover and the associated soils. However, human activity, namely deforestation, agricultural practices and drainage regulations, is the main factor that triggers their depositional decline in proto-historical and historical times (Goudie *et al.* 1993).

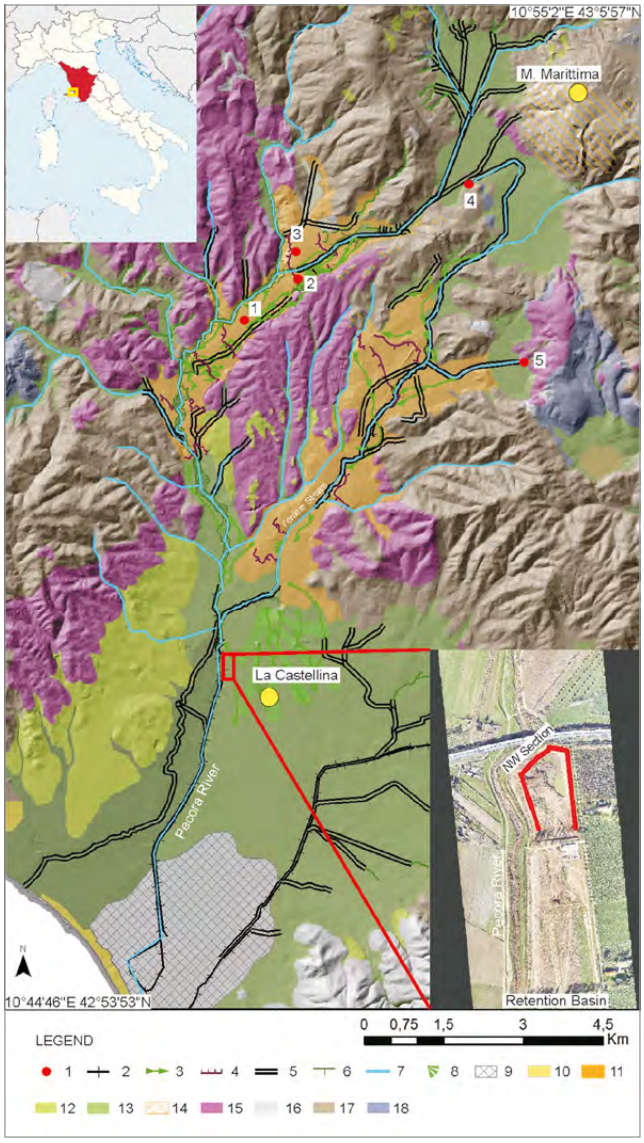

fig. 1 – Geological and geomorphological sketch of the studied area. Legend: 1) Localities cited in the text (1-Pian del Padule; 2-Padule del Moreta; 3-La Cascata; 4-Le Venelle Spring; 5-Aronne Spring); 2) Artificial levees; 3) Pecora river palaeochannels; 4) CT barrage; 5) Artificial channles; 6) Fluvial scarps; 7) Pecora and Le Venelle-Ferriere rivers and major tributaries; 8) Alluvia fan; 9) Lagoonal deposit reclaimed after1950; 10) Beach deposit (Holocene); 11) CT (Holocene); 12) Unactive alluvial deposit (Late Pleistocene-Holocene); 13) Active alluvial deposit (Late Pleistocene-Holocene); 14) CT (Late Pleistocene); 15) Polygenic conglomerates (Messinian); 16) Macigno Fm (Upper Oligocene – Lower Miocene); 17) Argille a Palombini Fm (Upper Cretaceous – Paleocene); 18) Calcare Cavernoso Fm (Upper Triassic).

2.2 Climate and vegetation

According to the weather station of Follonica (4.34 m a.s.l., UTM 643775 E, 4753770 N, data source http://www.sir.toscana.it/), the area is characterised by a Mediterranean climate, with an average minimum temperature of 3.1°C during the coldest month (25 years observations) and an average annual precipitation of 592 mm (observed over 80 years). Arable crops, vineyards and olive groves are present in the flat valley floors and/or on the gentler slopes. The evergreen sclerophyllous forest, dominated by *Quercus ilex* L. with *Arbutus unedo* L., prevails on the steeper slopes of the Pecora river basin. Small stands of deciduous broadleaved species, such as *Q. cerris* L., *Q. pubescens* Willd., and *Fraxinus ornus* L. are sparse, whereas the deciduous oak forest, dominated by *Q. cerris* L., is located only on the cooler north-western slopes of the basin.

3. MATERIALS AND TOOLS

3.1 Sedimentology and Geomorphology

The investigations have been mainly carried out in a retention basin excavated ca. 500 m to the NW of the Vetricella site (*fig.* 1) on the hydrographic left of the Pecora river. The retention basin is c. 400 m long parallel and c. 100 m wide perpendicular to the Pecora river. The works started in 2015 and ended in 2016. During the excavations our research group was granted special access to these sections thanks to the kind collaboration of the "Consorzio di Bonifica 5 Toscana Coste" and the "Soprintendenza Archeologia, Belle Arti e Paesaggio per le Province di Siena, Grosseto e Arezzo". The excavations allowed the observation of a sedimentary section, around 8 m thick, cutting the alluvial terrace on top of which is located the Vetricella site (Section E, *fig.* 1) and c. 3 m thick sequence perpendicular to the river flow direction (Sections

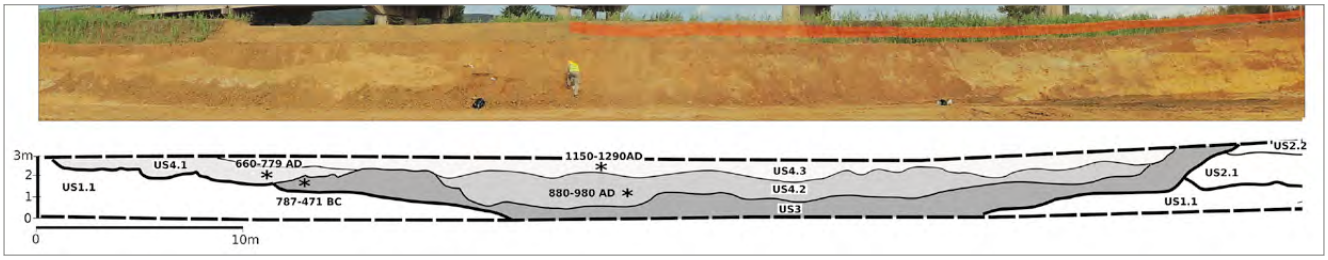

fig. 2 – The NW section studied within the retention basin (for location see *fig.* 1). The US numbering follows the description in the text whereas the asterisks indicates the radiocarbon dates on charcoal samples.

NW, *figg.* 1 and 2). The outcropping sequence was analysed in the field, drawing the sedimentological characteristics in terms of facies analysis following the method proposed by Miall (1996). Samples of sediments were taken for routine analysis whereas charcoals were sampled both for radiometric dating and anthracological analysis. Facies analysis allows the reconstruction of the depositional environment starting from the sedimentological characteristics (grain size, composition, shape of clasts, internal geometry and fabric) or lithofacies that indicate the flow dynamics; lithofacies are in turn grouped into associations or architectural elements that correspond to the characters of the internal depositional environments. Finally, the associations of architectural elements and the presence of bounding surfaces allow the definition of fluvial models or styles that correspond to the river dynamics and associated landscape.

To establish the relationships of the observed sedimentary characteristics within the valley, further investigations have been carried out along the thalweg. In the studied area the River Pecora is confined downflow within artificial levees and the river is hanging on the floodplain; this prevents the observation of the sediments. Upflow, the thalweg is downcut within the floodplain sediments allowing the description of further sedimentary sections. The analysis was also coupled with geomorphological investigations along the Pecora basin; these have been carried out in the field and in the laboratory by remote analysis of colour and black and white multitemporal aerial photos, spanning from 1954 to 2016. Moreover, the imagery was integrated with a highly detailed Digital Terrain Model derived by LiDAR and 10 m DTM. All the remote images and topographic models are available from the Regione Toscana Environmental Agency (http://www.regione.toscana.it/web/geoblog/-/open-geodata).

The geomorphological mapping was carried out following the guidelines of the Italian National Geological Survey for the 1:50,000 scale geomorphological maps of Italy (Ispra-Apat, 1994). Punctual, linear, polygonal landforms and related deposits are classified according to the prevalent geomorphic process (i.e. superficial running water, gravity, karst, anthropic etc.). The field and remote maps have now been digitalized in the ArcGIS© environment and the features classified within a geodatabase structured following the adopted legend.

3.2 Charcoal

The abundance of charcoal within the sediments is the result of the incomplete combustion of plant vegetation (Forbes *et al.* 2006). Usually, it is difficult to establish the source and the formation processes leading to the creation of the charcoal assemblage. The main source is generally forest fires naturally ignited or fired by humans in relation to anthropogenic activities (Pyne, Goldammer 1997; Moore 2000). The possible provenance of charcoals from nearby human-related contexts, such as archaeological sites or charcoal kilns, must also be taken into account when interpreting the charcoal record. Furthermore, in cases of forest fires, topographic conditions can influence the dispersion and deposition of charcoal during and after afire (Clark 1988; Thinon 1992; Scott *et al.* 2000).

In the case of Pecora river, bedforms were characterised by the abundance of very fine to very coarse charcoal. In the Section NW, 23 sediment samples were collected at different levels, ranging from 500 to 2390 ml of volume. The samples were firstly air-dried and weighed, and successively wet-sieved through two sieves with 1 and 0.4 mm mesh-size. Charcoal concentration and taxonomical identification were preliminarily performed for charcoal remains larger than 1 mm. Smaller charcoal fragments were excluded since they are usually not suitable for taxonomical identification and cannot provide information on past forest composition (Robin *et al.* 2014). Charcoal concentration is expressed as specific anthracomass (SA) in milligrams of charcoal per kilogram of dried sediment (Talon 2010). Specific anthracomass is calculated per sample layer (SAL).

Taxonomical identification was carried out with an incident light microscope at a 100×, 200× and 500× magnification and supported with wood anatomy atlases (Abbate Edlmann, De Luca, Lazzeri 1994; Schweingruber 1990; Vernet *et al.* 2001) and the reference collection at the Dipartimento di Agraria, Università di Napoli "Federico II". Charcoal fragments were identified at the species or genus level for the most part, thanks to their good preservation, whilst for only a few poorly preserved fragments (bad preservation or vitrification) the identification was possible at a family level, or no identification was possible at all.

4. DATA

4.1 Sedimentology and Facies analysis

The retention basins allowed the observation of 4 sections and the presence of 4 well distinguishable Stratigraphic Units (US) separated by important sedimentary unconformities (*fig.* 3).

Here, we mainly describe and discuss the palaeochannel, c. 50 m wide and 3 m deep, observed along a section (NW

section) perpendicular to the Pecora flow direction excavated within a retention basin (*figg.* 1-2). The section is located in the distal reach of the Pecorariver where the thalweg is regulated by artificial levees and the landscape opens into a wide flat floodplain. The current geomorphological setting is the result of the reclamation of the wide lagoonal and swampy system that characterised the area at least until the beginning of the 19thc, as is also indicated by the Maps of the CatastoLeopoldino available for the area (http://www502.regione.toscana.it/castoreapp/). Up valley the watercourse is not regulated and becomes suddenly incised within the floodplain. The incision increases up to 10 m in the upper reach where the CT characterises the landscape with wide flat terraces alternated with barrages.

4.1.1 *US1*

US1 is made of massive to laminated, bioturbated, horizontally bedded greyish clays (Fm, Fl; Miall 1995), with rare sandy-silty lenses and blankets (Sm, Sh; Miall 1995). Rare vegetal fragments (woods, leaves) and charcoals are present. The overall sedimentary characteristics are typical of a very low-energy lagoonal environment, perennially flooded as indicated by the lack of any pedogenetical evidence.

A clear erosional unconformity cuts US1 on top. The unconformity is undulated and corresponds to a channel system more than 8 m deep that shows a planar geometry parallel to the river flow. This unconformity is buried under US2 (*figg.* 2-3).

4.1.2 *US2*

US2 is separated by a minor unconformity and characterised by different facies associations (US2.1 and US2.2). US2.1 is made of trough and planar cross-bedded, or massive sands and silts (Sp, St, Sh, Sm) with very rare polygenic fine gravels and very thin muddy lenses (Fm). The gravels represent the lithologies of the Ligurian and Tuscan Units outcropping in the catchment area. The facies association, mainly made of downstream accretion and sandy bedforms with minor floodplain architectural elements, are typical of a deep sand-bed braided river.

A minor unconformity is in turn buried under US2.2 sediments. They are packed, fine to coarse-grained, subrounded to rounded trough cross-bedded or massive, poorly sorted gravels (Gt, Gh, Gm) with abundant sandymatrix. The gravels are polygenic and represent all the Ligurian and Tuscan Units present in the drainage basin. The architectural elements made of gravelly bedforms indicate massive sedimentation within a multi-storey channel typical of a shallow gravel-bed braided river (Miall 1995). US2.2 constitutes the uppermost part of the alluvial terrace whose top surface is at a maximum elevation of about 5 m above the present-day thalweg and floodplain and gently sloping to the south,where the site of Vetricella is located. US2.2 is also weathered on top by a polycyclic, reddish, strongly leached argillic soil (Alfisol, Usda 2015, fig. 4).

4.1.3 *US3*

On the N section a ca. 4 m deep channel cuts both US2 and US1. This channel is filled by US3 sediments and, in turn, is cut by a further weakly undulated and shallower channel filled by US 4 sediments (*figg.* 2-3).

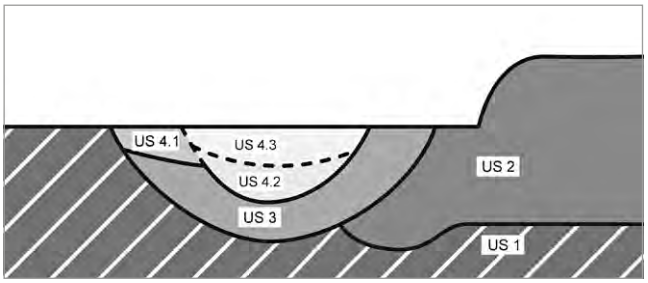

fig. 3 – The US observed within the retention basin and described in the text. Bold lines are the main unconformities, dotted lines represent the minor unconformities.

US3 is made of loose planar cross-bedded, poorly sorted, rounded to subrounded fine to coarse-grained gravels (Gp), variable amount of sandy matrix. Minor planar or low angle cross-bedded sands (Sp) and lenses and blanquets of massive to finely laminated silts and clays (Fm, Fl) are also present. The composition of the gravels also include rare clasts of CT and rare charcoal fragments. The facies association is typical of a gravel-sand wandering to meandering river (Miall 1995) with a westward lateral accretion of gravelly and sandy bars and filling of abandoned channels.

4.1.4 *US4*

US4 is composed of loose, unsorted, trough crossbedded to massive, fine to medium-grained, rounded to subrounded gravels (Gt, Gh), locally matrix supported (Gsm). Minor trough cross-bedded or massive sands (St, Sh) and lenses and blanquets of massive to finely laminated silts and clays (Fm, Fl) are also present. The gravels are made of very abundant clasts of CT, locally, filling entirely smaller channels. The bedforms are also characterised by the presence of very abundant fine to very coarse charcoals, both scattered within the sediments or concentrated along the base of the beds. The faciesassociation, made of fine gravelly and sandy downstream accretion and mass flows bedforms with minor floodplain sediments are typical of a distal shallow gravel/sand-bed braided river environment. The same sediments filling smaller channels have also been observed a few tens of metres downflowalternated to laminated clays and silts, weakly weathered by palaeosols with root tracks (*fig.* 4) typical of shallow swampy or lagoonal environment.

Although the sedimentary characteristics of US4 are homogeneous, a further subdivision has been made on the base of the presence of minor unconformities: US4.1 is observed in the western part of the section that buries a shallow and almost flat unconformity that cuts both the US1 and the US3 sediments. US4.2, towards the east, fills a deeper channel cutting entirely into the US3 sediments. US4.2 also represents the thicker sub-unit suggesting that this is the most important depositional phase. Finally, both US4.1 and US4.2 are cut by a further very shallow and slightly undulated unconformity buried under US4.3 sediments.

4.2 Chronology

The whole palaeochannel filled with US3 and US4 sediments is the last sedimentary event recorded in the succession investigated in the retention basin. For this reason,

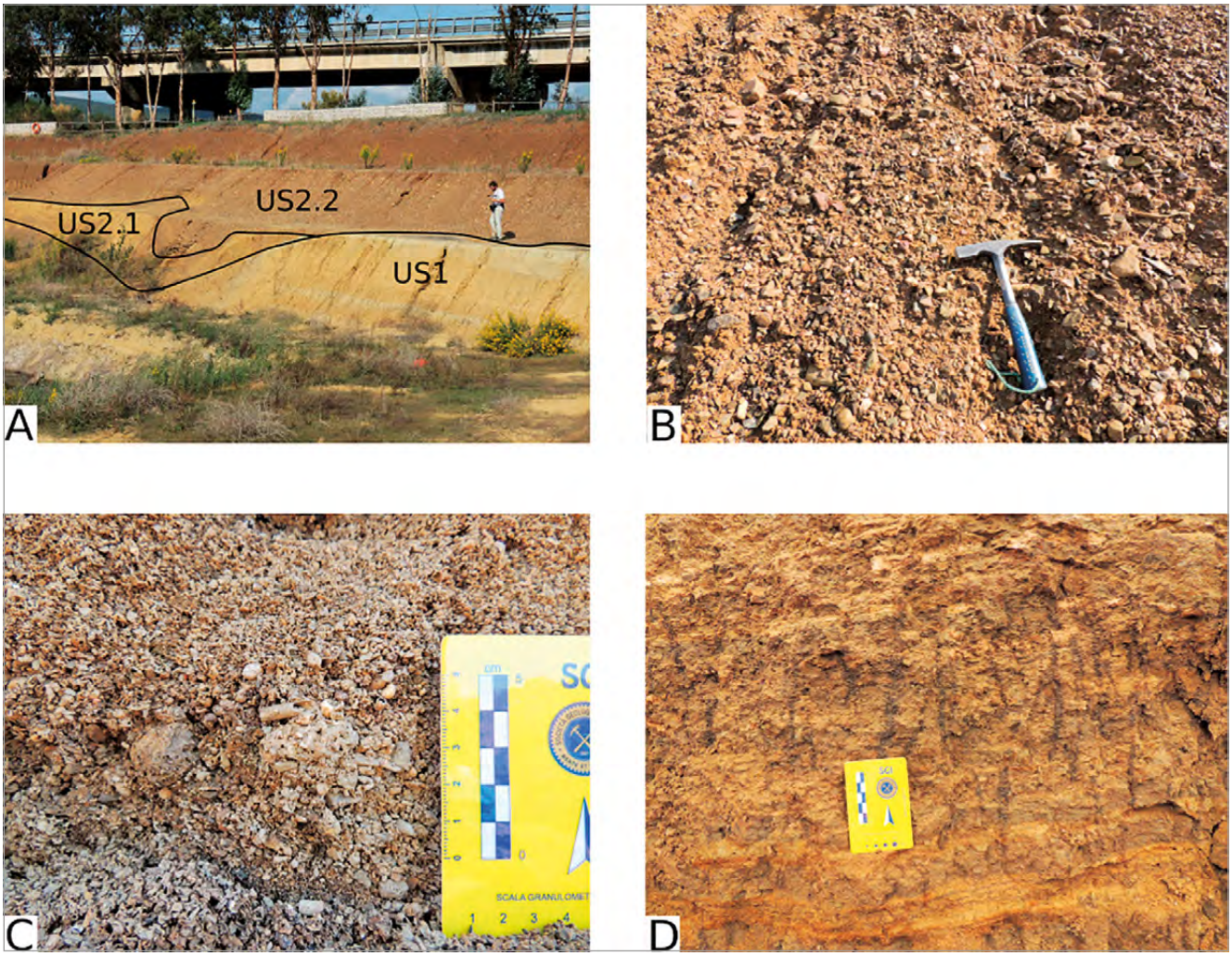

fig. 4 – A) The unconformity affecting the basal US1 sediments filled by US2 sediments subdivided into two minor sub-units. US2.2 is weathered by a reddish palaeosol on top. B) Angular, unsorted, polygenic gravels of the US2.2 unit. C) The almost monogenic composition of the US4 gravels and sands made of clasts coming from the erosion of the CT. D) Root tracks and weakly developed palaeosols affecting the shallow swampy or lagoonal deposits entered by the US4 sediments.

it has been investigated also to assess its chronology and the sedimentary changes observed. This was made through radiocarbon dating of the abundant charcoals found mixed with the sediments. Preliminary results (*fig.* 2; *tab.* 1) show that the US3 sediments were left at least until 787-471 CAL age BC (Sample Fi3497) whereas the filling of the upper palaeochannels (US4) can be dated between 660-779 CAL age AD (US4.1, Sample Fi3554) and 1150-1290 AD (US4.3, Sample Fi3451).

4.3 Sediment charcoal analysis

Sediment charcoal analysis was preliminarily carried on 14.5 litres of sediment from 13 samples, with ca. 19.4 g of extracted charcoal. The samples were collected from US4, characterised by braided shallow channel (sub-units US4.3 and US4.2) and braided sheet channel (sub-units US4.1; Table 1). The sample 1.3 collected in US4.1 was found to be sterile.

To assess the taxonomical information, 191 charcoal fragments were preliminarily analysed allowing the identification of 17 taxa. The results of the taxonomical identification, together with the SAL and the radiocarbon dating, are presented for each sample in the diagram (*fig.* 5). The main identified taxa useful to reconstruct the forest types, such as *Alnus*, *Erica*, *F.* cf. *oxycarpa*, *F.* cf. *ornus*, *Q.* cf. *cerris*, *Q.* cf. *ilex*, *Salix*, and *Ulmus* are presented in detail, whilst other identified broadleaved deciduous taxa (*Fraxinus*, Maloideae, Monocotyledon, *Prunus*, and *Quercus*) are grouped under the definition "Other broadleaves". Calculations and percentages are based on the charcoal frequencies (number of identified charcoal remains per sample). To better highlight the vegetation changes in the record, key taxa have been grouped based on their ecological significance.

Among the identified taxa, deciduous broadleaved trees prevail on the total of the charcoal remains. *Ulmus* is the most attested (23%), followed by *Alnus* (7.3%), *F.* cf. *oxycarpa* (6.8%), *Q.* cf. *cerris* (5.8%), *Salix* and *F.* cf. *ornus* (3.7%). Among sclerophyllous evergreen taxa, *Erica* (4.7%) and *Q.* cf. *ilex* (2.1%) are attested. Other broadleaves constitute 25.7% of the total. Unidentifiable charcoals (because of bad preservation status or vitrification) constitute 13.1% of the total.

5. DISCUSSION

Paleoenvironmental reconstruction of fluvial landscapes along the Pecora river valley was made possible by an integrated sedimentological, geomorphological, stratigraphical, geochronological and charcoal analysis. In particular, the sections opened in the retention basin along the distal reach of the Pecora river allowed a detailed modelling of the sedimentary history along the valley and its relationships with the changing environment in the upper reach of the drainage basin.

The older depositional environment (US1) is characterised by clayey sediments deposited within a stable palustrine/lagoon environment with no evidence of palaeosols or arrival of coarse-grained sediments. Such an environment can be related to a marine high-stand during periods of warm and wet climatic conditions, possibly associated with the Last Interglacial (Coltorti, Pieruccini 2006). US1 is abruptly cut by a major unconformity buried under US2 sediments. They are coarse-grained gravels and sands deposited in a high-energy fluvial environment typical of deep and shallow gravel and sand-bed braided rivers (Miall 1995). These sediments form an alluvial fan whose top surface is gently sloping to the south. US2 indicates an environmental change with an increase in gravelly bedload and the formation of a braidplain. This environment is associated with a wide alluvial fan filling the earlier lagoon. This phase can be linked to the onset of cool and arid climatic conditions typical of the cooler stages of the Last Glaciation that enhanced the production of debris from denudated slopes driving the sedimentary aggradation of the valley floors. The c. 120 m sea level fall due to the cool climatic conditions shifted the coastline to the south. The climatic amelioration at the beginning of the Holocene, due to the abrupt bedload decrease together with the rapid sea-level rise, enhanced the capacity of the river system to downcut the valley floors (Coltorti, Pieruccini 2006). Therefore, the previous alluvial fan forms an alluvial terrace where the Vetricella site is located, that in its apical part is c. 10 m high on the present-day thalweg.

A single channel, up to 3 m deep, cuts both the US1 and US2 and is filled by US3 sediments. These are gravels and sands with facies associations typical of a gravel-sand wandering to meandering river with the formation of point-bars and swamps along the valley floor following meander-cuts. The gravels, finer-grained than US2, are made of lithologies belonging to the bedrock of the basin and by scarce clasts deriving from the erosion of CT. This composition suggests that the CTsystems, present in the mid- and upper reaches of the Pecora and Le Venelle-Ferriere rivers (*fig.* 1), were already in formation although not strongly eroded by fluvial dynamics. US3 sediments also commonly contain charcoals that allowed the dating of this sedimentary phaseat least up to 787-471 BC Cal Age (Sample FI 3497) and possibly up to the Roman age. The presence of burnt vegetation also suggests the onset of land use practices related to fuel production or land clearing and vegetation opening.

US3 is cut by a further unconformity represented by a composite channel buried under c. 2.5 m of US4 sediments that can be subdivided into 3 main subunits bounded by minor unconformities (*figg.* 2-3). US4 sediments are characterised by unsorted fine-grained gravels, coarse-grained sands and silts deposited within shallow and small channels with cut-and-fill geometries that indicate an abrupt change from a sinuous wandering river to a shallow braided river testifying toan increase of bedload and fast deposition in a less confined channel system. The most striking feature of US4 is the composition of the sediments that shows an abrupt change becoming predominantly made of unsorted clasts coming from the erosion of the CT. This is the very first evidence of the erosion of the up-valley CT environments (*fig.* 1), although the amount of sediments and the geometry of the sedimentary body suggest that only minor changes occurred upstream. These environments are typically made of wide flat swampy areas alternated with barrages or waterfalls. Both environments enhance the deposition of calcium carbonate due to the biological activity of algal and microbial floras and faunas within the swamps and to turbulence in the correspondence of the waterfalls (Capezzuoli *et al.* 2014). The sedimentary characteristics and the chronology of US 4 indicates that the process of inactivation and erosion of the CT systems occurred in a very short time span that starts in the 8thc AD (US4.1) but is mostly concentrated in the 10th-11thc AD (US4.2), with sedimentation rates up to 0,7 cm/yr. The response of the fluvial system to the changes occurring in the upper reach of the cathchment lasted until the 13thc AD (US4.3).

The presence of swampy areas along the Pecora river valley is also testified by the place names reported in the topographic maps such as "Padule Moreta" and "Pian del Padule" ("Padule" is a Tuscan term for swamp, *fig.* 1). The drainage of these wet areas occurred by means of drainage regulations still observable today. Moreover, the main barrage of the CT system (named "La Cascata" meaning Waterfall, *fig.* 1) is bypassed by a deep artificial cut that diverted the natural course of the river to the west, draining the whole wetland up-valley (*fig.* 1). All these artificial water regulations are responsible for the drainage of the CT environments and for their erosion due to the subsequent river down-cut that led to the transport and deposition of the amazing amount of CT clasts found in the NW section down valley. Furthermore, the NW section is located very close to the mouth of the Pecora river entering the early medieval shallow swampy or lagoonal environment as testified by the interlayering of these deposits with the US4 sediments (*fig.* 4).

US4 sediments also contain very abundant charcoals, from very coarse to fine, concentrated within the troughs and beds. Charcoals are within sedimentary record and their abundance coupled with the absence of human artefacts allows us to exclude an archaeological-related contamination (i.e. there are not derived from a nearby archaeological site, see chapter 3.2.). Moreover, the dispersion and deposition of charcoal during and after the fire (Clark 1988; Thinon 1992; Scott *et al.* 2000) is strictly dependent on run-off processes and the capability of the river to re-distribute sediments and charcoals down-valley. Such fast and widespread vegetation fires linked to the erosion of the CT environments and their drainage cannot be attributed to climate changes also because the climatic signals in the Mediterranean are not strong enough (Luterbacher *et al.* 2012) to be able to generate such a rapid response of the fluvial system for the time interval under consideration.

The preliminary radiocarbon dating, pointed to the overlapping alluvial phases, shows a coherent and linear

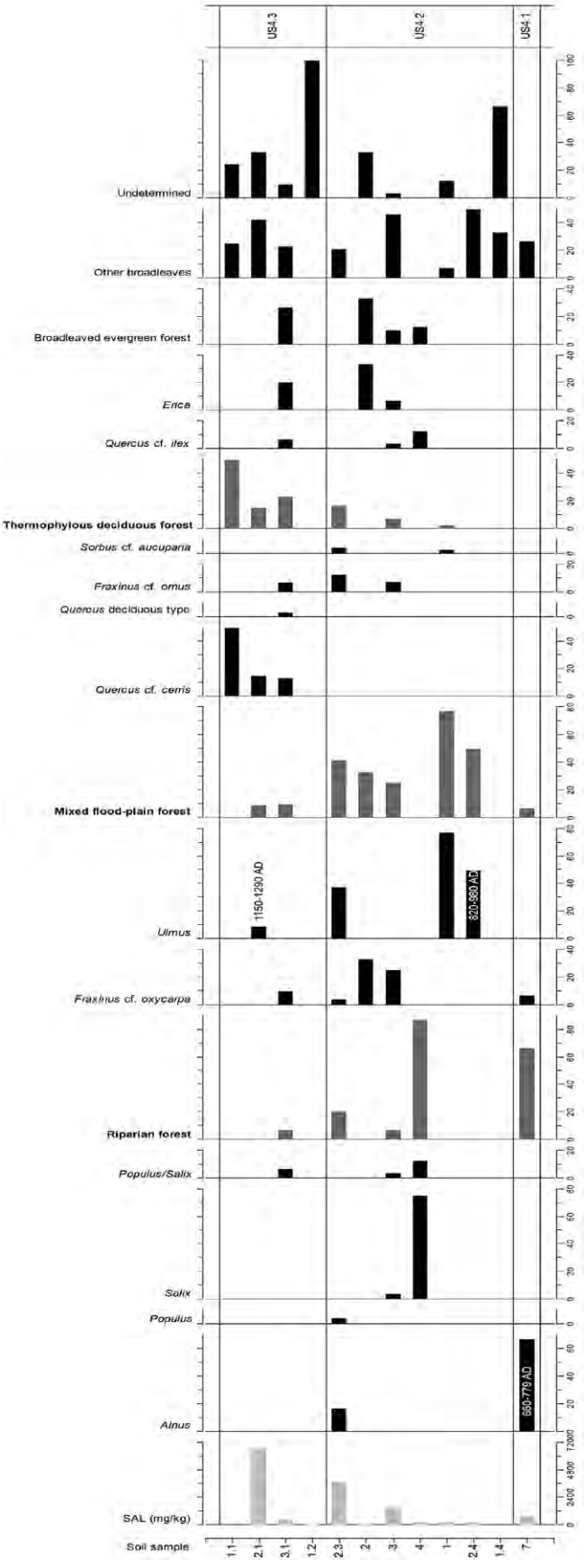

fig. 5 – Section NW charcoal analysis. From left to right: charcoal samples listed according to the depth; light grey bars: SAL (sample layer) values; black bars: percentage of most important taxa with indication of the AMS radiocarbon dates; dark grey bars: related ecological groups; stratigraphic units according to facies analysis.

chronological sequence. Assuming that the charcoal record is a result of forest fires, we can argue that the period between the end of the 8thc AD and the 13thc AD recorded the presence of fire activity within the Pecora river basin, with a peak of fire activity in the 9th-11thc AD period.

US4.1 is preserved on the right side of the palaeochannel and indicates a first phase of deposition occurring in a very shallow, flat and unconfined channel system dated to 660-779 AD Cal Age (Sample FI3554). This age postdates the beginning of the erosion of the CT systems and the onset of a braidplain in the distal reach of the Pecora river. However, the limited thickness of the sediments and the unconfined geometry of the depositional unit indicates only minor changes occurring in the upper catchment.

US4.1 taxonomical identifications document the presence of *Alnus* and, at a lesser extent, *F.* cf. *oxycarpa*, indicating that in this period mainly riparian and mixed floodplain vegetation is affected by fire, coupled with the onset of fluvial erosional events along the swampy areas within the CT environments. This suggests that the drainage and reclamation of these wet environments was also due to vegetation clearance along the floodplain, which could be evidence of woodland management carried out by 8thc AD settlements capable of seeking high-quality crop production in a period of involution of the medieval state (Buonincontri *et al.* 2017). However, fire activity and sedimentary processes increase in the following centuries.

In fact, US4.1 is in turn cut by a minor unconformity that indicates the formation of a deeper channel whose filling, US4.2, shows the same facies model, with the predominance of cut-and-fill bedforms made again of CT fine-grained gravels. Nevertheless, the increasing thickness of the sedimentary succession and its deposition within a deeper and more confined channel indicates that this is the main depositional phase, possibly associated with the major drainage and environmental changes occurring upstream. Also, the frequency and volume increase of charcoal fragments lead to the older dating of this depositional stage to 880-980 AD Cal Age (Sample FI3452).

US4.2 anthracomass shows that fire activity included more established forest vegetation made of *Ulmus*, *F.* cf. *oxycarpa*, *Alnus*, *Populus* and *Salix*. This indicates that fire events affected a wider environment involving the riparian and mixed flood-plain forest occurring along the riverbed, wetlands, and distal alluvial plain. The presence of *Erica*, *Q.* cf. *ilex* and *F.* cf. *ornus* suggests that broadleaved evergreen forest of the foothill areas was also affected by fire activity.

Thus, the observed evidence argues in favour of the clearing and reclaiming of woodland in the whole Pecora basin suitable for the cultivation of large kernelled crops as well as fruit tree cultivation (Buonincontri *et al.* 2015, 2017), probably due to the establishment of a new economic system (Hodges, Bianchi; Collavini *et al.* this volume). This hypothesis is also supported by the comparison of charcoal data with pollen analysis in the region, which show a noteworthy match of fire signals and forest clearance. At the Accesa lake the pollen sequence attests a decrease of wild arboreal pollen and an increase of cultivated tree pollen (olive and chestnut) from c. 850-950 AD (Magny *et al.* 2007).

US	Sub-Units	CT abundance	Facies model	^{14}C Age	Ch samples	Ch abundance	Fired vegetation
US4	US4.3	*****	Distal sheetflood unconfined gravel/sand-bed braided river	1150-1290 AD	1.1 2.1 3.1 1.2	***	Riparian, proximal, distal floodplain and foothill
	US4.2		Distal shallow gravel/sand-bed braided river	820-980 AD	2.3 2 3 1.3 4 1 2.4 1.4	****	Riparian, proximal and distal floodplain
	US4.1		Distal sheetflood unconfined gravel/sand-bed braided river	660-779 AD	7	***	Riparian and proximal floodplain
US 3		*	Gravel-sand wandering to meandering river	787-471 BC		*	

tab. 1 – Section NW sedimentary facies and related chronology and environments CT (Calcareous Tufa) and Ch (Charcoal) abundance: * rare; **scarce; ***common **** abundant *****very abundant.

A further minor unconformity is buried under US4.3 sediments that show the same sedimentary and compositional characteristics in the period of 1150-1290 AD Cal Age (Sample FI3451). However, the thickness of the sedimentary record is very limited and, as with US4.1, deposition occurred in an unconfined shallow channel, indicating a decreasing in sedimnetary and associated environmental dynamics in the surrounding landscape.

In this unit a strong presence of *Q.* cf. *cerris* and, at a lesser extent, *Erica*, *Ulmus*, *F.* cf. *oxycarpa*, *Populus* and/or *Salix*, *Q.* cf. *ilex* and *F.* cf. *ornus* is recorded. Overall, the data suggest that in this phase fire events occurred intensely on the foothill areas, affecting the thermophilous deciduous forest dominated by *Q. cerris*.

The reclamation of the CT environments seems to come to an end in the 12th and 13thc AD, when exchange, productive specialization and semi-industrial activity became very complex and affected agriculture. In the same period, the farming system reached the highest levels and its expansion reached the foothills (Di Pasquale *et al.* 2014; Buonincontri *et al.* 2015, 2017).

This is the last sedimentary stage recorded within the palaeochannel, although we cannot exclude the erosion of younger sediments. However, the geomorphological investigations indicate that after this moment the river dynamics were not confined within channels until the definitive reclamation occurred after the 19thc AD.

6. CONCLUSIONS

The analysis of the NW section within the retention basin allowed a detailed reconstruction of the physical and biological environments of the fluvial landscape in the distal reach of the Pecora river, which represents an exceptional case of study for the Early Medieval times for this Mediterranean area. Sedimentological investigations revealed the erosion of the CT systems in the mid-to proximal reach of the river indicated by the occurrence of CT clasts. The erosion must be related to the disappearance of these environments that occurred in a short time span comprised between 8th and 13^{h}c AD together with an abrupt change from sinuous-meandering to braided river model. These changes are also characterised by the appearance within the sedimentary record of abundant charcoal remnants. The processes related to the CT swamps and systems of barrages/waterfalls inactivation must be attributed to fast drainage of the swampy areas and bypass of the waterfalls that work as barrages for the wet environments. Such processes cannot be attributed to natural events (i.e. climate changes) due to the very short time duration necessary for the erosion, transport and deposition downvalley of such an abundant sedimentary record and charcoals associated with vegetation fires. Moreover, for the time span under consideration there is no global or local climatic signal able to trigger such strong environmental changes. On the other hand, artificial run-off regulations for the improvement of wet environments drainage and bypassing of waterfalls can serve as the determinant factor for the recorded changes. Furthermore, these processes occurred at the same time with widespread vegetation fires that can be easily attributed to land clearance for agricultural purposes as suggested by the selective fire activities along the ecological vegetation groups typical of environments proximal to the valley floors such as riparian, floodplains and foothills. Within the medieval palaeochannel we recognised 3 main depositional events that embrace respectively the 8thc, 9th-11thc and 12th-13thc AD. The older event is characterised by a limited thickness of sediments and the minor amount of associated charcoals, suggesting as in this chronological interval that the drainage and vegetational changes in the upper catchment were at an embrional stage. The most important event in terms of sedimentary response and charcoal amount is associated with the 9th-11thc AD when the CT environments become strongly eroded and mostly drained, as suggested also by the broader ecological groups affected by fires. Finally, the last evidence of this sedimentary history spans the 12th-13thc centuries AD, when the depositional processes decreased and the fires also affected the hilly landscape.

This analysis revealed that the fluvial dynamics and associated landscapes changed in the Early Medieval times, with major changes occurring at the Vetricella settlement providing information about site formation processes and landscape exploitation strategies.

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Abstract

Sedimentary filling within fluvial valleys are excellent archives for landscape changes along the river basins since the valleys work as traps for sediments coming from the slopes and later re-worked, distributed and deposited by fluvial processes. In terms of physical and associated biological landscapes, fluvial sediments reveal if and how the riverine dynamics changed, providing information about different fluvial styles. At La Vetricella we had the chance to observe thick sedimentary records in the distal reach of the Pecora river basin. At c. 1 km to the NW from the site, engineering works for the excavation of a retention basin on the left bank of the river revealed the presence of a wide palaeochannel filled with up to 3 m of sediments. The combined sedimentological, geomorphological, anthracological and geochronological analyses revealed an abrupt change of the river dynamics and associated landscape that mainly occurred between the 8th and 13thc, testifyingtostrong human impact on the surface hydrology and vegetation in the mid- and upper reach of the Pecora river basin.

*Luisa Dallai**
With contributions by Andrea Bardi, Arianna Briano*, Mauro Paolo Buonincontri*, Mirko Buono*, Luisa Dallai*, Gaetano Di Pasquale***, Stefania Fineschi*, Giulio Poggi*, Elisabetta Ponta*, Marta Rossi*, Luisa Russo*, Vanessa Volpi***

INVESTIGATIONS AT CARLAPPIANO: NEW ARCHAEOLOGICAL FINDINGS IN ANTHROPIC AND NATURAL LANDSCAPES

«Il sale che io sento
Mi dice che sto diventando mare
E mare sia. Perché ho capito, adesso
Non cambio in qualcos'altro, ma in me stesso»

B. Tognolini, *Filastrocca dei mutamenti*

1. INTRODUCTION

This article presents an initial summary of the scientific data acquired during excavation in September-October 2016 at the site of Carlappiano, lying just outside the Parco della Sterpaia (Comune of Piombino), on the coast of the Gulf of Follonica. In the part of the Cornia river plain which we will be concerned with, formerly belonging to the lands of the town of Populonia, the research project which began in the 1990s has, thanks to the nEU-Med project, seen new development opportunities[1]. Carlappiano in particular constitutes one of the key sites identified by the project to investigate in detail the characteristics of resources exploitation through time along the mid-Tyrrhenian coastal area.

For a better understanding of the scientific data, we will firstly provide an overview of the environmental context in which the site found itself (para. 2), reconstructed on the basis of various sources (maps and photographs, and geological, archaeological and historical sources). The settlement patterns of the plain in the Classical time and up until Late Antiquity, highlighted by numerous archaeological surveys, offer a diachronic perspective, within which occupation of the Carlappiano dune (para. 3) is also located. The study of surface pottery finds reveals that this occupation continued into the Early Medieval period (para. 4). However, the stratigraphies revealed by the 2016 excavation campaign do not make it possible to specify the nature of the occupation for time periods previous to the 12thc. The excavation contexts are presented in an analytical form for each of the three sectors, and are preceded by a description of the preliminary investigations carried out on the site (paras. 5, 6).

Finds retrieved during the archaeological investigation are presented and discussed in the following paragraphs; in particular, from the analysis of charcoal (para. 7) a reconstruction is proposed for the forest vegetation relating to the hills surrounding the site. The 1,678 potsherds are quantified by class (para. 8). From an analysis of them their provenance is reconstructed, and thereby the site is placed within the economic and trading systems already attested in the local area. Geochemical analyses (para. 9) provide useful support for the interpretation of the archaeological contexts with a view to production, and lead into the initial conclusions (para. 10). These, being based on all the findings presented in the previous paragraphs, propose the identification of an evaporation salt-works at the site of Carlappiano in the 12th-13thc. To facilitate the immediate understanding of this interpretation, a 3D reconstruction is offered (para. 11), drawn up on the basis of excavation findings and map information. Finally, in an appendix, the findings collected at the site, in the course of three separate topographical campaigns (in 2002-2003; 2009; and 2016), are published. This represents a useful contribution to the reconstruction of medieval settlement and trade dynamics, also in view of the scant documentation of post-classical pottery contexts from the lower Cornia valley.

2. THE ENVIRONMENTAL CONTEXT

The site stands on a dune, along a stretch of low sandy coast in the Gulf of Follonica (*fig.* 1). As on other parts of the Tuscan coast, a lido, extending between the higher ground of Piombino and Punta Ala, which constitute its terminal points, separated a large inland lagoon from the sea. This lagoon was generated by a series of water-courses which flowed into and across the plain, bringing with them a certain amount of detritus (Pasquinucci, Mazzanti 1987, pp. 96-98). The data available so far suggest that the internal waters must have reached their maximum expansion in the course of the Holocene, and in particular around 5000

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[1] Over the years, the Piombino area has been the subject of much significant historical and archaeological research. For a bibliographic summary of articles, see Dallai 2016, and associated bibliography.

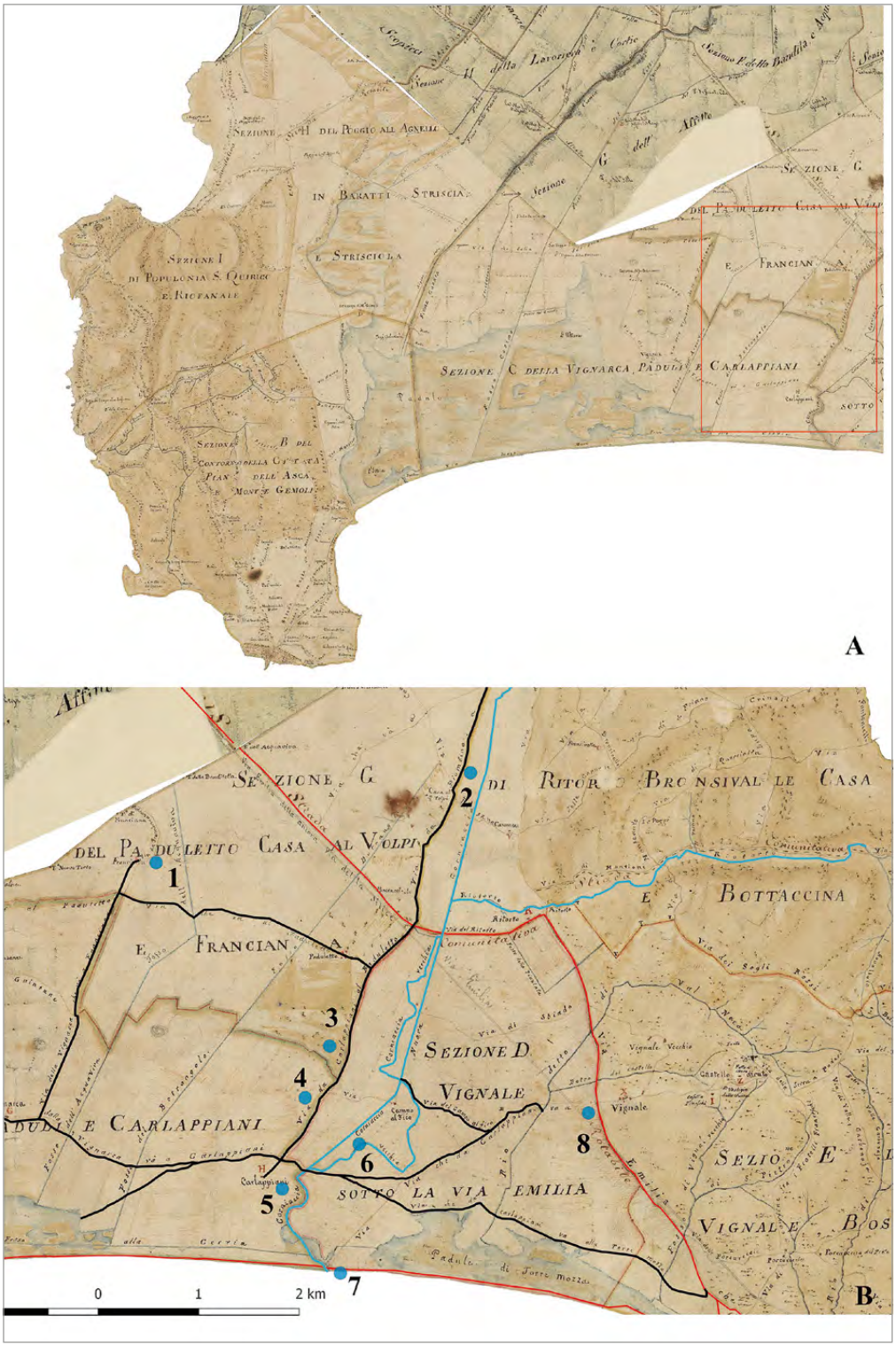


fig. 1 – Location of sites mentioned in the text: 1. Franciana; 2. Casal Volpi; 3. Masseria Paduletto; 4. Campo al Pero; 5. Carlappiano; 6. Campo al Fico; 7. Tomba Località Sterpaia; 8. Vignale. Background map: *Catasto Lorenese, Quadri di Unione (1821)*: Progetto Castore, Regione Toscana and Archivi di Stato Toscani.

years BC, at the same time as optimal climatic conditions, with a sea level estimated as being 1-2 m lower than today (Censini *et al.* 1991, p. 60, and map). Around the lagoon there is evidence of human groups being settled since the Neolithic, and these took advantage of the resources made available by the presence of the brackish waters (Fedeli 1983, pp. 65-74, especially sites 331 and 334 located in the area of Franciana). Between the latest Bronze Age and the earliest Iron Age, along the sandy coastal ridges, north and south of the promontory of Piombino and as far as Puntone di Scarlino, settled sites are documented (Fedeli 1983, pp. 65-74; Botarelli 2004, pp. 223-224); the Carlappiano dune itself has yielded a number of pottery from this time period (Dallai in Patera *et al.* 2003). In some cases, the settlements located display strong features of productive activities; the site at San Vincenzo-Riva degli Etruschi and the site found at Torre Mozza (De Marco, Poesini, Galiberti 2015-2017, pp. 219-223), in particular, have yielded heaps or waste dumps of pottery fragments from coarse-ware cooking jars, dark down or reddish in colour, and traces of fire activities

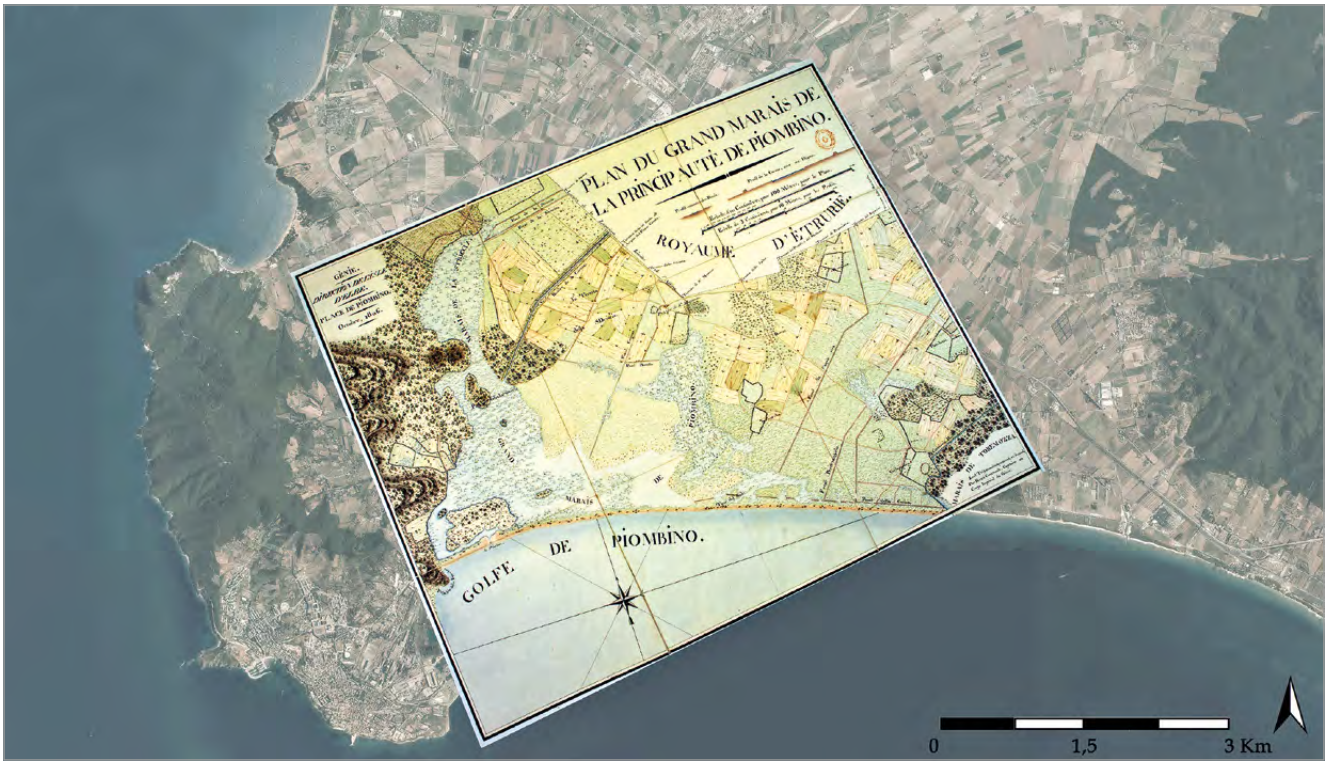


fig. 2 – Piombino plain; areas subject to marsh formation in early years of 19th c. (1806). Georeferencing of *Plan du Grand Marais de la Principauté de Piombino* on orthophoto-map (2016). Online resource: http://www502.regione.toscana.it/ows_ofc/com.rt.wms.RTmap/wms?map=owsofc&map_resolution=91&.

that have been linked to salt production (De Marco 2017). This specific type of site is attested in several locations along the mid-Tyrrhenian coastline, and is documented, as stated above, also in the nearby area of Scarlino (at Portiglioni and Portiglioni-Campo da Gioco; Aranguren *et al.* 2014), bearing witness to the importance of later prehistoric salt production in coastal and lagoon contexts.

The considerable influx of detritus generated by the rivers and streams, in the case of the Gulf of Follonica in particular by the Cornia and the Pecora rivers, lies at the origin of the gradual accumulation of alluvial and lagoon or marshy sediments which characterize the surface geology of the Piombino plain and the deeper stratigraphic sequence (test drillings have identified up to 50-100 m of sediment of fine detritic origin, alternated by repeated layers of conglomerates); however, as yet there are no exact chronological indications relating to this sequence (Censini *et al.* 1991, p. 52). The same sediments are also one of the causes of the growth of the coastline over time, although this growth is modest compared to the Arno and Ombrone river delta areas. Combined with this coastal development is a phenomenon of subsidence attested to at least the last 100 years (Cappuccini 2015, p. 573 with bibliography).

The "beach rock" sediments recognized to the north and south of the promontory, and today located below sea level, at a distance of between 50 and 100 m from the modern-day coast, mark the limit of the ancient shoreline; the presence of remains (iron-working debris) from the Etrusco-Roman era contained within them allows one to pinpoint its chronology (Idem, pp. 570-571; Pasquinucci, Mazzanti 1987, p. 104). The identification of a burial datable to the second half of the 2nd c BC near Sterpaia, not far from the site of Carlappiano, currently lying below sea level at around 6 m from the shoreline (Fedeli 1989), is further testimony to the fact that the coast has retreated in the area adjacent to our site between the Roman period and the present day[2].

The cause of this phenomenon is the constant rise in sea level, which at the end of the 1st c AD is estimated as being around 1 m lower than today (Pasquinucci, Mazzanti 1987, p. 96) and, as of the mid-19th c, the large-scale land-drainage work commenced with the Grand Duke's *motu proprio* in 1828[3].

The drainage of the wetlands in this part of the Maremma was achieved by creating embankments along the water-courses or landfill (*colmate*). Landfill operations were used specifically to drain the marshes of Piombino and Torre Mozza; after closing the outlet to the sea at *Il Puntone*, the sediments of the river Cornia were used to fill the extensive wetlands of the area located inland. The course of the Corniaccia, in particular, was diverted towards the Torremozza marshes, and the sediments used to fill in the vast depression, as shown in the 1864 *Carta della Pianura di Cornia in via di bonificamento*[4]. With the landfill, new lands were created which could be used for agriculture[5], but the

[2] This is cited and commented on in Giroldini 2009-2010, pp. 201-224.

[3] The reclamation was actually carried out between 1831 and the years of the annexation to the Kingdom of Italy; drainage activities continued until the 1930s; Pellegrini 1984, pp. 13-27.

[4] Grosseto State Archives, "Genio Civile", "Pianura di Cornia in via di bonificamento anno 1864". An analysis of the cartography available for the area in question in Bartoli 2017.

[5] On the subject of land drainage, see: Rombai 1997; Rombai, Signorini 1993; Federci, Mazzanti 1995.

removal of inert material washed down by rivers and streams did not permit the lidos to re-form in a natural way, and since then they have been considerably reduced in size.

The increase in size of the dune ridges over time, basically parallel to the modern-day coastline, led to the creation of depressions between the dunes towards the interior, and these are still visible today. The noticeable differences in height (from the modern-day *Strada Geodetica* to the coastline this ranges between 3.9 and 0.7 m asl) allow us to imagine a landscape in which the flooded areas alternated with dry ones. These were used for paths and roads that crossed the plain, facilitating connections between apparently isolated zones, shaped by the topography of the inland waters (Dallai 2016).

On the basis of the information assembled thus far, we can define a number of essential features of the landscape in which Carlappiano was located, prior to the profound changes occurred in the 19th c. We have to imagine an area which was certainly dry (height measurements help us, as does the prolonged occupation of the dune), which was relatively close to the shore (but alot less close than today, as is possible to understand from both archaeological findings and from the presence of beach rock deposits); it was located near the river Corniaccia (the meandering course of which is still visible in 19th c maps, and also in historic aerial photos, for example IGM 1938 and GAI 1954[6]), and, more particularly, close to its mouth (on the basis of the distances derived from the *Catasto Leopoldino* the mouth was just over 700 m from the southernmost excavation area at Carlappiano, Area 2000.) Moreover, the site was fairly close to the wetlands, which are also shown on the same *Catasto;* to the west, the wetlands of Piombino marsh (standing around 2 km from Carlappiano); and to the east the wetlands of Torremozza (just over 1 km away, as in *fig.* 1B). However, the distances of the site from the lagoons are among the most problematic aspects to be defined. We know that, in the 1820s, at the time when the *Catasto Leopoldino* was drawn up, only a relic was left of the lagoon (in this area called, significantly, *Paduli* – Marshes) which, up until the early modern era, had offered a refuge to ships as large as brigantines[7]. The many studies devoted up to the present day to define the extent of the lagoon in the historical period show that the question is complex[8]. Significant variations over the centuries have been suggested both on the basis of the archaeological record (for summary overviews, see Fedeli 1983; Botarelli-Cambi 2004-2005; Cambi 2009) as well as the geological and environmental data (a summary in Cappuccini 2015 and Dallai 2016). However, these variations do not directly involve the dune near the Foce di San Martino, which offered an advantageous point of dry contact between the lagoon and the sea, along a stretch of coast which saw constant mercantile traffic, testified to by finds of traded pottery (such as amphorare) found in the stretch of sea just off the former river-mouth (Fedeli 1983, p. 422, number 339) (*fig.* 2).

In conclusion, the site of Carlappiano was situated in a typical "marginal marine" coastal environment, with a rich array of variously integrated economic resources: salt, fish farms (traces of which are still present in 19th c maps, along the final stretch of the river Corniaccia, near its mouth) and pasture land, which were all developed widely over time[9]. For that matter, it is the peculiarity of some of these, as well as their highly complementary nature, which made this coastal area economically significant ever since the early centuries of the Medieval period and consequently considered a "fiscal estate", subjected to firm control by the public powers, here rapresented by the dukes/marquises based in the city of Lucca (on this subject see the contribution of Bianchi and Collavini in this volume) and, from the 9th c, by local aristocratic families (Collavini 2016, especially pp. 66-68).

3. SETTLEMENT PATTERNS IN THE CARLAPPIANO AREA FROM THE 1ST C BC. TO THE 7TH C AD.

Pottery finds from the Carlappiano dune collected after several survey campaigns and most recently as a preliminary to the excavation (Dallai in Patera *et al.* 2003, pp. 300-301; Marasco 2013, pp. 63-64), attest to permanent occupation of the site which, as of the 1st c BC, extended until Late Antiquity (7th c AD). For the chronological range between the 1st c BC and mid-Imperial period (3rd c AD), the site has yielded a significant selection of pottery indicators which include coarse wares, cooking vessels and tableware, remains of traded pottery (including Dressel 2/4 amphorae), pieces of slag, a few fragments of hematite, stones, bricks and fragments of *opus signinum.* The overall picture seems to point to a site associated with diverse productions[10].

The presence of the nearby tomb of La Sterpaia, perhaps part of a larger burial ground, and just 1 km away from Carlappiano, the contemporary settlement site of Campo al Fico, located closed to the *Corniaccia*, and certainly linked to hematite processing[11], suggests that the area near the river mouth was fairly densely used and settled.

As of the 3rd c BC, in particular, the settlement pattern reconstructed from the numerous field-walking projects and archaeological excavations carried out in the area reveals

[6] These two important historical flights were made by the Istituto Geografico Militare (1938) and by the Gruppo Aeronautico Italiano – GAI – on behalf of the Istituto Geografico Militare. The 1954 flight in particular is the first stereoscopic flight covering the entire national territory after the end of World War 2. Details available on line: https://www.igmi.org/.

[7] ASP, *Piombino*, *Consigli*, 19, c 45. 1494. Register cited in Cardarelli 1938, p. 342, note 1.

[8] For a recent summary of current knowledge on the question, see: Dallai 2016, particularly pp. 92-95. For detailed contributions, see: Fedeli 1983; Bardi 2002; Isola 2009; Giroldini 2012; Cappuccini 2015; Camilli 2005, pp. 203-214.

[9] The use of zones near brackish waters as pasture-land is documented ever since antiquity; specifically, see Vanni, Cambi 2015, pp. 111-112. For the Sterpaia area, a similar use is likely; in the modern era, this is documented specifically by a deed dated 19 March 1514, with which the Piombino town elders donated the Sterpaia reserve to Jacopo the 5th on condition that all the people of Piombino could have free use of it, for pasture-land, for «tame beasts, and a couple of wild animals»; Fani 1930, p. 152.

[10] For details relating to the material, see (below) the pottery repertoire by A. Briano and E. Ponta.

[11] For the site situated at Campo al Fico, no bibliography is currently available. The area, surveyed during geoarchaeological and chemical-physical diagnostic tests within the ERC project (2016-2017 season) and coordinated by this writer, appears as a vast concentration of fragments of pottery, bricks and tile, and construction material, mixed with slag and fragments of ore. Also attested are Dressel 2/4 and Dressel 1 amphoras.

a trend of growth in settlement numbers linked to a multiplicity of factors: economic, political and commercial[12]. The 4th and 3rdc BC represent the period of greatest development in the iron industry at Populonia (Cambi 2009, p. 224). Indeed, in this historical time and, until the 4thc AD, palaeoclimatic data indicate that the territory saw a drier phase, with rainfall comparable to the modern era[13]. While shunning any historical determinism, it is possible to say that the dynamics of demographic and productive-commercial growth in the Populonia area between the 3rdc BC and the early Imperial era benefited from a basically stable climatic context, in which the phase of lower rainfall, starting in the mid-4thc BC, was probably accompanied by limited amounts of detritus brought down by the rivers and streams. This probably encouraged more intensive use of the plain near the inland lagoons, the main water-courses and delta areas.

A number of élite settlement areas have been identified whose occupation continued on a significant scale for several centuries; good examples of this are the areas of Franciana, Vignale and Casal Volpi (the location of these sites is shown in *fig.* 1), just to mention those closest to Carlappiano. All of them witnessed large-scale occupation in the Republican period, which continued until the 5thc AD[14].

The major contraction in settlement patterns in the Populonia territory began in the 3rdc AD, as is also evident for the sites near the Corniaccia and the border of the lagoon. The widespread occupation attested to in the early Imperial period along the lower river course, in particular at Masseria Paduletto, Campo al Pero[15], Campo al Fico and Carlappiano, was followed by a decrease in site number and after the 2ndc AD, only the sites of Carlappiano, Vignale and Franciana show signs of stable occupation. In these three areas the presence of settlements, albeit with features which are yet to be clearly defined, is attested to until the 7thc (Giorgi, Zanini 2014; Botarelli 2004, pp. 230-231)[16].

At Carlappiano pottery indicators relating to chronologies subsequent to the mid-Imperial period, while present, are few in number. These consist of cooking vessels (casseroles, and cooking pans imitating African wares; cooking pots made from undecorated coarse ware; African D forms, especially pans and plate-lids), described in the pottery report below. They bear witness to the use and occupation of this "liminal" area throughout Late Antiquity.

4. THE EARLY MEDIEVAL PERIOD

The presence of pottery fragments dating to and beyond the 7thc (bowls with inverted, rounded rims made from undecorated levigated clay; jugs/jars with a rounded rim and strap handle right below the rim; bowls with flattened rims and slightly squared sides; a fragment from a jug of *forum ware*) attests to the continued occupation of the dune at Carlappiano in the Early Medieval centuries, between the 8th and 10thc. Occupation of the nearby site of Vignale presently under investigation, the sole survivor of the late imperial site pattern, does not extend beyond the 7thc AD (Patera *et al.* 2003, pp. 290-291; specifically, see the materials tables, pp. 290-291), although stydies currently in progress could produce new evidences. As already stated, archaeological evidence that might provide a date beyond the 7thc is still absent from the Franciana area. This toponym is frequently found in early medieval written documentation to identify the *caput curtis* of a large fiscal estate documented since the 8thc (Collavini 2016).

It is thanks to historical documents that the few archaeological indicators related to early medieval chronologies collected thus far can be placed within a larger economic and juridical context relating to much of the lower valley of the river Cornia. This area, like the nearby Val di Pecora, with its important resources (especially salt), was controlled by an imperial authority (Tomei forthcoming). The *curtis* of Franciana, in particular comprised much of the Cornia valley and included the woods on the inland hills, the plains, the lagoons, the fish farms and of course the moorings offered by coastal bays and inlets[17]. Over time, marginal parts were detached off from this large-scale estate. The *curtes* of *Casalappi* and *San Vito*, attested to between the second half of the 8thc and the first 30 years of the 9thc, were given to and controlled by the bishop of Lucca[18].

The topography of the zone occupied by Carlappiano did not alter significantly in this period. Close proximity to the river-mouth of an important watercourse, the Corniaccia, which written documents identify as a crucial topographical feature, probably led to this place to be chosen; Carlappiano was of course also close to a lagoon as well as to the Via Aurelia[19]. On the basis of the available data, it is, however, impossible to define with greater precision the nature and purposes of this early medieval occupation. It is also not possible as yet explain the hypothesis that locates in this area the *castellare* of the *curtis*, mentioned in the 1125 document with which the Aldobrandeschi ceded to the monastery of San Quirico at Populonia half of the estate called *Franciano* (see Bianchi 2016, p. 379; Collavini 2016, p. 69). However, this same document tells us something more about this territory. As well as mentioning the existence of the *castellare*, abandoned by this time, it records that it was surrounded by

[12] For a summary: Botarelli 2006, esp. pp. 481-500.

[13] The long and detailed environmental record of the nearby Lago dell'Accesa, available from 12000 years cal BP until the present day, indicates that, between the mid-4thc BC and the 4thc AD, the waters of the lake gradually decreased, arriving at roughly their current level; Magny *et al.* 2007, esp. fig. 10, p. 1750.

[14] For Vignale see Giorgi, Zanini 2014; for Franciana, details in Fedeli 1983, p. 419, site 332; see also Botarelli, Cambi 2004-2005, p. 165; Cambi 2009, p. 225, pp. 229-230); for Casal Volpi, survey data attesting human presence until the 5thc AD, are the fruit of investigations by A. Casini, *Ricerche di archeologia mineraria e archeometallurgia nel territorio populoniese: i monti del Campigliese* (unpublished degree thesis, Università di Siena, 1991/92), sites 147-148.

[15] Giroldini 2010, sites 97, 98, 100.

[16] The recent surveys made in the Franciana area on the occasion of the 2017 geoarchaeological and geochemical investigations led to identify some fragments of African D pottery (specifically type Hayes 109), attesting the occupation of the area in the 7thc AD.

[17] For a general overview of the Franciano *curtis*, see Collavini 2016.

[18] San Vito, especially, which it has been suggested is to be identified with the modern-day Casal Volpi area is located not far from our site and became the central place for managing the bishop of Lucca's proprieties in the Cornia valley; Ceccarelli Lemut 1985, pp. 22-23; Farinelli 2007, site 33.5, s.v. *San Vito in Cornino*; Tomei forthcoming.

[19] The question has been addressed on several occasions by this writer; see, esp., Patera *et al* 2003, pp. 296-30; Dallai 2016, pp. 94-95.

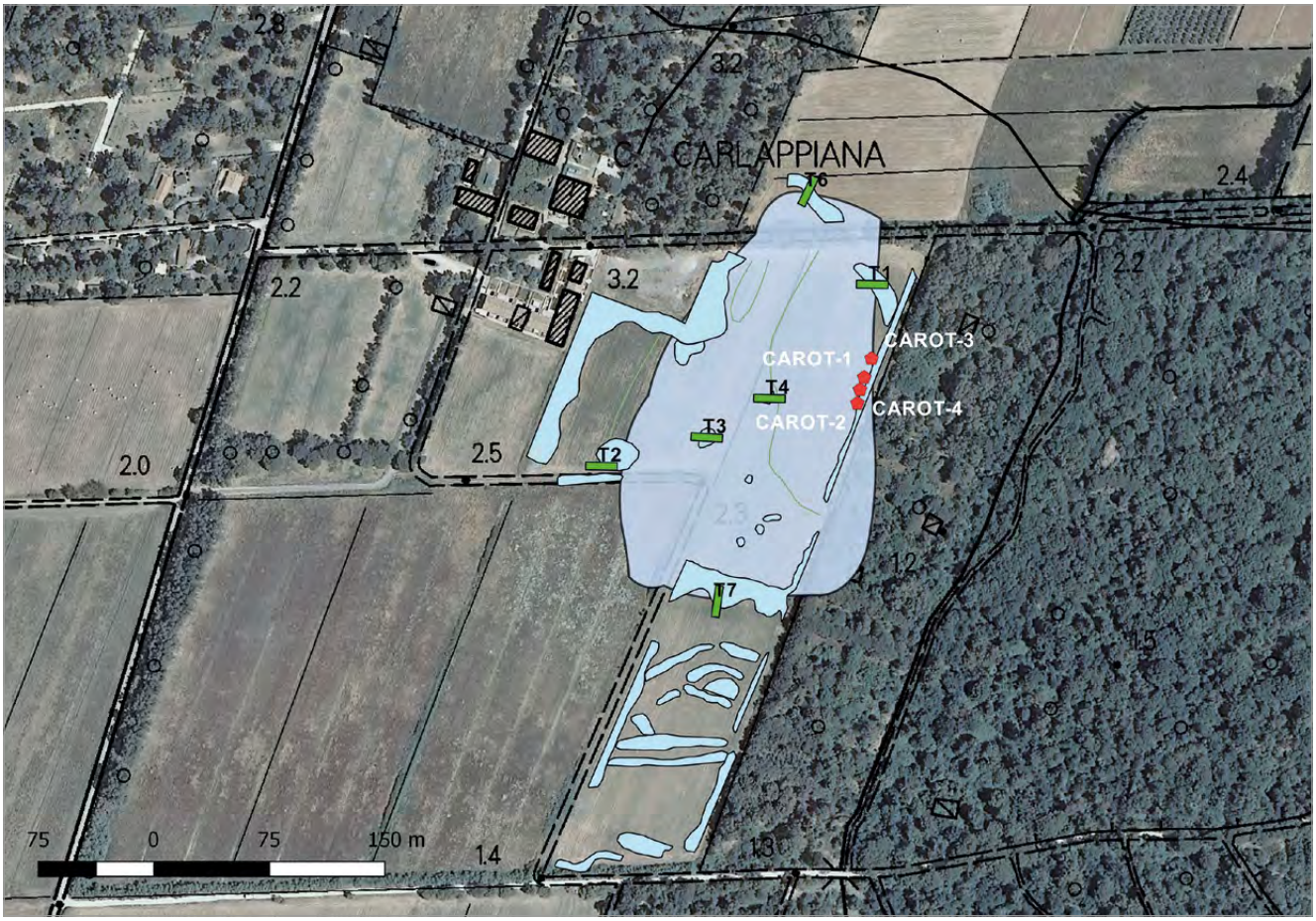


fig. 3 – Carlappiano. Location of the anomaly, trenches and test corings carried out in 2016 season. In blue: rendering of magnetometric anomalies. Cartographic basis: orthophoto-map (2016). Online resource: http://www502.regione.toscana.it/ows_ofc/com.rt.wms.RTmap/wms?map=owsofc&map_resolution=91&.

culverts and a channel. In addition, the document lists the important resources present in the territory of the *curtis*, and the rights acquired by the monastery via property transfer, above all rights over the salt-works located within it, and over cultivated and uncultivated land.

This is the historical context in the 8th to 11thc for the area of Carlappiano. Setting out from these preliminary considerations, the excavations described below provide initial answers to the many questions relating to ways in which the economic resources of the lower Cornia valley were used and developed between the 12th and 14thc.

5. THE EXCAVATION

The site identified by the 2016 excavation is located 700 m from the coast, at a height of between 2.30 and 1.54 m a.s.l., but indeed, as we have described above, in earlier times it must have stood on higher ground. The presence of a road referred to in the *Catasto Leopoldino* as the *road which goes from the Torre del Sale to Vignale* extending SW/NE, highlights a significant height limit between the "high points" and the "low points" in this small but topographically complex portion of plain.

The area chosen for the excavation campaign was identified on the basis of previous remote surveys (aerial photo analysis, especially IGM 1938), which revealed the presence of a prominent dark mark, of rounded shape, interpreted as the traces of a probable ditch or moat (Marasco 2013a, p. 64, fig. 5). This anomaly encloses an area of around 35,000 sq m, and can still be seen in French cartography dating immediately before the land drainage[20] (*fig.* 2). In turn, this feature stands within a dense network of dark, curved lines, corresponding to the numerous former courses (palaeochennels) belonging to the Corniaccia river and still visible on the *Catasto Leopoldino*.

The 2016 investigations began with a joint campaign of survey and remote sensing activities (magnetometry; drone and micro-survey; hhXRF; manual corings) aimed at better defining the context within which the areas for later excavation would be selected. The results of this initial investigation phase enabled the acquisition of further surface finds and made it possible to delimit with greater precision the size of the anomalous feature. Furthermore, a series of core samples and small trenches have allowed us to select three areas in which excavations were conducted: Area 1000 (corresponding to trench T1); Area 2000 (corresponding to trench T7); and Area 3000 (corresponding to trench T3) (*fig.* 3).

From the manual cores conducted in the NE sector of the anomaly further indications were obtained about the

[20] Archivio di Stato di Firenze, *Miscellanea di Piante*, c. 278a, 1806, *Plan du Grand Marais de la Principauté de Piombino*.

fig. 4 – Carlappiano. Orthophoto-plans of excavation areas investigated in 2016 season, and their location within the anomaly.

nature of the soils present in the area. In two cases in particular (cores 1 and 3) the stratigraphic sequence provided evidence for the addition of sandy and silty strata, which can be ascribed to flooding by the nearby river. These layer of soil were deposited on top of the contexts associated with the dune and with the deeper massive clays which constitute the lagoon's stratigraphical horizon before the formation of the dune itself[21].

L.D.

6. THE INVESTIGATION AREAS (*fig.* 4)

6.1 Area 1000

The northernmost of the excavation areas (Area 1000) is situated in the north-eastern part of the site, in a spot on the edge of the feature identified from aerial photographs and confirmed by geomagnetic surveys. This sector, measuring 5×6 m, has extended the preliminary exploratory trench T1. At a depth of around 40 cm below the level of ploughsoil, the trench revealed a clear limit, aligned N/S, between two very different sandy layers: to the east US 1002, a grey friable layer apparently devoid of inclusions, and to the west US 1004, a compact yellow layer with dark patches derived from the the oxidation of nodules of iron and manganese widely present in the soil.

The investigations showed that this clear limit constitutes the contact interface between the terrain which characterizes the original morphology of the place, namely the dune (US 1004), and the bank of a channel, in turn filled with silt and clays rich in nodules of iron and manganese as well as calcium carbonates (US 1003) (*fig.* 5). Only the western edge of this channel, which cut the original dune and ran in a NW-SE direction, was intercepted. In view of the perfect correlation between the anomaly visible from aerial photography, the results of magnetometry survey and the western limit of the channel identified from archaeological ecavation, the position of the other bank was estimated with a good degree of certainty; this enabled a calculation of the overall breadth as being around 10 m. Further information collected relates to an estimate of the depth of the channel. By taking two corings (C1, C2) inside the channel, as of a depth of 1.80 m below the current ground level, we were able to estimate a depth of more than 2.80 m. This depth, when taken into account with the height of the dune, made it possible to establish that the total depth of the channel was more than 2.4 m. The feature, which exploited the presence of one of the channels or offshoots of the river, was presumably a man-made earthwork (embankment).

Excavation of the channel infill yielded numerous pieces of brick and tile arranged completely randomly, sometimes

[21] The geoarchaeological investigations conducted in parallel with the excavation activities were coordinated by prof. Pierluigi Pieruccini from the Department of Earth Sciences, University of Turin.

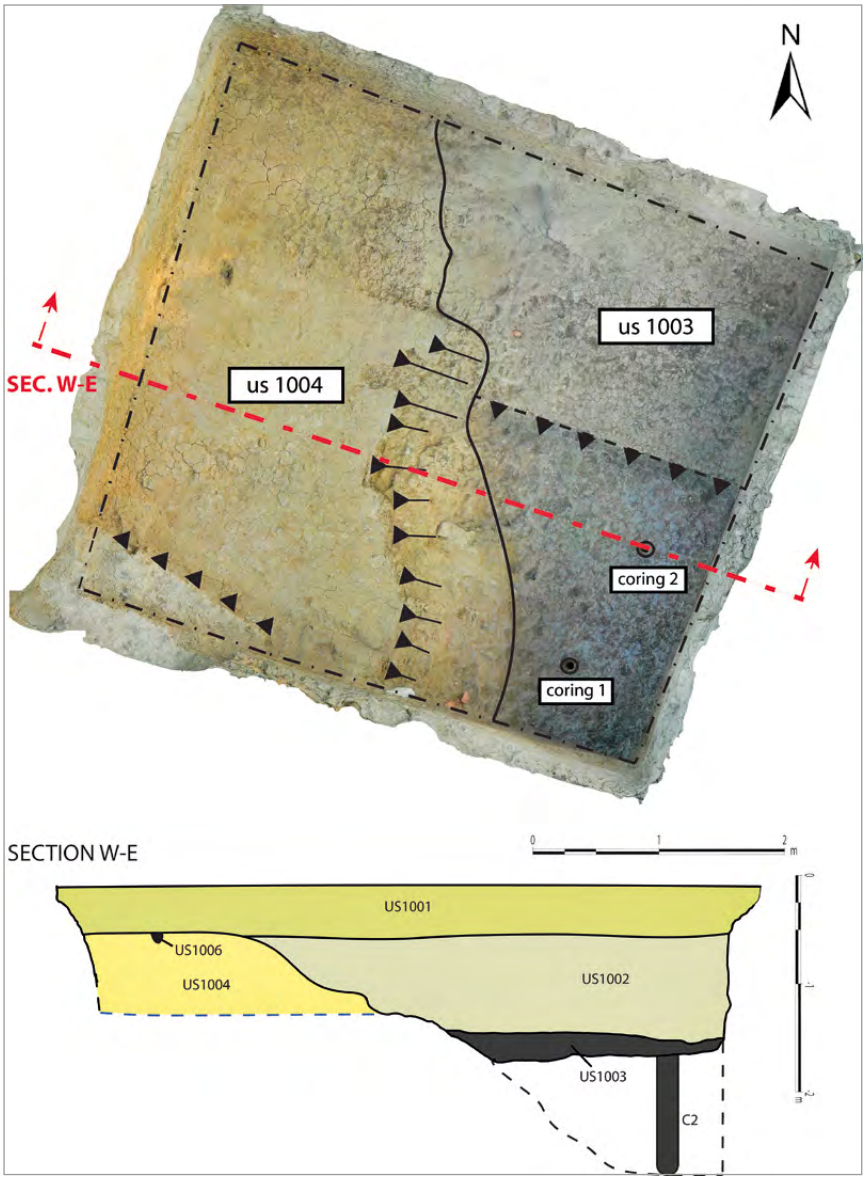


fig. 5 – Carlappiano. Area 1000: orthophoto-plan, and W/E section.

positioned near the bank. These were interpreted as being deliberately discarded, and later being subjected to the action of the water in the channel. By contrast, the sandy dune, at least in this sector of the excavation, did not show signs of significant anthropic activity, except for the discovery of a post-hole (US 1006) located in a relatively high position (-50 cm from the ground level), within which a large fragment of pointed charred chestnut wood was found (US 1007). This was attributed to the modern era and probably associated with farming activity well documented at Carlappiano.

G.P.

6.2 Area 2000

Area 2000 is situated at the southern extremity of the anomaly identified from aerial photos, where a clear-coloured linear feature is clearly visible on the 1938 aerial photo. A preliminary trench (T7) led to a walled structure being intercepted. This was constructed using large, rough-hewn blocks of limestone, including some reused blocks, aligned N/S (US 2003, 2004). The total area subjected to stratigraphic investigation was 125 sq m; in turn, this area was divided into three sectors (A, B, C) (*fig.* 6).

M.B., E.P., L.R., S.F.

6.2.1 *Sector A*

Sector A is located in the north-eastern part of the area, and has a total surface of 18 m². At higher levels, the stratigraphy displays evidence relating to the intense farming activity which has characterized this zone in recent years (US 2002). Furthermore, the remains were identified of a road crossing the area in an E/W direction. This road is no longer documented, but it is present on technical maps, such as the 1978 Ortofotocarta[22], and in aerial photos from the mid-1970s (US 2021, 2026).

Older traces of use were found in two portions of wall (US 2006, 2037) bordering the sector to the West, which can be interpreted as originally part of a single N/S align-

[22] Regione Toscana, Ortofotocarta 1978, sezione 317040. Online resources: http://www502.regione.toscana.it/wmsraster/com.rt.wms.RTmap/wms?map=wmsofc

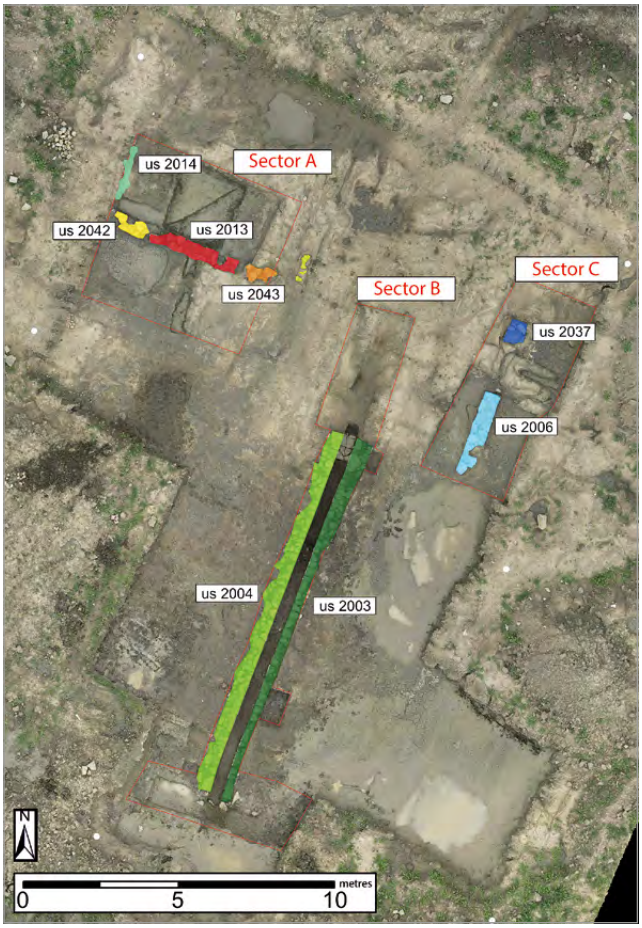


fig. 6 – Carlappiano. Area 2000: orthophoto-plan showing walled structures, and water channel (phase 3, end 11th-12thc).

ment (US 2037, US 2006). In the first case (US 2037), the structure consists in a single course of medium-sized stones (20×30 cm) bonded by soil and arranged in a regular way, also with the use of small wedges; the stones rest directly on the clay deposit (US 2050), and no foundation cuts have been identified. The presence of fleeting traces of mortar on the upper surface of the alignment might suggest these were originally used as bonding agents.

Not far from US 2037 the remains of a second wall (US 2006) was found 2.80 m length and 0.53 m width. In this case, too, there is a single course of stones resting directly on the clay deposit (US 2050) and the arrangement of the stones is totally similar to the one already described. The two walls are separated by a robber trench (US 2030). As evidence of the destructive actions which took place during late use of the area, corresponding to the phase of its functional abandonment, further signs of the removal of parts of the wall were identified on the upper surfaces, and on the body of the two walls.

A large deposit of clay was found partially covering the walls (US 2020), extending across all the surface of the sector. This was interpreted as a beaten-earth floor, formed after the zone was frequented for a prolonged period.

Although the state of preservation of the features is extremely compromised, it is possible to suggest that the two surviving stretches of wall were part of a system designed to delimit open areas, possibly placed in relation to the use of the channel oriented N/S and identified in the nearby sector B (US 2003, 2004).

6.2.2 *Sector B*

Sector B is located in the central part of area 2000; its elongated form, in a N-S direction (4.2×17,5 m), is in line with the alignment of the main structural feature previously identified with trench T7, namely the US 2003-2004 channel (*fig.* 7).

The two aligned walls are preserved for a total length of 12 m, and represent the perimeter of a channel sloping to the S, designed to canalise the waters of this portion of the area to the round moat visible from the aerial photos. From here, the waters were in turn directed towards the Corniaccia by means of a connecting canal located in the SE section of the anomaly.

The removal of the deposits situated N of the channel enabled its entrance to be located. The layers removed were small deposits of sandy soil mixed with animal bone remains and cooking pots sherds with dark marks from contact with fire (US 2016, 2034, 2046), datable to the high to central centuries of the Medieval period. The accumulation of these remains is connected to the phase of demolition of the structure, which occurred after the area was abandoned.

At a lower level other layers were found composed of waste material transported by water toward the channel (US 2052, 2059), and also by the collapse of part of the walling which occurred after maintenance had ceased (US 2060). Overall, this deposit constitutes the oldest phase of the water feature's loss of function.

The delicate environmental state of this part of the area, situated between the opening of the water channel and the northern section of the sector, which was subjected to clear water action, is evidenced by the presence of layers composed of fragmented brick and tile and small stone slabs bonded by clayey soil, which have been interpreted as efforts to drain and consolidate the ground surface (US 2054 especially). These strata fill a cut identified in the clay deposit US 2038 (US 2055), probably of natural origin, caused by water flow, or else by water stagnation.

Excavation of the deposits inside the channel identified a large deposit of sandy and clayey soils (US 2007, 2016, 2064), largely homogeneous in nature, and a certain amount of material included within them. Specifically, the deposits nearer the surface (US 2007, 2016, 2064) are characterized by a prevalence of soil and gravel; at lower levels (US 2067, 2068, 2072) accumulations of brick and tile were found, with a clear predominance of curved roof tiles mixed with fragments of tableware and kitchenware, especially numerous in US 2067 and US 2068, datable to the central centuries of the Medieval period.

As regards interpretation of these strata, which were deposited in line with the gradual southward slope of the channel, the basic homogeneity found in terms of size and composition suggests that these may be accumulations of water-borne anthropic material. The characteristics of US 2077 in particular, a large sandy stratum rich in pottery and bone finds, extending across the entire internal surface of the

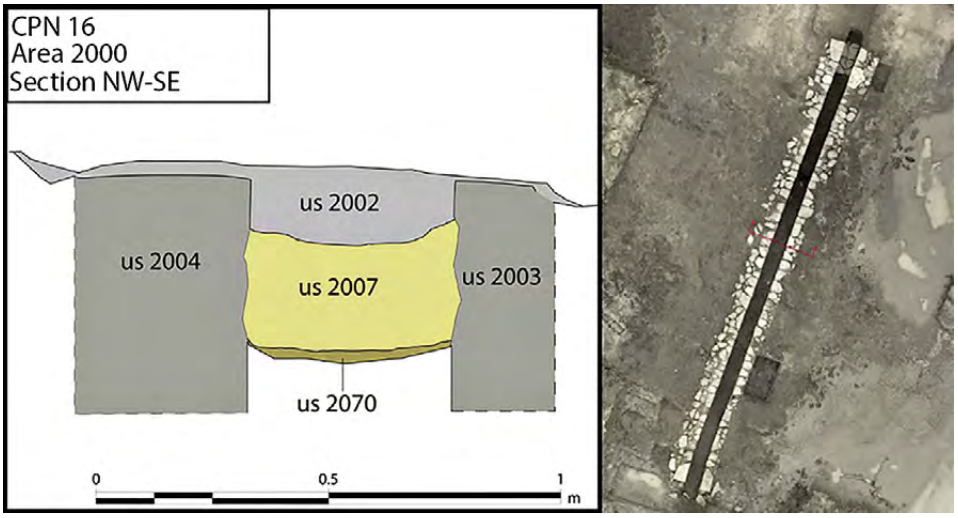


fig. 7 – Carlappiano. Area 2000: detail of water channel US 2003-2004, and NW/SE section.

channel and in the part adjacent to its southern entrance, suggests it may have formed after a large-scale flood. This would have occurred when the channel system had been abandoned.

By removing the deposit within the structure, it was possible to reveal the bottom of the channel. The northern opening and the southern extremity are characterized by the presence of medium-sized to large stone slabs (30×20 cm on average) of irregular shape, smoothed on the surface (US 2075, 2082), resting on a malleable layer of clay which forms its bed (US 2076, 2079). By contrast, this feature was not found in the central part of the channel, the base of which was composed of the clay deposit alone.

M.B., E.P.

6.2.3 *Sector C*

Sector C is situated in the NW portion of area 2000 and covers a surface area of around 30 m².

The removal of the layer of humus displayed a high concentration of finds (pottery fragments, pieces of brick or tile, pieces of iron and lead, slag, glass) and enabled the identification of a number of remains of walls which are only partially preserved.

We can ascribe to a relatively late phase (the early modern era) a very irregular wall built of small stones, brick and tile (US 2014), located at the western limit of the excavation area.

The most significant feature located in this sector was a wall (US 2013) extending in a NW-SE direction for a length of 2.80 m, with an average width of around 50 cm. Only one course of the structure remained, composed of unworked medium-sized to large stones laid irregularly. In this case, too, as described for the walls in sector B, no foundation trenches were found, and wall US 2013 was built directly on the clay layer.

In the central portion of the wall some restorations or renovation were identified (on the North side US 2040, and South side US 2061). These interventions consist in the positioning of small squared stone slabs arranged obliquely.

Both to the West and East of the wall two further features were found (US 2042, located to the west; US 2043 located to the east), which can be compared to the first wall in terms of building technique, size, alignment and state of preservation. In these cases, too, only one course remains, laid irregularly, and extending just over one metre.

Waste dumps (US 2019, 2036, 2032, 2035), located immediately North of wall US 2013, have yielded ash, charcoal, waste material from a probable forge, numerous pottery sherds (coarse and fine), and an equally large number of animal bones.

Wall US 2013 divides sector C into two parts. The whole southern portion of the area is characterized by the presence of concentrations of fragmented brick and tile, a small amount of iron slag and the presence of a cut (US 2041) stretching in a N-S direction, with a length of 1.50 m and an average width of around 50 cm. This last action of removal/stone-robbing was followed by a small repair, consisting of fragments of brick and tile, some of which had traces of being exposed to a fire (US 2051).

In order to better understand the nature of the clay layers on which the walls found in this area were laid, it was decided to excavate a further trench 2,18×2,30 m in size, located in the western half of the excavation area. The section obtained thereby enabled the analysis of an initial clay layer (US 2062), around 0.24 m thick, clearly different from an older, underlying deposit (US 2063), around 0.30 m thick. This last also consists mainly of clay, and is characterized by numerous nodules of calcium carbonate (Ca CO_3) that could be a result of the natural phenomenon of saltwater intrusion, or, alternatively, of productive activities implying the use of salt water.

The analysis of the type of deposit, in association with the materials found, allows the stratigraphy to be dated to the Central Medieval period, between the 12th and 14thc. The nature of the layers reveals, specifically, a frequentation of the space which also seems to extend beyond the life of channel US 2003-2004, the main feature identified in the adjacent sector B.

L.R., S.F.

6.3 Area 3000

Area 3000 is situated about 80 m from the previous area 2000, to the NW; the decision to locate the excavation, opening an area of around 75 m², aimed to evaulate a significant

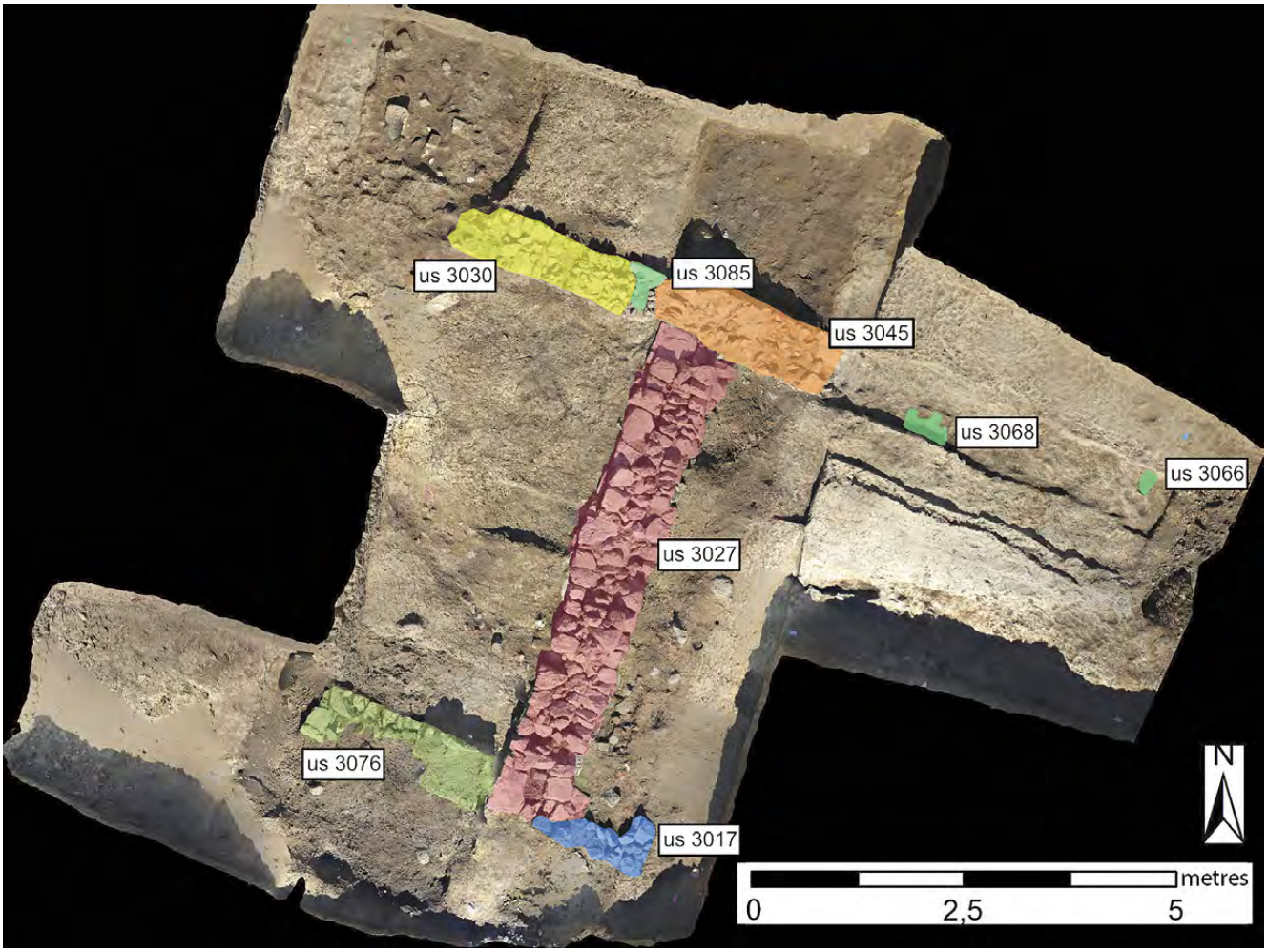


fig. 8 – Carlappiano. Area 3000: orthophoto-plan showing walled structures (phase 3, end 11th-12thc).

geophysical anomaly detected prior to excavation. This was followed by an exploratory trench (T3) (*fig.* 8).

Below the ploughsoil layer (US 3001), which was removed using earth-moving equipment, a complex stratigraphy emerged, at least partly the product of natural phenomena, the oldest traces of which consist of a number of walled features of which the foundation and the first course of stones were preserved. An alluvial event (US 3014), a layer of grey and yellow sediments present in much of the excavation area, except for the eastern section (standing higher up), marks the beginning of the definitive abandonment of the structures, which here, as in Area 2000, were constantly subjected to floodings. Nevertheless, while in Area 2000 the features seem to have been strictly dedicated to productive activities, in Area 3000 walls and spaces are most likely to have been part of service buildings (possibly warehouses).

The oldest of the walls is aligned N/S (US 3027); bonded with this is a second wall aligned E/W (US 3017). The two walls bordered a space which extended to the East. These two structures were followed by the construction of other walls, in particular: US 3076, similar in construction technique and material, which determined a new structure developed to the West; US3030, running E/W, for which smaller stones were used, that bordered to the North the space created by US 3027 and 3076.

Owing to the rise in the water table, it was not possible to investigate the foundation layers of these walls, and thus, where this is not evident, it is not possible to make precise hypotheses regarding the existence of reconstruction at the foundation level. However, it seems plausible that the intention linked to the construction of the later walls was to create a functional subdivision of the existing space.

These construction activities were followed by a period of abandonment, attested to by the accumulation of a significant layer of silty sediments totally devoid of anthropic material (US 3040), identified at several spots in the excavation area, except for the western sector. This absence could indicate that, at the time when the deposit was formed, the walls, although partly levelled, were still above ground, forming a sort of bulwark against the process whereby the layer was deposited.

The phase which follows this period of abandonment included a number of activities, involving both robbing and construction: in the northern section of the excavation area a series of cuts and fills were identified, the oldest of which, with its fill (US 3058 and US 3019), was interpreted as the robber trench of a wall which constituted a northward extension of wall US 3027. The robber trench was filled by a layer rich in fragments of brick and tile (US 3073); this composition is very similar to that of US 3041, located along the eastern side of the wall itself.

The layer of soil with fragments of brick and tile was almost completely removed by the foundation cut (US 3049) of a wall aligned E/W, the existence of which can be reconstructed on the basis of three sections which survived the destruction activities (US 3085, 3066, 3068). This wall is built using medium-sized and small stones, and was designed to define a space East of the central walled feature US 3027. In the northern section of the foundation trench, stones brick and tile were found, as were the remains of a horse's head.

Layer US 3060, which fills in this trench, seems to be of alluvial origin, as suggested on the basis of a study of the sediments which make it up. The flooding which caused it could be at the origin of the partial destruction of US 3085.

This major alluvial event also had repercussions on the West and SW section of the excavation area, leading to the formation of accumulations of heterogenous material (US 3078, 3015; brick and tile, glass, pottery, stones) alongside wall US 3076.

Later signs of human use were concentrated in the East and NE area of the excavation sector, and included the removal of much of the new E/W wall (US 3085 3066, 3068), and the creation of a ground surface made of mortar and stones (US 3038). Meanwhile the zone seems to have become a quarry for construction material (US 3065), and also a waste dump (US 3057 and US 3079). This phase of frequentation ends with the creation of a small restoration of feature US 3038 (US 3070), executed using poor quality mortar and just a few stones.

A.B., L.D.

7. POTTERY FROM THE CARLAPPIANO EXCAVATIONS

The excavations yielded a large amount of ceramic material, displaying a significant variety of forms and types. In many cases the finds, although fragmentary, have well-preserved diagnostic parts, making it possible to determine their formal types and functions.

Specifically, this pottery falls into the two overarching functional groups of tableware/storage vessels and cooking ware, represented fairly homogeneously at the site, in equal amounts.

The analyses carried out have shown that, alongside regional and sub-regional wares represented mostly by undecorated and slip-decorated vessels, there are also imported wares from north Africa. In almost all cases the characteristic types belong to a period between the 12th and 15thc.

E.P., L.R.

7.1 Tableware and storage vessels

Of the material from Area 2000, 52% (174 frg.) belong to this first group, and 58% (173 frg.) of the material from area 3000[23]. In a majority of cases, these are jars and jugs (52%)[24] made from levigated, undecorated pottery, having a pinkish fabric, with carefully finished surfaces, and fired to an excellent standard. As regards morphology, they have very similar characteristics and are distinguished solely on the basis of their size. Indeed, in both cases they have a trefoil or round rim, a globular body, a flat base (*tav.* 1, 1) and, where still extant, a flattened strap handle, decorated occasionally with a radial impressed stamp (*tav.* 1, 2). Typological features enable these forms to be dated to the central centuries of the Medieval period, while technical characteristics, such as the fabric, suggest they were made on a regional and sub-regional basis, probably produced in Pisa and the surrounding area[25].

Associated with jars and jugs, which may have had a twin function as tableware and storage vessels, there are open vessels, mostly straight-sided bowls (1%), similar to contemporary undecorated western Tuscan wares[26]. One example only, coming from the destruction layers of the drainage channel excavated in Area 2000 and characterized by a fine levigated fabric and an orangey-red clay body, differs in form. This is a bowl with an inverted rim decorated with a motif of wavy lines incised on the outer surface (*tav.* 1, 3) a pottery type frequently found in Pisan contexts in the course of the 14thc (Giorgio 2017, p. 118).

The pottery repertoire from Carlappiano is not restricted to undecorated wares alone. Slip-decorated vessels form 1% (9 frg) while of maiolica arcaica consitutes 6% (38 frg.), blue maiolica arcaica 1% (6 frg.), and slip-decorated pottery (9 frg).

The most frequently found maiolica arcaica form is represented by the jug (or jar) (55%); these are characterized by a globular form, a rod-shaped handle, a trefoil rim, and a distinct stem (*tav.* 1, 4). These forms are found widely in the Tuscan coastal area and in the immediate hinterland[27].

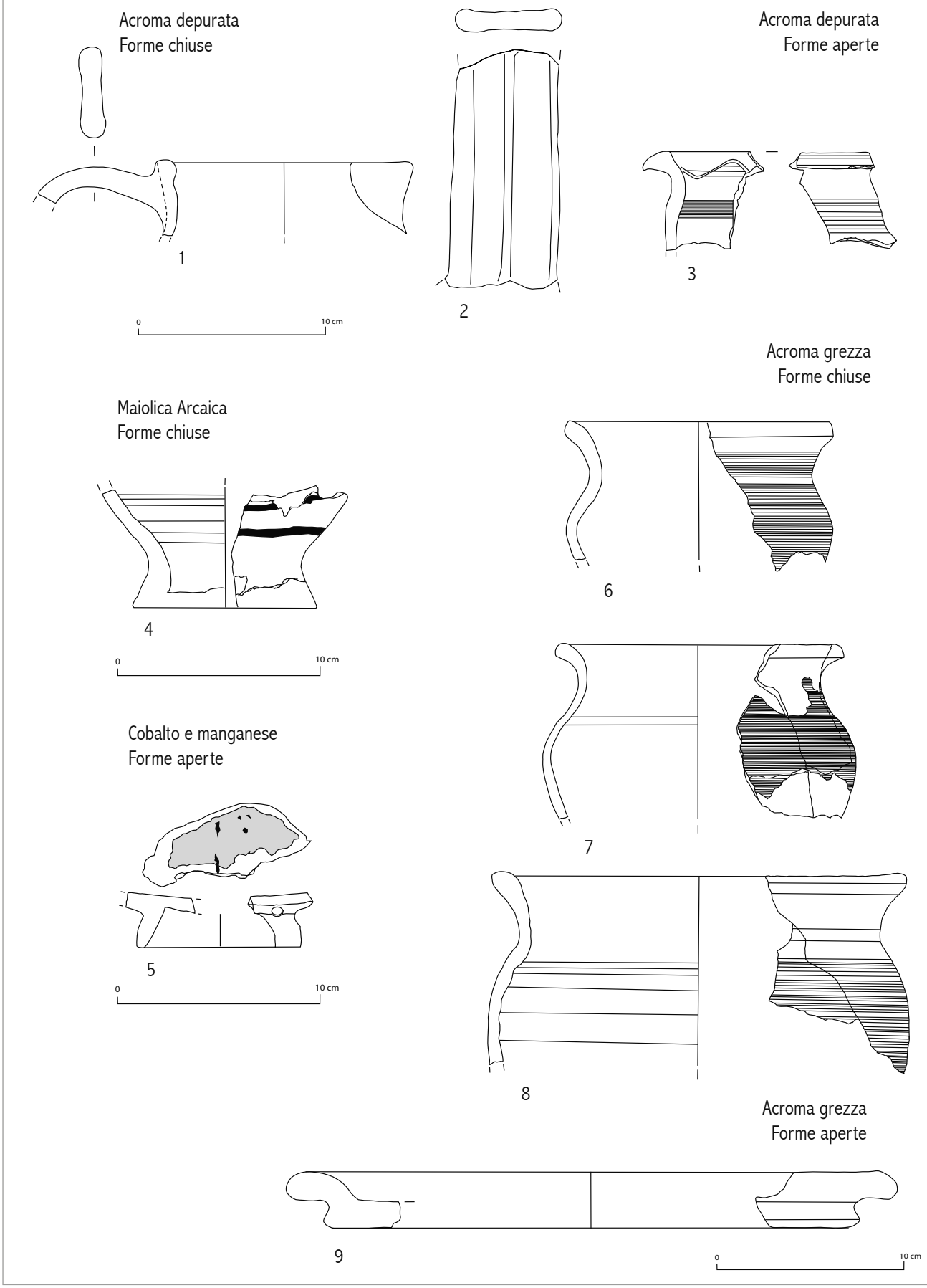
[23] The material presented here comes, in almost all cases, from a secondary deposit. For a description of the provenance contexts, see the section relating to the site stratigraphy.

[24] In this case the percentage refers to the total number of fragments from the two areas investigated.

[25] For an overview of the distribution of this form in the Colline Metallifere, see most recently Grassi 2010, p. 43; regarding finds at scattered sites in the costal area, see: for Campiglia Marittima (LI) Boldrini 2003, pp. 285-292; for Rocca San Silvestro Francovich 1991, figs. 97-98, p. 110; for the Scarlino Cucini 1985, tav. X, n. 2; at the regional level: for the Florence urban context see Bruttini 2007, pp. 303-307, esp. cf. tavv. VIII-IX, pp. 379-380; for Pisa: Piazza Dante Menchelli 1993, pp. 478-479; Piazza dei Cavalieri: Menchelli, Renzi Rizzo 2000, pp. 123-162. In particular for the pisan production of jugs with radiating stampa carved on the handles: for the site of *Portus Scabris*-Portiglioni (Puntone di Scarlino, GR), Vaccaro 2011, Plate XCV, nos. 1-8; for the urban context in Pisa: Piazza Dante, Menchelli 1993, p. 483, n. 6; via Bovio Berti G., Gelichi S. 1995, p. 200, tav. 3, n. 4; for the Pisan rural context, by way of example, see Calcinaia (Alberti, Baldassarri 2004, p. 73, tav. 6 n. 20). For southern Tuscany: Grassi 2010, p. 32, n. 7, fig. 26; for the site of Rocca San Silvestro Boldrini, Grassi 1997, p. 356 tav. 2, n. 14; for the more inland area, and especially the site of the Canonica di S. Niccolò, Montieri (GR): Briano A. 2010-2011, *La Canonica di San Niccolò a Montieri (GR): i reperti mobili provenienti dal complesso ecclesiastico medievale (XI-XIII secolo)*, Master's degree thesis, Università degli Studi di Siena. For Rocca degli Alberti (Monterotondo Marittimo, GR): Russo L. 2013-2014, *La ceramica di Rocca degli Alberti a Monterotondo Marittimo (GR) tra alto e basso medioevo (VIII-XIV secolo),* Master's degree thesis, Università degli Studi di Siena, esp. tav. 24, n. I.1.7; Boldrini 1999, p. 158, tav. 2, n. 9. For pottery forms circulating in the inland areas Ponta E. 2011-2012, *Dinamiche di formazione e trasformazione del paesaggio tra Tarda Antichità e Alto Medioevo. Il caso di Monterotondo Marittimo (GR),* Master's degree thesis in archaeology, Università di Siena, Supervisor Prof.ssa G. Bianchi.

[26] For southern Tuscany, see Grassi 2010, p. 44; for the inland area see, for example, the Florence context: Bruttini 2007, tav. I, n. 20.1.2, p. 372 (13thc); for a comparison between the two areas, see Cantini, Grassi 2012, pp. 129-137, esp. p. 134; for Pisa Piazza dei Cavalieri: Renzi Rizzo 2000, fig. 1 n. 2, p. 168.

[27] For an overview of the diffusion of this class of pottery in the area involved, see most recently Grassi 2010, pp. 46-47 with reference bibliography; at the regional level, see Luna 1999, pp. 411-427; Degasperi 2007, pp. 409-426.



tav. 1 – Carlappiano: pottery forms attested at the site (12th-15thc).

Associated with these are a number of open vessels, interpretable as bowls (3%), extremely fragmented but marked by the same technical aspects found in the case of the jars and jugs. In particular, the fabric, which is well levigated, varies between orangey-pink and orangey-red, indicating a fairly large area of provenance, ranging from Sienese workshops to Pisan workshops, not to mention the area of Volterra or, perhaps, Massa Marittima (Briano 2015). These products are normally dated to the 14thc. A number of hemi-spherical cups with an indistinct rim, made of white monochrome maiolica, are dated to a slightly later chronological horizon, and can be attributed to late 14th and early 15thc wares (Giorgio 2011, p. 225).

Blue maiolica wares consist almost entirely (80%) of jugs; these are good quality products ascribable to Sienese production in the later 14thc (Caroscio 2007, p. 427; Grassi 2010, pp. 47-48).

One last consideration relates to finds of products in "cobalt and manganese" ware (<1%) from Tunisia, bearing witness to the vitality of this site during the later Medieval period. These consist of fragments of dishes with a wide edge and a ring-shaped foot. The internal surface is decorated with floral motifs in blue and dark brown (*tav.* 1, 5), datable to between the last quarter of the 12th and the first half of the 13thc (Grassi 1997, pp. 107-108).

Imported cobalt and manganese wares are also documented at other sites in this area, both near the coast, such as San Quirico di Populonia (Grassi 2016, tav. 2, n. 4, p. 262), and inland, as shown by the two examples of bowls found at the site of Montemassi (Grassi 2010, p. 36), and the Canonica of San Niccolò, at Montieri[28].

E.P.

7.2 Kitchenware

Alongside tableware and storage vessels, cooking pots were also found, characterized by the usual refractory fabric; these vessels were used in the preparation and cooking of food, and because of this they were designed to be directly exposed to fire (Cuomo di Caprio 2007, pp. 125-129). Around 30% of the fragments found in Area 2000 (99 frg.), and 32% (97 frg.) of those from Area 3000, can be attibuted to this pottery class.

In both areas cooking vessels, which by tradition are distinguished by a limited repertoire of forms (Grassi 2010, p. 42), are represented mainly by jars (around 50%), characterized by rims with a range of profiles, elongated necks, globular or hemi-spherical bodies, and a flat base (*tav.* 1, 6-8). These types are well attested in the Colline Metallifere and the central Tuscan coastal area and are normally dated to the 13th-14thc[29].

Regarding open vessels, there is a clear dominance of flat pans (*testi*) for bread-making (*tav.* 1, 9), accounting for 24% of all finds made in the two areas overall, added to which there is just 1 sherd, ascribable to a small bowl, also used in the kitchen for preparing food (Grassi 2010, p. 41).

In addition to the forms which can be reconstructed, a significant number of sherds are indeterminate (11%), and in other cases can only be attributed generically to a "closed vessel" (13%) or "open vessel" (2%).

Although the study of the finds is still at a preliminary stage[30], the Carlappiano context, overall, corresponds closely to the assemblages of pottery and circulation patterns already known for the Colline Metallifere area and the central Tuscan coast during the central centuries of the Medieval period.

L.R.

8. THE ANCIENT PLANT LANDSCAPE BY MEANS OF THE ANTHRACOLOGICAL REMAINS

The study of charcoal remains sampled both in Area 2000 (US 2016, 2018, 2019, 2029, 2032, 2033, 2035, 2051, 2054, 2064, 2072) and in Area 3000 (US 3010, 3016, 3018) allowed to define the supply areas of fuelwood and therefore the type of woodlands.

In order to reconstruct the local vegetation cover, the archaeological contexts were carefully selected among those containing scattered charcoal resulting from long-term activities and processes, such as emptying and cleaning of hearths, fire places and domestic ovens (Chabal 1997; Figueiral, Mosbrugger 2000).

The samples were floated and sieved with 4-mm, 2-mm and 0.5-mm meshes. Charcoal fragments over 2.0 mm were identified by an incident light microscope working between 100x, 200x and 500x magnification, referring both to wood atlases (Abbate Edlmann, De Luca, Lazzeri 1994; Schweingruber 1990; Vernet *et al.* 2001) and to the reference collection in the Laboratory of Vegetation History and Wood Anatomy of the Department of Agricultural Sciences (University of Naples "Federico II"). The anthracological analysis involved 178 fragments of charcoal, for a total of 12 identified taxa, with a clear dominance of deciduous *Quercus* (67.2%), followed by *Ulmus*, *Fraxinus ornus* and *Ostrya carpinifolia*. Also identified were *Quercus ilex*, *Erica*, *Rhamnus*/*Phillyrea*, *Rosaceae*/*Maloideae* and *Olea europaea* (*fig.* 9).

As suggested by the nearby weather station of Venturina, the area is characterized as a meso-Mediterranean bioclimatic zone (average minimum temperature in the coldest month: 2.9°C), with sub-humid precipitation (annual precipitation: 700-800 mm). Arable crops, vineyards and olive groves are currently present in the alluvial plain of Carlappiano, compromising the potential of spontaneous vegetation. On the hills, the most-represented vegetation type is Mediterranean evergreen forest, dominated by *Quercus ilex* L., with *Arbutus unedo* L., *Viburnum tinus* L. and *Phillyrea latifolia* L.; on the cooler hill slopes, the forest canopy is dominated by decidu-

[28] At this site it is a residual find in layers dating to the second half of the 13thc (Briano 2010-2011, pp. 90-91; fig. 57, p. 138).

[29] For a reference bibliography in relation to areas of time periods of interest: F. Grassi for the Colline Metallifere (Grassi 2010), R. Francovich for the site of Scarlino (Francovich 1985) and Rocca San Silvestro (Francovich 1991), G. Bianchi for Campiglia Marittima and the surrounding area (Bianchi 2003), F. Cantini for Florence (Cantini *et al.* 2007), and B. Fatighenti for the Valdarno zone (Fatighenti 2016), A. Alberti, E. Abela, S. Menchelli for Pisa (Bruni 1993 Piazza Dante; Bruni, Berti, Abela 2000 Piazza dei Cavalieri), C. Citter, A. Arnoldus-Huyzendveld for Grosseto (Citter, Arnoldus-Huyzendveld 2007), finally, for Castel di Pietra E. Boldrini (Bianchi *et al.* 1999).

[30] Indeed, it must be stressed that the findings presented here only refer to a count of individual sherds, and not to the total minimum number of vessels.

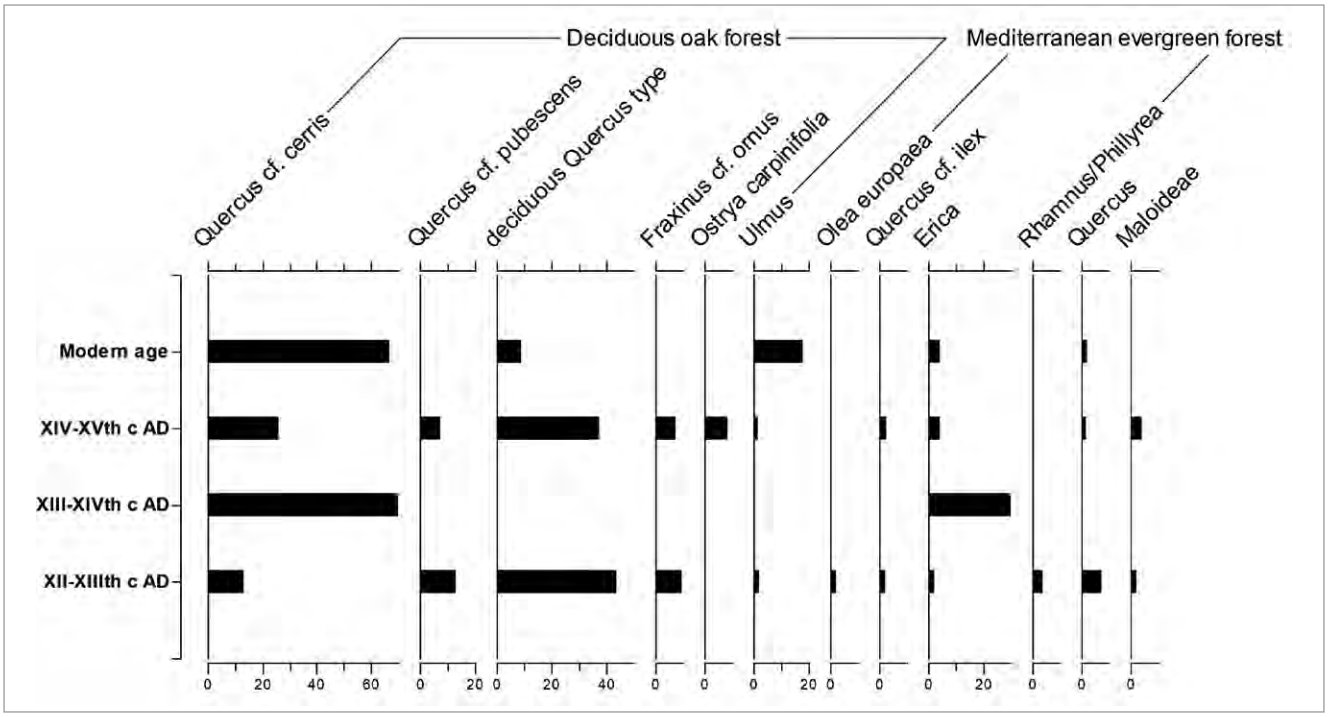


fig. 9 – Carlappiano. Charcoal analysis diagram with percentage bars of the identified woody taxa.

ous broad-leaved trees with *Q. pubescens* Willd., *Q. cerris* L., *Ulmus minor* Mill. and *Acer monspessulanum* L.

Showing the predominant use of *Q. cerris*, *Q. pubescens*, *Ulmus* and *O. carpinifolia* as fuelwood, charcoal analysis suggests that firewood was collected from a mixed deciduous broad-leaved forest until the Modern Age (*fig.* 9). Interestingly, the sclerophyllous evergreen taxa, today the most present in the area, such as *Q. ilex* and *Rhamnus/Phillyrea*, are not very represented in any significant amount. Given that evergreen trees and shrubs have often higher heat values than the deciduous broad-leaved trees (Doat, Valette 1981; Madrigal *et al.* 2011; Dimitrakopoulos, Panov 2001; Todaro *et al.* 2007), the greater use of woody deciduous taxa is not correlated with the choice of best fuelwood, but with a most likely presence in the area. One may suppose that the deciduous forest was during the Late Middle Ages the dominant vegetation cover on the hilly slopes of the lower Cornia valley. However, this forest type prefers soils not subject to frequent or long seasonal flooding, such as the alluvial plain of the Cornia river and Carlappiano. Therefore, the anthracological remains suggest an intention to use wood resources not immediately available near the archaeological site.

M.P.B, G.D.P., M.R.

9. THE CONTRIBUTION OF GEOCHEMICAL PROSPECTION TO THE INTERPRETATION OF EXCAVATION DATA

In order to support activities prior to excavation, a multi-analytical and multidisciplinary protocol of analyses was established and carried out with the use of portable X-ray fluorescence (pXRF) both within the aerial-photo anomaly and in the sorruonding area.

The analysis of soils and stream sediments in archaeological contexts has now become a well-consolidated and fairly common technique. If combined with the traditional archaeological survey, geophysical prospection such as magnetometry and georadar, can become very helpful for the acquisition of information both for prediction and description, while pXRF analyses can provide further information regarding intense and prolonged activities carried out in an archaeological context. The analytical results can be related to domestic or productive activities, to the use of fertilisers, the presence of accumulations of bones, burials, and construction activities[31]. Moreover, compositional and structural alterations of soils deriving from the combination of anthropic factors and natural phenomena (geological, pedological and hydrogeological processes) can be useful for understanding and reconstructing the environmental dynamics which have shaped the landscape in a well-defined historical period (Wilson *et al.* 2008; Andra Simniškytė Strimaitienė *et al.* 2017; Oonks *et al.* 2009b).

In the case of Carlappiano, pXRF analyses were performed so as to get essential information regarding the chemical composition of the soil and facilitate the identification of any anthropic activities in the research area. Sampling was determined on the basis of six transepts aligned N/S, taking measurements every 20 m.

The results of the geochemical analysis, which included the evaluation of Fe, Mn, K, Ca, Sr, Zn, Pb and Cu, revealed the presence of two chemically different zones, coinciding with the southern edge of the anomaly: the first, located outside, has higher average values for all the elements taken

[31] Oonks *et al.* 2009a; anthropic activities may irreversibly alter the chemical composition of the natural soil, leading to a higher or lower concentration of some chemical elements such as Ca, P, Cu, Fe, Mg, K, Zn, Pb and As.

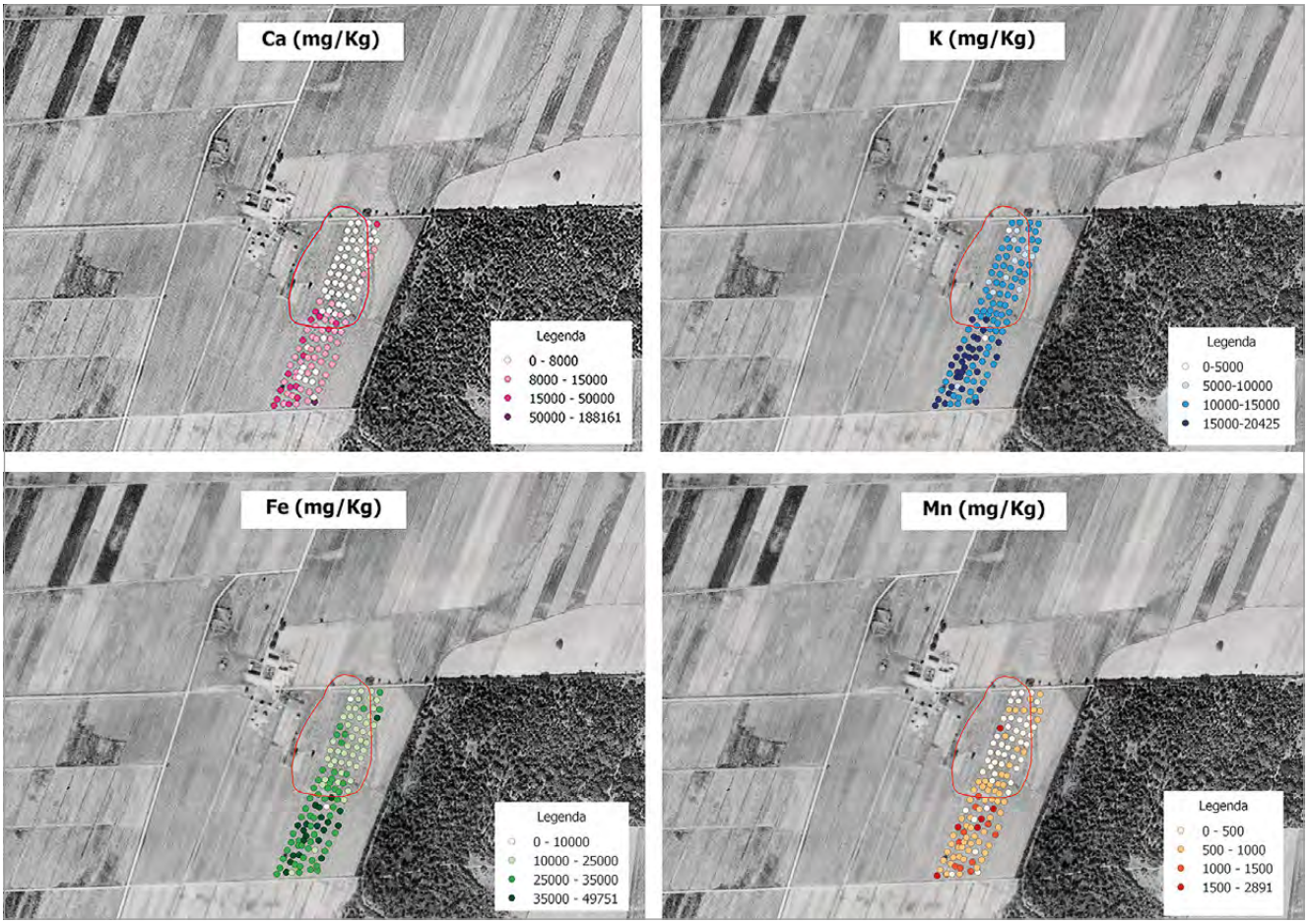


fig. 10 – Carlappiano. pXRF analysis: rendering of values for the following elements: K, Ca, Fe, Mn. A marked distinction is visible between the area inside and outside the anomaly.

into consideration (Fe 33178 ppm; Mn 906 ppm; K 14951 ppm; Ca 12423 ppm; Sr 107 ppm; Zn 55 ppm; Pb 24 ppm; Cu 38 ppm) compared to the second zone (Fe 21804 ppm; Mn 516 ppm; K 1179 ppm; Ca 6568 ppm; Sr 70 ppm; Zn 35 ppm; Pb 18 ppm; Cu 22 ppm) (*fig.* 10).

It is noteworthy that the enrichment or depletion of certain elements indicates not only the existence of two different soils, but could be interpreted as the resoult of a productive activity, in this case possibly related to solar salt production.

In the scientific literature, the chemical analysis of soils carried out in archaeological contexts linked to the solar salt production cycle is rare, whereas there are numerous case-studies connected to the technique of *briquetage* (the archaeological sites of Chan b'I, in Central America, and Zhongba in central China, as an example). On the basis of the available literature, the chemical elements that can be used as fingerprints for this kind of production and identified at Carlappiano are Mg, Ca and K (Flad *et al.* 2005; Cory Sills 2016).

As it is known, solar salt-works were organized in a sequence of basins (first evaporation, second evaporation and final crystallizzation) of varying sizes, located from the sea toward the hinterland, all connected to each other via a system of channels.

In the initial evaporation basins, the closest to the sea, calcium carbonates ($CaCO_3$) and oxides of iron and manganese precipitated, while in the second evaporation, positioned in a more inland area, the calcium carbonates continued to precipitate together with the calcium sulphates; these last, in particular gypsum ($CaSO_4$), form a thick, hard crust on the bottom of the basins.

The purified hypersaline liquid was then ready to flow into the last system of basins for the crystallization. These were smaller and shallower than the evaporation ones, and were water-proofed with a layer of clay (Antczak 2017). In this final phase of processing pure salt (NaCl) precipitated; this was collected at the corners of the basins and then stored inside the warehouses.

The concentration of chemical elements at Carlappiano, and particularly the increase in value of Fe, Mn, Zn, K and Ca found outside the anomaly, could be linked to the presence of possible evaporation basins in this area. The precipitation of the calcium carbonates and iron and manganese oxides in fact enrich the natural substrate. Inside the anomaly, on the other hand, where the crystallization ore vats containing the hypersaline liquid devoid of impurities and the salt heaps may have been positioned, there would have been no such enrichment of the natural substrate.

V.V.

10. INITIAL CONCLUSIONS AND INTERPRETATION OF EXCAVATION RESULTS

The considerations outlined thus far and the findings from the 2016 excavation season make it possible to put forward an initial interpretation of the features in the environmental context outlined in the introduction.

In chronological terms, the three areas of excavation have supplied useful information for defining a sequence divided up into 9 distinct phases (for the sequence and its detailed internal division, see the matrix in *fig.* 11), covering an extended chronological period, defined in its oldest phase by the formation of the dune (phase 1 – **dune**; Area 1000, US 1004). This constitutes the emerged surface on which the anthropic activities recorded by the excavation later developed.

On top of the dune, the silt deposits which accumulated as a result of the morphology of the place, generated thick layers of clay, in some cases rich in nodules of calcium carbonate (Ca CO_3), the evidence of a slow evaporation of stagnant, brackish waters (phase 2 – **silt deposits**). These are the layers which formed the foundation for the construction of the walls identified in the excavation of Areas 2000 and 3000 (phase 3 – **construction of walls and channel**) and to their actual phase of use (phases 4/5 – **use and transformation of built structures**; **construction activities**). In Area 3000 these consist specifically in a series of walls aligned E/W, extending out from the first wall (US 3027) originally aligned N/S. In Area 2000, on the other hand, a long water channel (US 2003-2004) around 50 cm high and 12 m-long has been identified, together with a few sections of walls at right-angles to this. Belonging to these phases is material useful for a chronological definition of the construction datable to between the 12th and 13thc.

Further activities in use of the area are also documented for the 14thc (phase 6 – **13th-14thc occupation**), but these made less impact on the context investigated.

An easily recognizable event of an alluvial nature ends the phase of use of the area, eroding the deposit, in some cases also significantly, and burying a large part of the stratigraphy below layers formed by sands and infrequent nodules of Ca CO_3 and Fe/Mn (phase 7 – **event of alluvial nature. Probable flooding of river Corniaccia**). The impact of this flooding, which can certainly be ascribed to the nearby river bursting its banks, is especially significant as regards the fate of the structures present in the area, because it was followed by only modest construction activities, accompanied by layers of accumulated material. These layers, while testifying to occupation of the area, also denote the fact that the structures (for example the water channels) were not maintained, and numerous ceramic material and food remains were found inside them, prooving that they gradually lost their function (phase 8 – **14th-15thc occupation**).

The final activities recorded do not have specific functional characteristics, although revealing, once again, the use of the Carlappiano dune which was more than just occasional (phase 9 – **late occupation, post 15thc**).

Therefore, in the light of the features briefly outlined thus far, what is the possible functional interpretation of the finds made in this excavation campaign?

Although we are dealing with a relatively poor deposit, the nature of the structures found, together with the environmental context in which the site is situated, make a crucial contribution to the formulation of our working hypothesis.

The first finding that emerges with considerable certainty is the productive and seasonal character of the site; this is evidenced by the absence of genuine settlement layers which can be associated with the structures found. The walls in Area 2000, in particular, appear to belong to investment of a productive nature, which have their central axis in a channel. The absence of adequate foundations, the nature of the bonding material and the quality of the masonry structures themselves is revealing and suggest a moderate height.

The structure for which there is clearly a greater investment in quality is certainly the central water channel which, in turn, is connected to the larger ditch which surrounds this portion of the dune (Area 1000). These water conduits and drainage works were clearly judged to be crucial by whoever decided on investments in the site. However, the chronologies could diverge considerably, since the moat seems to delimit the area of occupation of the hill in earlier times, judging by the area of concentration of surface finds. Rather than a totally new investment, the moat may have been a pre-existing feature which was renewed and improved over time (specifically, in the phases of use of the structures found by the 2016 excavation) to adapt it to the needs of the site.

A short distance away (Area 3000), more robust walls define a series of rectangular enclosed spaces, one abutted against the other: these are probably storage rooms or structures associated with the open areas and channels described in the case of Area 2000. In this case too, aside from a few later traces of use, excavation did not reveal the presence of hearths, beaten-earth floors, or other traces bearing witness to a continuous use of the spaces for habitational purposes.

On the basis of the above, and given the reconstructed environmental context, we believe we can interpret the structures found at Carlappiano as features designed for the solar salt production cycle (*fig.* 12). Salt was indeed an important resource in this central Tuscan coastal area throughout a long chronological period, as is well-known from the textual sources though until now it has been invisible for Medieval Archaeology (Carusi 2008). As well as low walls and water channels, other features which support this hypothesis are the fact the site is located close to the river, and the presence of the moat. It is precisely in places close to the sea, but which are sheltered and secure, and above all with available fresh water, that salt-works find their perfect conditions, as well evidenced also by the nearby area of Grosseto[32].

The salt production cycle involves a gradual increase in salt concentration, generally flowing into progressively smaller basins, from the sea water (contained in large evaporating basins) to brine water (collected in smaller basins, called "salanti"). The salt obtained was finally washed with salt water to purify it, and then accumulated in dry, open areas and sometimes stored in storage rooms[33]. In this series

[32] For suggestions regarding the location of the former saltworks features, see Citter Arnoldus 2011, pp. 38-58.

[33] The process is described in detail by Agricola, in Book XII of *De Re Metallica.*

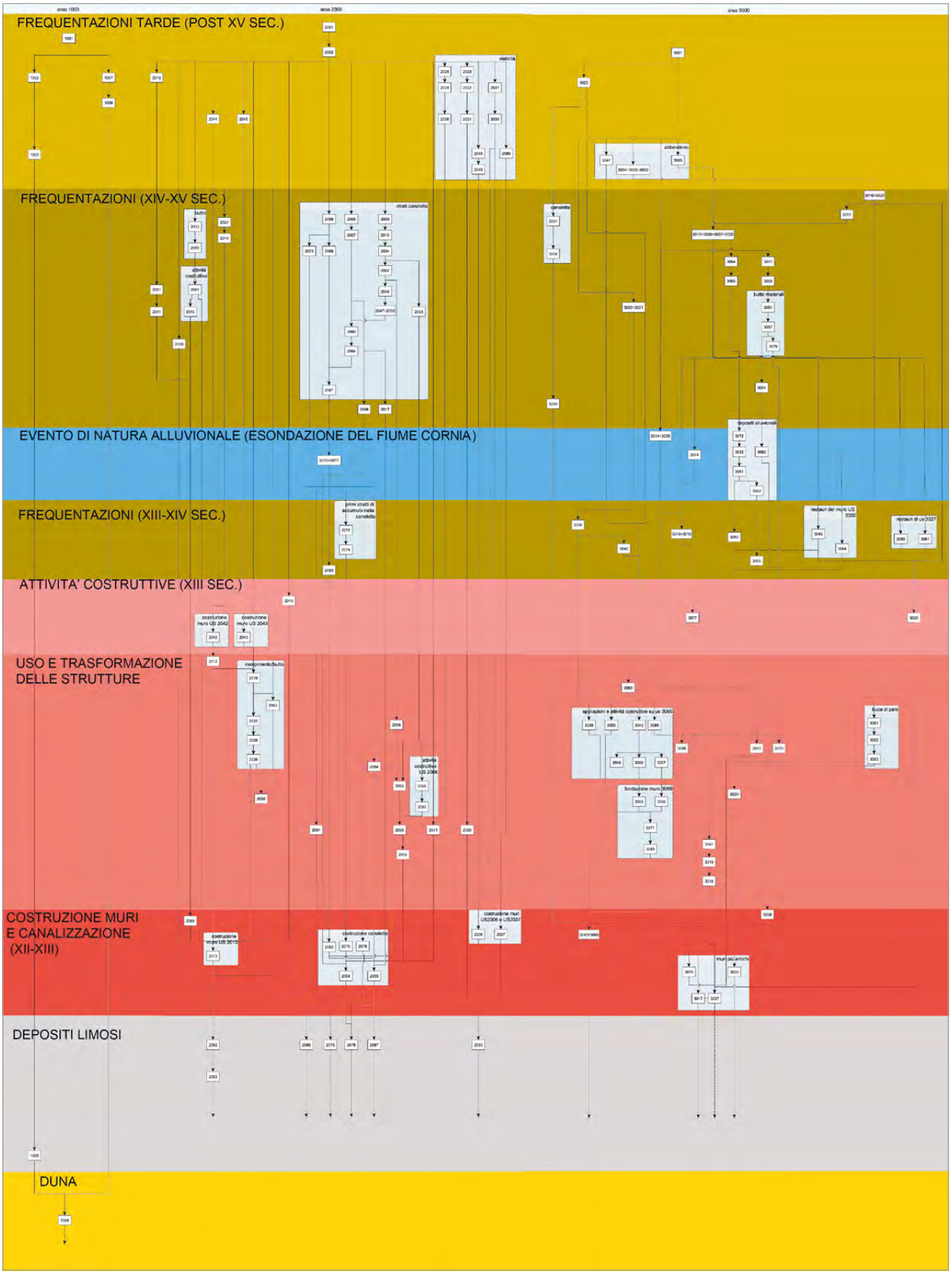


fig. 11 – Carlappiano 2016, excavation matrix.

fig. 12 – Antonino Leto, *Saline di Trapani,* ca. 1881, oil on canvas. Courtesy of the Galleria d'Arte Moderna di Palermo.

of steps, fresh water was essential, since it served to regulate the degree of concentration of the salts in the solution during the evaporation process. Indeed, sea water contains a mixture of different salts, which precipitate when differing degrees of concentration are reached. The first to precipitate are calcium carbonates and sulphates, and only afterwards is precipitation of sodium chloride obtained, and finally magnesium chlorides and sulphates[34]. This latter event is, however, to be avoided at all costs, because the end product would be a poor quality salt with an unpleasant taste. It is thus vital to maintain control of the concentration of the saline solution, and to do this the use of fresh water is crucial evidence of the need, to position the production facilities near rivers.

The geomorphological conditions of the Carlappiano area (described at para. 2) make it an ideal site for the location of evaporation saltworks facilities. The more low-lying areas surrounding the dune could have easily been used to site evaporation basins, which were the larger kind of basin directly linked to the sea. Meanwhile, the finds from the excavation on the dune can be linked to the phases of brine concentration, during which possible use of fresh water was necessary to control the precipitation of magnesium salts, and open, flat areas were needed where the final product could be left to dry. In particular these may relate to the open spaces delimited by low walls identified in Area 2000, and indeed the accumulation of salt here could be what was responsible for the depletion of chemical elements in the soil recorded by the XRF analyses, as suggested above.

The scale of the overall investment in the site, and in particular in the construction of the water channels, was determined by the significant economic impact of salt production. As a resource, salt was central, as of the Early Medieval period, in the financial interests of the central authority (as said in this part of the Cornia valley until the 11thc this was in the hands of the dukes and marquises of Lucca), and the proceeds from it would later be placed under the control of the conti Aldobrandeschi (see Bianchi and Collavini in this same book). These counts at the end of the 11thc passed them on to the monastery of San Quirico di Populonia, which probably carried out the works identified by our research. Moreover, the site's characteristics make it a strategically perfect place not just for salt production but also for the collection of salt produced in other surrounding areas, all located within the *curtis* of Franciana, where the topographical conditions made it possible to establish such facilities. From Carlappiano it would have been easy to distribute it locally or regionally, thanks to the presence of an effective system of road communications and the proximity of the river Cornaccia and the Foce di San Martino, open to the sea.

L.D.

11. FROM EXCAVATION TO THREE-DIMENSIONAL RECONSTRUCTION

The analyses conducted at the site and outlined above, depict Carlappiano as an important context in the historical panorama of the Medieval Cornia valley, an economic and administrative centre for the salt production which we find attested to in written sources, but which so far had been unknown to archaeology (Collavini 2016). For this reason, the site was chosen as the subject of three-dimensional modelling which has attempted to visualize the various suggested reconstructions for the 12th-13thc occupation phase, the phase identified in the excavation. This reconstruction had two goals; the first uses three-dimensional modelling as an integral part of scientific research, because, as shown by the case in question itself, it is a useful means for validating suggested reconstructions, and also provides discussion points and ideas which may direct future research. In addition to this, visual representation is one of the most effective tools for conveying information, thanks to its evident emotional

[34] Hocquet 1990, pp. 10-11.

fig. 13 – Carlappiano. Reconstruction of salt-works and of the surrounding environmental context, on the basis of excavation findings.

impact, and therefore it proves to be an excellent means for presenting the work conducted by the research team.

In the case of Carlappiano, the work of 3D modelling began with the excavation campaign. The graphic documentation of the site was carried out using three-dimensional photogrammetry, involving every stratigraphical unit; this produced an archive of 3D models of the excavated layers. The photogrammetry was carried out using the *Agisoft Photoscan* software, based upon the *Structure from motion* and *Dense image matching* algorithms. Starting out from a set of photos framing an object from several viewpoints, tthe program extracts a three-dimensional model which is geometrically accurate and which has information regarding the colour of the surfaces. These models provided the geometrical and spatial reference points which guided the whole reconstruction process. The use of *Blender* software completed the task of producing the 3D reconstruction, from the surface modelling phase to the *rendering* of the final images.

The reconstruction involved a rectangular transept aligned north-south measuring around 880×1,330 m in length, for a total area of 117 ha. As well as the excavation areas, it also includes the surrounding environmental context in the conviction that this is vital for a proper understanding of every archaeological place. This concept is even more relevant for a production site such as Carlappiano.

The reconstruction concentrated initially on the original paleo-environment, outlining the course of the river Corniaccia, located a few metres east of the circular anomaly, and visible from historical maps; a reconstruction of the limits of Piombino lake on the basis of the various previous studies was also suggested (Bardi 2002; Isola 2009; Cappuccini 2015; Dallai 2016). As regards the Carlappiano zone in detail, it is hypothesized that the lagoon reached as far as the southern limit of the ridge of dunes which the site stands on. This possibility seems to be supported by some features in historical maps which, just where the coastal dune makes contact with the plain between the dunes, show the point where the river Corniaccia flows into the lagoon, marked by an area where the waters flow more slowly.

On the basis of the excavations, Area 2000 is interpreted as a place dedicated to the final phase of the process of salt extraction, during which the product was left to dry in the sun, heaped into piles, in accordance with a methodology both at contemporary saltworks in Trapani, Margherita di Savoia and Cervia, and in the modern era in the now-abandoned saltworks at Portoferraio (Riparbelli 1998).

The building found in area 3000 has been reconstructed in the phase with the presence of two main building periods, the older structure recorded as US 3027, 3017, 3068 and 3066, and the more recent build abutting it, delimited by US 3030 and 3076.

During surface analysis and excavation, the "salanti" basins where the salt was produced were not identified, but only, as already described in detail, the drying area. However, in the course of studies of the wider area for 3D reconstruction, two possible locations were identified for these features, lying outside the anomaly identified from aerial photos, in the area where the X-ray fluorescence investigations identified the largest concentrations of diagnostic elements (Fe, Mn, Zn, K and Ca).

On the basis of cartographic data, the basins have been suggested as having existed in a 4 ha rectangular area, located west of the circular anomaly. This features a system of roads represented on the historical maps. A second hypothesis suggests that the system of basins stood in the area immediately to the south of the circular anomaly, the area between the lagoon, the moat and the Corniaccia, a zone whose position was especially advantageous for operations connected to the production cycle, but which was more exposed to possible flooding from the river (*fig.* 13). The suggested system of basins reproduces the system described by Agricola in Chapter XII of his *De re metallica*, which envisaged the use of three differing types of basin, of different sizes, for the gradual evaporation of water.

M.B.

12. APPENDIX. CERAMICS FROM CARLAPPIANO: A STUDY OF THE SURFACE CONTEXT

This Appendix provides an opportunity to reconsider analytically the finds made at Carlappiano in the field-walking surveys conducted in the year 2000 (Dallai 2003-2004), 2008/2009 and in the 2014/2015 campaign, ahead of the excavation. The total number of finds made is 836 fragments[35] and this comprises ceramic material, glass, metal, stones and bricks used in construction, minerals and slag. The largest percentage comes from the most recent survey, made in November 2015 (74%)[36]. This number is closely linked to the excellent visibility of the ground surface, encountered at the time of the survey. In comparing the percentages to the previous years (2000: 5%; 2008/2009: 21%), we note that the 2015 season was a particularly "fruitful" one.

Here, most attention is given to the pottery, but mention must be made of the material associated with it in order to present a more detailed picture of the context. Both roof tiles (tegulae and imbrices) and construction materials (bricks) were found; in the latter case, the materials were of mixed source (artisanal and industrial), and determine a broad chronological span[37]. Moreover, some examples are characterized by a high degree of surface vitrification, denoting exposure to direct heat.

The presence on the site of regularly shaped stones, mortar and *opus signinum* suggests the presence of walled buildings and floors.

Also found were pieces of slag and iron-bearing ore (hematite) in significant percentages, and a grinding stone made from iron slag was found.

Finally, the only piece of glass was retrieved. This was a piece of bevelled colourless glass with applied blue glass festoons. This fragment may be a link piece of the side and the stem of a Roman glass of "Isings 36/38/40" type (Isings 1957, pp. 50-54), made between the second half of the Ist C and the 3rdc. Alternatively, it could be a handle from a stopper or a lid of "Isings 66" type (Isings 1957, pp. 85-86), datable to the same period. However, the decoration with applied blue glass filaments is reminiscent of glassware made as of the 5thc AD. (Hayes 1975, n. 405, p. 109, p. 212; n. 394, p. 107, p. 215).

12.1 Pottery

The total number of sherds collected between 2000 and 2015 is 738; the minimum number of forms[38] is 84. Analyzing all of the sample, three different functional types were identified, covering a very wide chronological range (*tav.* 2):

I. kitchenware/cooking vessels
II. storage vessels and tableware
III. transport vessels

Belonging to the first group are cooking pots and pans made in a coarse, undecorated fabric, or glazed coarseware (glazed only internally) and cooking pans and dish-lids made of sigillata africana for use in the kitchen.

The second group comprises forms for storage such as jugs, jars, bowls and *orcioli* (small pouring vessels) with a levigated undecorated fabric; for tableware, there are: maiolica arcaica, slipware and graffito ware, monochrome glazed ware, thin-glazed ware, green, cobalt and manganese glazed ware, red-slip ware, sigillata africana and heavy-glazed ware.

Finally, the third group includes amphora from various sources.

[35] The total count also includes material belonging to the UT 92 site records, compiled by Lorenzo Marasco as part of his research doctorate 2008/2009 (Marasco 2013).

[36] During the survey, it was decided that only diagnostic sherds would be gathered, and a representative sample of the construction material present on the site.

[37] Several types of fabric were identified, characterized by differing amounts of inclusions, and various kinds of inclusions, attributable generically to the Roman period and up to and including the modern era.

[38] The calculation of the minimum forms was based on the diagnostic parts found (rims and bases).

12.1.1 *Coarse, undecorated pottery* (*tav.* 3)

The olla (cooking pot) is the most frequently found form, and can be divided into two differing types:

– I.1.1. Olla with an everted rim and indent for the lid, with a rounded rim and globular body (dis.11; Cantini 2003, tav. 10, I.7.18, p. 93) is attested in contexts dating to the second half of 8th-10thc.
– I.1.2. Olla with everted, thickened rim with external groove below the rim (dis.14; Cantini 2005, tav. 31, 5.83, p. 143; Vaccaro 2011, tav. IX, 8, type 3, US 5147), datable to first half of 7thc.
– I.1.3. Casserole/pan with a thickened rim folded back externally with groove emphasizing junction between rim and vertical wall; externally, a grey patina is visible on the rim (dis.12; Atlante delle forme ceramiche, tav. CVIII, num. 8, p. 221). The form recalls African cooking ware, and specifically *Ostia I,* fig. 270 (dated to 3rdc AD), and dated to the 4th-5thc, on the basis of a comparison with various find contexts in Italy (Fontana 1998, pp. 83-100; Fontana 2005, pp. 259-278).
– I.1.4. Casserole with short, rounded rim with ash-coloured patina externally on the rim (dis.10; *Ostia III,* fig. 331), datable to same time horizon as point 3.
– I.1.5. Casserole with ring foot (dis.13; *Lamboglia 10A;* Atlante delle forme ceramiche, tav. CVI, nos. 10-11, p. 217). This can also be identified as an imitation of African products on the basis of its typological characteristics, datable to 4th-5thc.
– I.1.6. Flat base of cooking pan, made of sigillata africana (dis.36), on the surface of which a well-preserved layer of red slip is visible (dates to the 2nd-5thc).
– I.1.7. Three-ribbed handles from closed vessels (diss.21-22; In Siena these are attested to the first half of the 6thc, Cantini 2005, tav. 19, 4.100, p. 106; Vaccaro 2011, tav. CIV, num.3,5, Podere Serratone), made from semi-levigated clay. These belong to the 7th-to 8thc.
– I.1.8. Simple strap handle (dis.25; Cantini 2005, tav. 19, 4.105, p. 106; Vaccaro 2011, tav. CX, no. 8, Casa Steccaia) belonging to a closed vessel made from an undecorated semi-levigated fabric, datable to the Early Medieval period, 7th-9thc AD.

A large number of wallsherds of undecorated coarseware pots possess a range of differing fabrics[39], which in many cases have parallels, on the basis of type and quantity of inclusions, with the diagnostic parts datable to the Early Medieval period, as described above.

Finally, the kitchenware categories identified[40] include the undecorated coarseware glazed only on the inside or on both surfaces with a thick, dark-coloured glaze. The forms relate to cooking pans and cooking pots which, on the basis of technological characteristics, can be dated to a period between the 12th and 13thc (Grassi 2010, p. 30).

12.1.2 *Undecorated levigated pottery* (*tav.* 3)

The most common form is the jug/jar which, on the basis of rim and handle typology, relates to a broad chronological period, ranging from the Roman era (see dis.5 for the rim, and diss. 20 and 24 for handles with flattened section, I.2.6) to the Central Medieval period.

In particular, the following vessels are attested:

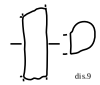
– I.2.1. Jug/jar with rounded, thickened rim, round mouth, cylindrical neck and strap handle attached directly below the rim (dis.15: Cantini 2005, tav. 7, nos. 4.10-4.11-4.12; Vaccaro 2015, fig. 7, no. 2 from Podere Serratone and dis.23: curved strap handle; Cantini 2005, tav. 19, no. 4.106; Vaccaro 2011, tav. CIV, no. 2) and flat bases (dis. 3: Cantini 2005, tav. 16, no. 4.85, p. 104; Vaccaro 2011, tav. CIV, no. 10 from Podere Serratone; diss. 27, 28: Cantini 2005, tavv. 15-16, nos. 4.76-4.87; Vaccaro 2001, tav. CVII and tav. CIV, nos. 9-10 and no. 11 small amphorae from Casa Andreoni and Podere Serratone); in western Tuscany this form is ascribed to the 7th to 9thc AD.
– I.2.2. Jug/jar with everted, rounded rim and wall suggesting a globular body shape, with strap handle attached to a neck rising slightly

[39] Fabric analysis was carried out macroscopically on all fragments found, distinguishing 13 variants (5 for plain, coarse pottery, 4 for semi-levigated/selected pottery, and 4 for levigated pottery).

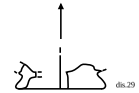
[40] These are fragments of the walls of pots which are too small to be drawn.

Roman Age

depurata ware, small handle: 1st c. BC-1st c. AD

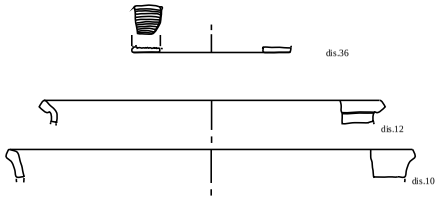


amphora, Dressel 24: 1st-2nd c. AD



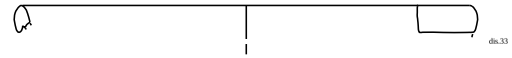
depurata ware, bowl with ring base: late Republican age

Late Antique



african red slip and imitation/cooking ware: 3rd-5th c. AD

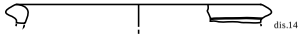
coarse ware, casserole: 4th-5th c. AD



“Hayes 105”, nn. 7-10, 15-16, tav. XLIII: 580/600-660 c. AD

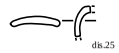
Late Antique/Early Medieval (5th-7th c. AD)

“Empoli” amphorae: 5th-6th c. AD

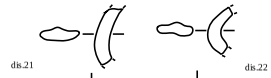


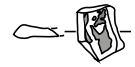
coarse ware/cooking ware: 7th c. AD

depurata ware, jug handle: 7th-9th c. AD



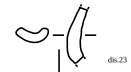
selezionata ware/jug handle: second half 6th-beginning 7th c. AD



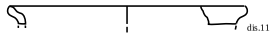


ingobbiata di rosso, handle jug: 6th-7th c. AD

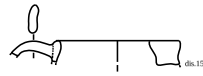
depurata ware, jug handle: second half 7th-8th c. AD



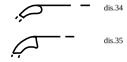
Early Medieval (8th-10th c. AD)



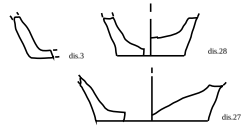
coarse ware/cooking pot: second mid 8th-9th c. AD:



acroma depurata ware, small amphorae or jug: 8th-9th c. AD

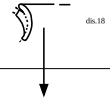


depurata ware, basin with inverted and flattened rim: late 8th-10 th c. AD



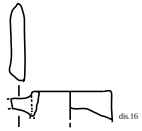
depurata ware, jug base or small amphora base: 7th-9th c. AD

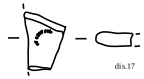
acroma depurata ware, small jug: 10th c. AD



depurata ware, basin: mid 8th-9th c. AD

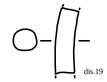
Middle Ages





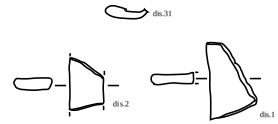
depurata ware, medieval jug and handle from the territory of Pisa: 11th-14th c. AD

cobalto e manganese, dish with ring base: late 12th-mid 13 c. AD



archaic majolic, jug: second half 13-14 c. AD:

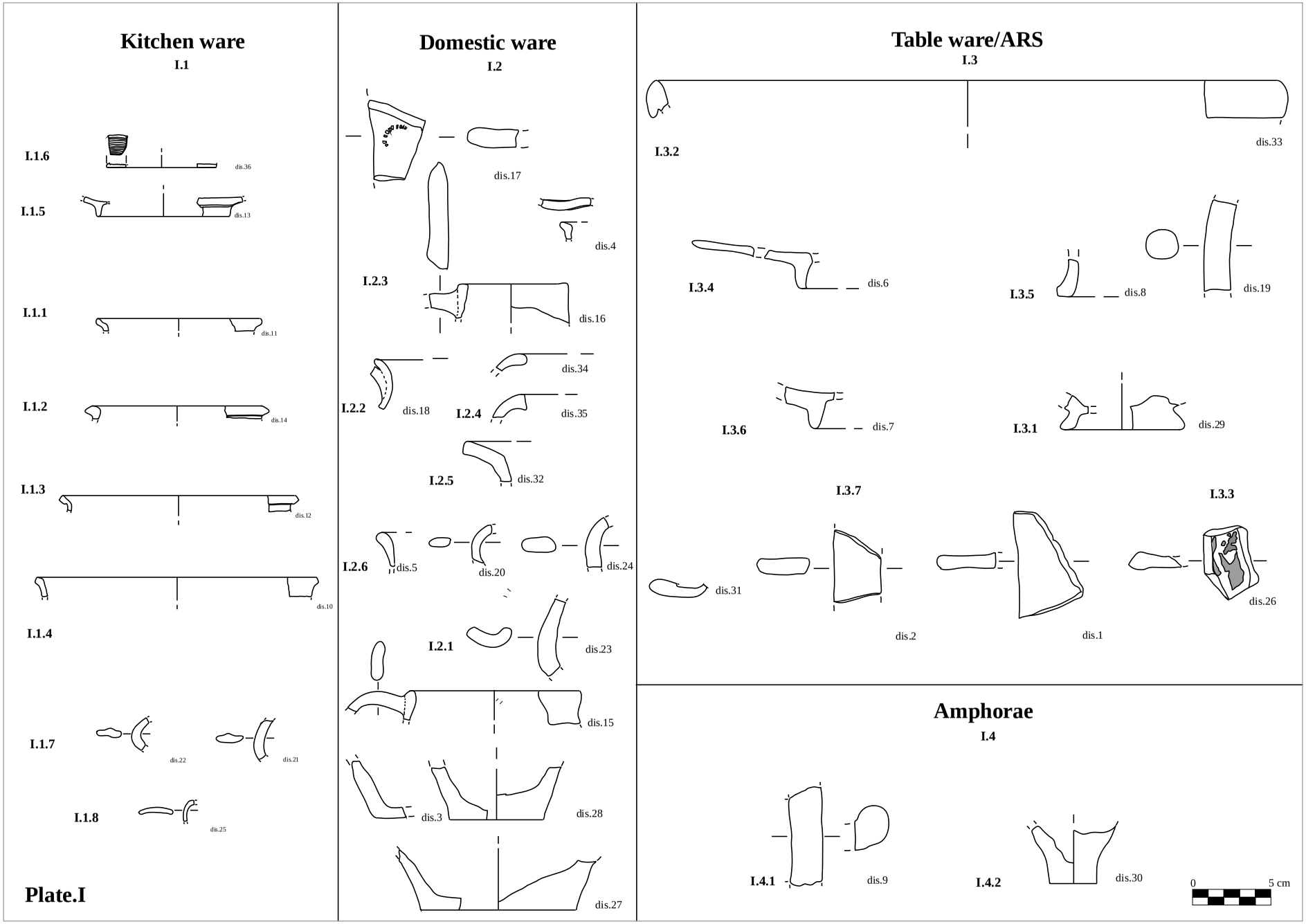
depurata ware, handle of medieval jug



ingobbiata e graffita, dish with ring base: 15th-17 c. AD

Plate. II

tav. 2 – Carlappiano: chronology and pottery types collected during field survey.



tav. 3 – Carlappiano: table showing the most significant pottery finds made during the *survey* and distinguished on the basis of function.

above the rim (dis.18: Cantini 2003, tav. 25, II.6.4; Cantini 2005, tav. 8, no. 4.18); this type is datable to between 10th and 12thc AD.
– I.2.3. Jug/jar (dis.16: Grassi 2010, fig. 81, jug group 1, type 2-3,), with rounded rim flattened on top, and more or less thickened, a round or trefoil mouth (dis.4: Grassi 2010, fig. 25, group 1, types 1, 2, 3) sometimes with a small spout, cylindrical or slightly tapered neck, with ovoid body and flat base, strap handle attached immediately below the rim, as is typical of the central centuries of the Medieval period; in one instance, a symbol with radiating dials is stamped on the handle (dis.17: for the stamp see Berti, Gelichi 1995, type III.C; Vaccaro 2011, tav. XCV, nos. 1-2), characteristic of 12th-14thc Pisan ware.
Alongside the jugs and jars there is also another form, the bowl, made of plain, levigated clay, present in two types:
– I.2.4. Bowls with inverted rim and rounded edge, or slightly thickened and rectangular edge, flattened on top (diss.34 and 35: Cantini 2003, tav. 21, II.2.5, p. 120; Cantini 2005, tav. 13, nos. 4.57-4.58; Grassi 2010, fig. 6, nos. 9-11; Vaccaro 2011, tav. CXIII, no. 8). Although this was a simple form, made in workshops with sub-regional distribution networks, it seems to have first appeared between the 6th and 7thc in association with the coil-made pot, but unlike the latter it continued to produced throughout the Early Medieval period (Grassi 2010, pp. 16-17).
– I.2.5. Bowl with wide rim and slightly rectangular edge (dis.32: Cantini 2003, tav. 31, III.2.1; Cantini 2005, tav. 13, no. 4.61); in the Siena area it is associated with contexts dating to the second half of the 8th-9thc.

12.1.3 *Tableware* (*tav.* 3)

Among the oldest finds in the functional sphere of tableware a very large number of rims, side fragments, handles and bases were found, and specifically:

– I.3.1. Dishes and bowls with a ring foot base (dis.29: Dyson 1976, fig. 4, CF 54, late Republican), all poorly preserved but belonging to the Roman period.
– I.3.2. Rounded, pendant rim, identifiable as part of a *Hayes 105* dish in terra sigillata africana D (dis.33: Atlante delle forme ceramiche, tav. XLIII, nos. 3-4, p. 96). The surfaces still retain a thick layer of good quality, bright red slip. The presence at the site, albeit sporadic, of an African product dating to 580/600-660 AD.
– I.3.3. Profiled handle belonging to a closed vessel (dis.26: Cantini 2005, tav. 42, no. 7.29; Vaccaro 2011, tav. XXVII, nos. 2, 4.) on which traces are visible of red slip, dated to 6th-7thc.
A fragment of a jug with a heavy glaze seems to relate to a slightly later phase; it can be dated to a chronological level in the course of the Early Medieval period.
– I.3.4. Base of dish with wide rim and ring foot, with its internal surface decorated with floral motifs in blue and brown, belonging to the "cobalt and manganese" class (dis.6: Berti 2002, type B, pp. 93-96; Baldassarri, Giorgio 2010, pp. 43-44, fig. 11; Berti, Giorgio 2011, p. 39). This is imported ware from Tunisia, production of which ranges from the last quarter of the 12thc to the first half of the 13thc[41].
– I.3.5. Maiolica arcaica jars made in Siena and Pisa, datable as per the various chronological production periods associated with these wares (dis.8: base with flared foot, and dis.19, rod handle: Alberti 1993, no. C8, p. 597; Berti 1997, tavv. 106-115, pp. 171-179; Cantini 2003, tav. 35, no. V.4.2-4; Grassi 2010, fig. 50).
– I.3.6. Ring foot, glazed with graffito design (dis.7: Gelichi 1993). This find is later, since it is characterized by the technique of slip-painting introduced to Tuscany around the second quarter to middle of the 15thc.
– I.3.7. jugs and jars made of plain, levigated pottery, datable to the Central Medieval period (diss.1, 2, 31, medium-to-large strap handles made in Siena and Pisa in 13th-14thc: Grassi 2010, fig. 34; Vaccaro 2011, tav. XCV, nos. 3-8).

Also present are a number of wall sherds, their primary surfaces coated with a layer of glaze with differing shades of green, identifiable as coming from open forms and closed forms, datable generically to the Medieval period.

12.1.4 *Pottery for transport* (*tav.* 3)

We have identified two types of wine amphora:
– I.4.1. Double-rod handle[42] ascribable to a *Dressel 2/4* amphora which, on the basis of technical characteristics, can be attributed to pottery production in coastal workshops of *Tarraconense* Spain, 1st-2ndc, well known in the Populonia area.
– I.4.2. Two spikes from *Empoli Amphorae* (dis.30: Cambi 1986, pp. 564-567; Cantini 2010, p. 353; Cantini 2011, p. 163, note 17; Vaccaro 2014, p. 216). Macroscopic analysis of the fabrics gives a definite attribution to 5th-6thc production in the Arno valley area, attested to in the area in question at numerous sites, including the nearby San Quirico di Populonia (Pagliantini, Ponta 2016, pp. 253-255, with reference bibliography).

Finally, there are 27 fragments of amphorae from various sources. Their preservation does not permit identification of these types but a North African or Tyrrhenian provenance is suggested.

For a better understanding of the findings made, we intend firstly to give an overview of the environmental context in which the site found itself (para. 2), reconstructing this on the basis of various sources (maps and photographs, and geological, archaeological and historical sources). The data for the ancient population of the plain in the Classical era and up until Late Antiquity, mostly the product of archaeological surveys, offers a diachronic perspective, within which occupation of the Carlappiano dune (para. 3) is also located. The study of surface finds of pottery reveals that this occupation continued into the Early Medieval period (para. 4). However, the stratigraphies revealed by the 2016 excavation campaign do not make it possible to specify the features of the occupation for time periods previous to the 12thc. These are presented in an analytical form for each of the three excavation sectors, and are preceded by a description of the preliminary investigations carried out on the site (paras. 5, 6).

The material found in the course of the investigation is presented and discussed in the following paragraphs. In particular, from an analysis of carbon finds (para. 7) a reconstruction is put forward of the vegetation relating to the hills surrounding the site. The 1,678 sherds are quantified by class (para. 8). From an analysis of them their provenance is reconstructed, and thereby the site is placed within the economic and trading systems already attested in the local area. Geochemical analyses (para. 9) provide useful support for the interpretation of the archaeological findings with a view to production, and lead into the initial conclusions (para. 10). These, being based on all the findings presented in the previous paragraphs, propose the identification of an evaporation salt-works at the site of Carlappiano in the 12th-13thc. To facilitate the immediate understanding of this interpretation, a 3D reconstruction is offered (para. 11), drawn up on the basis of excavation findings and map information. Finally, in an appendix, it is proposed that the material found at the site, in the course of three separate topographical campaigns (in 2002-2003; 2009; and 2016), will be published. This represents a useful contribution to the reconstruction of medieval settlement and trade dynamics, also in view of the scant documentation of post-Classical pottery contexts from the lower Cornia valley.

A.B., E.P.

[41] Imports of cobalt and manganese ware are also documented at other sites in both the coastal area (San Quirico di Populonia) and inland (Montemassi at the end of the 12thc, and the Canonica di San Niccolò at Montieri). The presence of Tunisian pottery stresses the vitality of trade involving this area. A. Costantini, Archeologia in Piazza dei miracoli, pp. 393-430.

[42] Salerno R. 2008-2009, *Le anfore romane nel territorio di Populonia*, Master's degree thesis, Università degli Studi di Siena, dis.9, p. 152; Costantini 2011, p. 398 with reference bibliography

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Abstract

For a better understanding of the findings made at Carlappiano after the 2016-2017 archaeological campaign, we intend firstly to give an overview of the environmental context in which the site found itself (para. 2), reconstructing this on the basis of various sources (maps and photographs, and geological, archaeological and historical sources). The settlement patterns of the Cornia plain in the Classical era and up until Late Antiquity, mostly the product of archaeological surveys, offers a diachronic perspective, within which occupation of the Carlappiano dune (para. 3) is also located. The study of surface pottery finds reveals that this occupation continued into the Early Medieval period (para. 4). However, the stratigraphies revealed by the 2016 excavation campaign do not make it possible to specify the features of the occupation for time periods previous to the 12th c. These are presented in an analytical form for each of the three excavation sectors, and are preceded by a description of the preliminary investigations carried out on the site (paras. 5, 6).

The materials found during the investigation are presented and discussed in the following paragraphs. In particular, from an analysis of carbon finds (para. 7) a reconstruction is put forward of the vegetation relating to the hills surrounding the site. The 1,678 pottery sherds are quantified by class (para. 8). From an analysis of them their provenance is reconstructed, and thereby the site is placed within the economic and trading systems already attested in the local area. Geochemical analyses (para. 9) provide useful support for the interpretation of the archaeological findings with a view to production, and lead into the initial conclusions (para. 10). These, being based on all the findings presented in the previous paragraphs, propose the identification of an evaporation salt-works at the site of Carlappiano in the 12th-13th c. To facilitate the immediate understanding of this interpretation, a 3D reconstruction is offered (para. 11), drawn up on the basis of excavation findings and map information. Finally, in an appendix, the materials found at the site in the course of three separate topographical campaigns (in 2002-2003; 2009; and 2016), is published. This represents a useful contribution to the reconstruction of medieval settlement and trade dynamics, also in view of the scant documentation of post-Classical pottery contexts from the lower Cornia valley.

*Lorenzo Marasco**
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*Carmine Lubritto**, Paola Ricci***

INVESTIGATIONS AT VETRICELLA: NEW ARCHAEOLOGICAL FINDINGS IN ANTHROPIC AND NATURAL LANDSCAPES

1. ARCHAEOLOGICAL STUDIES AT VETRICELLA AND "CASTELLINA": INITIAL RESEARCH AND THE nEU-Med PROJECT

The study project carried out near Scarlino in the area of Vetricella (GR), a toponym which designates an extensive estate holding which is the location of the archaeological site under study, represents an extensive archaeological research program. The first investigations date back to the autumn of 2006 [1]. With the 2016 season, the research possibilities offered by the new ERC nEU-Med project have enlarged the prospects for investigating and understanding this complex site.

Expanding our gaze to include all the local territory, this research process must be regarded as even longer and complex, establishing a link with a common area of archaeological research which, in the Maremma area, has been proceeding for almost 40 years[2]. Mention has already been made in this volume of the link between the most recent research conducted in the coastal Upper Maremma and the first investigations conducted by Riccardo Francovich towards the end of the 1970s (Francovich 1985; Bianchi 2015a; Ead. 2015b; Marasco 2009, pp. 326-327). From an overall reading of the data gathered, the historical questions and the answers to them, it is possible to highlight both the value of work done in the past and the importance of the new findings presented in this volume. Valuable work on historical reconstruction, which is expressed in terms of matching discoveries, and, to an even greater extent, in the possibilities of supplementing previous studies with new interpretive frameworks.

Drawing upon earlier studies in the area of Vetricella[3], the intention here is to present the state of play as regards research in one of the main contexts for the study of the established socio-economic order in the coastal area, during the Early Medieval period.

The site referred hereafter with the same name, *Vetricella*, was identified from the earliest research by the toponym *Castellina*, a name given to a farmhouse close to the excavation area, whose place-name is believed to be residual from former medieval features[4]. As well as identifying the individual site, the term *Vetricella* also stands for a larger area, containing in its etymology a reference to a previous marshland environment[5], devoid of any historical reference, and linked to a minor stream, near the farm of the same name. The uncertainty shown also on previous occasions in defining a single nomenclature for the investigation context is somehow a reflection of the total absence of specific documentary references (Farinelli 2013) and of the elimination of the local "place-name" memory owing to the growth of marshes and depopulation in the modern era[6].

Ever since the first few years of investigations, the methodological approach has been of a territorial nature, beginning as a project to reconstruct Early Medieval, area-wide landscapes, rather than as a study of an individual context[7]. In these terms, the research conducted between 2007 and 2009 helped to open a new interpretive window for a reconstruction of the settlement patterns in the coastal wetlands, stimulating, in parallel with other contemporary research, the larger aspects in the scope of nEUMed[8].

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[1] The project initially began as part of the activities of the LAP&T – Laboratorio di Archeologia dei Paesaggi e Telerilevamento (Landscape Archaeology and Remote Sensing Laboratory) at Siena University (Campana, Francovich, Vaccaro 2005; Campana, Francovich, Marasco 2006), before continuing as a specific research doctorate, and territorial research project (Marasco 2013b).

[2] See, in this present volume, the introductory summary overview presented by Richard Hodges.

[3] See, especially, the presentation of the preliminary phases of research (Campana, Francovich, Marasco; Campana *et al.* 2009) and of the initial fieldwork campaigns (Marasco 2013a, 2012, 2009).

[4] Despite the attractive idea of a relationship between the place-name and the spatial proximity of our site, we cannot discard the possibility that the presence of the name in this area may refer to different historical dynamics. Indeed, the toponym of *Castellina*, already attested to in the same area at the start of the 9thc (Barberini 1985), could actually refer to the presence in the same area of the "Bandita della Castellina", with reference to another fortified site situated in the territory of Massa Marittima (in reference to this *Castellina*, modern-day Pero Castellaccio, see Farinelli 2013 and Cucini 1985, p. 247).

[5] For the etymology of the toponym, connected to a marshland plant, *vetrice*, see Pieri 1969.

[6] For an initial historical analysis of the process of marsh formation and land drainage in this area, see Azzarri, Rombai 1985, p. 120 and the recent summary, supplemented by an archaeological interpretation, in Marasco 2013b, pp. 33-52. For considerations regarding indirect documentary sources relating to the history of Vetricella, see the article below by Simone Collavini.

[7] As already mentioned, the origin of the research project in the Vetricella area is directly connected to work on studying archaeological landscapes around Grosseto, promoted by Prof. Stefano Campana, and by the Remote Sensing Laboratory (LAP&T). Thus, ever since the first research work, a multidisciplinary approach has been pursued, with the integrated application of different investigative methodologies: aerial photo analysis and LiDAR surveys, georadar surveying, geo-electrical surveys and gradiometric measurements. For a reconstruction of the methodologies adopted, see Marasco 2013b, pp. 53-57.

[8] In the panorama of Medieval Archaeology in Tuscany, it is only recently that there has been an interest in contexts in low-lying areas, mostly coastal plains, and in former lagoon areas connected to these, historical contexts which have been analysed only marginally for the Early Medieval centuries. Previously hilly landscapes were favoured. We can cite the reconstruction of medieval landscapes in the nearby area of Piombino and the Val di Cornia (Dallai 2002;

The context in which our site stands is a flatland area near what is now the coast at Follonica (GR), through which flows the Pecora river and smaller, seasonal streams (*fig.* 1). Historically it was associated with large bodies of water, initially in the form of lagoons, and later marshlands. This is the context which will act as the general setting for the particular morphology for the site of Vetricella, which is distinguished by a slightly raised, round elevation (in part artificial), and by the presence of various concentric defensive features (clearly visible from the earliest aerial photos).

The particular appearance of the site immediately aroused the interest of archaeological research, having revealed its exceptional nature compared to the well-known forms for contemporary fortified structures in Italy. For these reasons it provided a stimulus for a specific study meeting in 2011 (Settia, Marasco, Saggioro 2013). An evident uncertainty in placing initial stratigraphic findings in their context is also clear in the attempts to attribute excavation findings to known typological terms or definitions. On several occasions the feature located at Vetricella has been interpreted in relation to the Medieval period *motte*-type feature (Marasco 2013a, p. 57; Id. 2009, p. 327).

The continuation of investigations, ensured by the new project, makes it possible to go beyond the problematics of the terminological identification of the site, at least at this stage of research, confirming that schematic terminological definitions are (sometimes) inadequate for the various different material solutions adopted, and also confirming the risk of an analysis founded on an interpretation of only the forms (Gelichi 2013).

Regarding the morphological definition, the new archaeological findings would probably also place our site within the larger category of *ring sites* with circular enclosures or ditches known from the northern European tradition, albeit on a scale, and having internal features, which suggest the image of the later seigneurial *motte*[9]. As for historical interpretations, the site of Vetricella was initially placed, owing to its material characteristics, in the context of the earliest early medieval manifestations of the establishment of a seigneurship (a small fortified nucleus comprising defensive features made of earth and wood), a precursor of the later appearance of the first castles (Marasco 2009; Bianchi 2010; Creighton 2012, pp. 94-45). By contrast, we shall see that the new archaeological data, integrated with an increasingly well-defined local territorial context, seem to describe a historical landscape that exists within a much broader framework, one probably connected to a public network of land holdings. This new key to interpretation involves not only the individual site of Vetricella, but also the surrounding territorial context, where previous investigations had already revealed a strong connection between the various settlement contexts identified on the ground (Marasco 2013b, pp. 198-213; Bianchi forthcoming; Bianchi 2015)[10].

Accordingly, in the paragraphs below the general archaeological context will be defined, as obtained from integrating the results of previous investigations with the new year of research work, proceeding from a study of the local territorial context toward excavation, and, in conclusion, presenting an initial analytical summary[11].

2. THE RIVER PECORA PLAIN: THE ANTHROPIC AND NATURAL LANDSCAPE

Going beyond the usual identification of the territorial context of the excavation area, the research conducted at Vetricella has always sought to place attention on landscape dynamics and their transformations through time, seeing them as the subject of the investigation itself. Dynamics in which a central role has always been played by an ancient lagoon environment which today is hard to perceive as such (or which may even be invisible), and partially overlooked, as a secondary aspect, in previous studies of the area.

The particular geographical context under examination today bears the typical appearance of expansive coastal plains which are a feature of part of the Tyrrhenian coast: large areas extensively farmed, surrounded by systems of low-lying hills and higher, wooded hills, and which were once occupied by lakes of brackish water and lagoons, which later turned into marshes, and which were finally drained for land reclamation (Bartolini *et al.* 1977; Federici, Mazzanti 1995). This scenario may already suggest how landscape transformation processes have seen a particular acceleration, especially as of last century, interrupting equilibriums between settlement sites, production activities and the exploitation of resources that had remained unchanged for centuries.

In environmental terms, the study area corresponds to the final section of the basin of the river Pecora, which is generated in the Massa Marittima area and which, over the centuries, has represented a central point of reference in the local historical landscape, despite the fact that today its name no longer preserves any reference to it[12].

Surrounding the large Pecora plain, the hills of Montioni and Cornia stand to the north, separating it from the nearby

Dallai, Ponta 2009) and territorial investigations carried out in the area of Grosseto (Vaccaro 2011). A vital contribution to a new research approach to the archaeological study of these contexts is offered especially by the application of extensive remote sensing methods, as is emerging from investigations in the ancient territory of Roselle (Campana 2017). For an analysis of the discipline in reference to examples of the archaeological study of wetlands (Wetland Archaeology), too often mistakenly regarded as marginal areas of the landscape, see the European overview put forward in Menotti, O'Sullivan 2013 and the research carried out in northern Italy by Fabio Saggioro (Saggioro 2012).

[9] Regarding problems connected to the classification of the material remains of fortifications made of perishable materials, see, in addition to the aforementioned Scarlino Conference, also the European overview put forward in Creighton 2012 and, more recently, in Christie, Herold 2016.

[10] See below, in this volume, for the reconstructive interpretation and historical analysis proposed by Giovanna Bianchi and Simone Collavini.

[11] In addition to this author, contributions to the drafting of the following paragraphs were also made by my colleagues who, with the 2006 campaign, collaborated in supervising the excavation and the archaeological investigation, conducted under Prof.ssa Giovanna Bianchi as Site Director. Together with them, however, there is a larger working group thanks to whom it has been possible, both in the previous seasons and with the new nEU-Med project, to carry out the research presented here: Mauro Buonincontri, Giulio Poggi, Stefania Fineschi, Marta Rossi, Elie Essa Kas Hanna, Elisabetta Ponta, Anna Romano, Roberta Ruotolo, Luisa Russo, and Davide Susini.

[12] The name of the river in the Early Medieval period is actually *Teupascio*, as mentioned for the first time in a document dating to 746 (CDL n. 87; MDL IV/1 n. 6; MDL V/2 n. 35). For the etymology of the place-name, and for its direct reference to the property of the king (*Teutpascio* da Þeudo-bakiz = river of the demesne), see the considerations put forward in Francovich Onesti 2000; Francovich Onesti 2002).

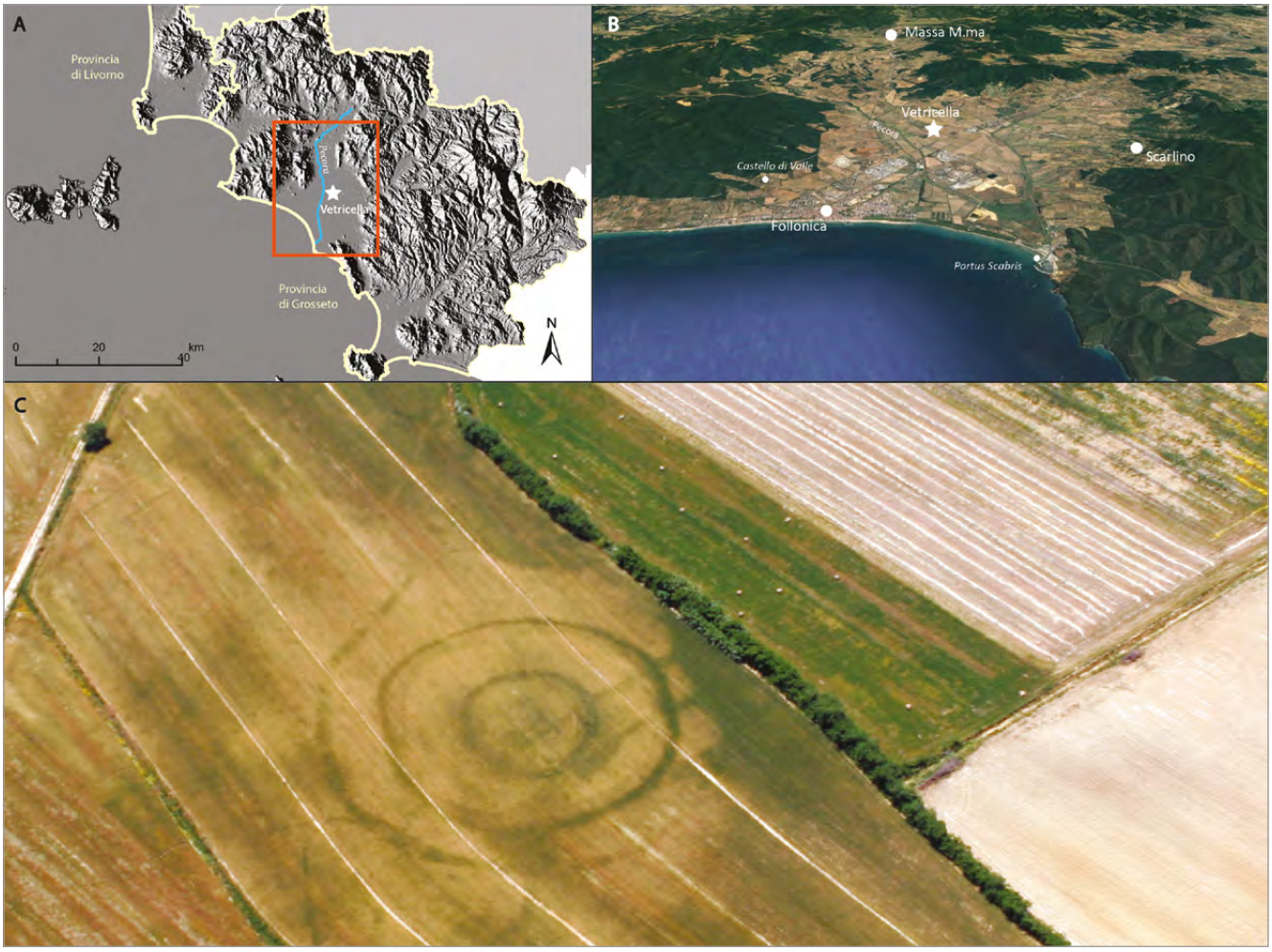

fig. 1 – Location of the study area and of the main toponymic references (A and B), with in detail the site of Vetricella (C), as it appeared in the summer 2005 (photo by LAP&T – University of Siena).

lagoon of Piombino, and the Colline Metallifere Massetane stand to the east, another vital reference point for reconstructing the historical landscapes. Finally, to the south, there are the hills of Scarlino, constituting the southern limit of the lagoon plain.

One of the most significant environmental features is local hydrography, which is very active in the formation of the ancient landscapes of the plain, both as a contribution to the standing waters of lagoon origin, and in terms of the harmful inflow of detritus, which contributed to marsh formation. Although this network of hydrographic features has been altered in its current state, as a result of operations to reclaim marshland, it can still be clearly seen by observing both historical maps and the traces found on the ground. One significant example of this is the reconstruction of the original course of the river Pecora, whose modern course has been artifically altered, but which in former times used to cross the plain not far from the area of Vetricella, subsequently bursting its banks in the lagoon area shown on 19thc maps as the *Palude di Scarlino (Scarlino Marshes)*[13] (*fig.* 2).

This must have been the location, in a smaller or larger form, of what is mentioned in the earliest written documents and maps as the *Lake* of Scarlino (Cucini 1985, p. 161; Cardarelli 1932, pp. 178-179), which, due to its brackish waters, bore witness to the very origin of the coastal plain (as reconstructed, with specific studies, for similar lagoon areas in the areas of Grosseto and Piombino[14]). Similar flat, low-lying contexts, which formed with the gradual withdrawal of sea levels, until forming, as of the Pleistocene, a large internal basin of brackish water, separated from the sea by a low sandy causeway. An extensive inland body of water which, in the Scarlino area, was fed with fresh water by the Pecora (and by smaller rivers), and with salt water penetrating from the wide river mouth, at a point corresponding to the spot now called Il Puntone (the site of the Roman-era *Portus Scabris*)[15].

[13] For a depiction of this, see, for example, the *Pianta Geometrica del Territorio adiacente alle Dogane del Puntone di Scarlino e Follonica*, dated 1835 (ASF, Miscellanea di Piante, 286r). For a more complex geomorphological study of the course of the river Pecora, see the contributions in Pieruccini *et al.*, in this same volume.

[14] For the Grosseto area of the former *Lake Prile*, see Arnoldus-Huyzendveld 2007, pp. 51-55; for the area of Populonia and Piombino, see the articles by Bardi 2002; Isola 2005 and Giroldini 2012, better analysed in Dallai *et al.* in the present volume.

[15] The earliest mention of the ancient harbour of *Portus Scabris* is found in the *Itinerarium Maritimum*, where it is situated between the port of *Alma positio* (which situated at the mouth of the modern-day river Alma, south of the Scarlino Hills) and the port of *Falesia* (on the modern-day coast at Piombino). For the location of the former *Portus Scabris* in the area of what is now Il Puntone, corresponding also to the Medieval Era *Portichale*/Portiglioni, see Pasquinucci 2004, and the underwater research illustrated in Bargagliotti, Cibecchini

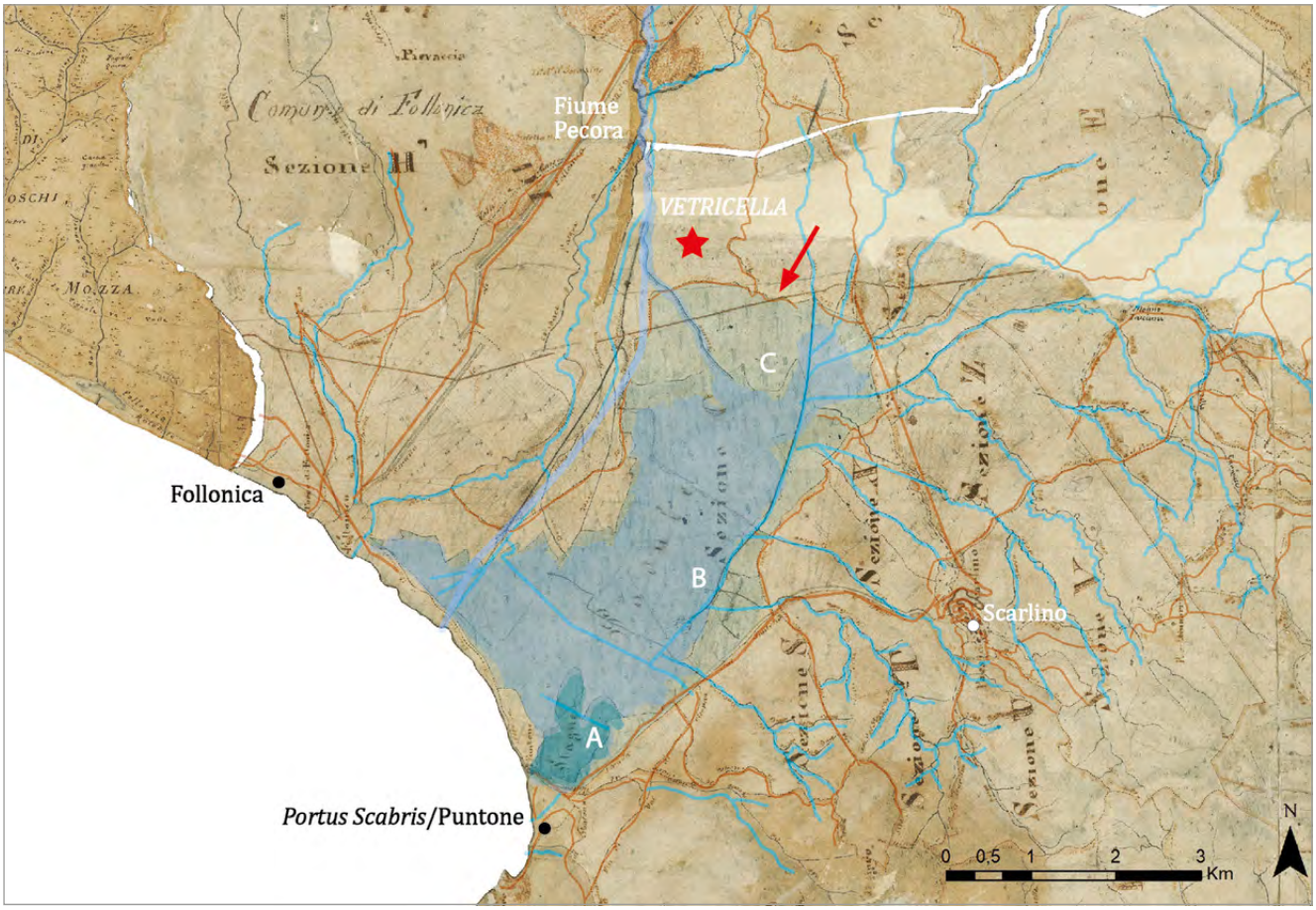

fig. 2 – Elaboration of historical cartography (Grand Ducal Land Register, *Leopolodino* – 19th c), with reconstruction of the hydrographic network and of the large area of water that occupied the plain of Scarlino, divided between *Stagno* (A), *Padule* (swamp) (B) and wetlands (C). The red arrow indicates an ancient road (not preserved today) that surrounded the wetlands and the swamp.

To reconstruct the landscape in which the site of Vetricella existed, it is thus crucial to fix landmarks in the transformation processes of the features described, to try to interpret them in a diachronic vision. First and foremost, we have to consider that *lake* of Scarlino, with a "*pond*" alongside it as early as the Medieval period[16], which certainly had a major role in shaping settlement patterns and economic activities in every period. Indeed, the novelty of the scenario proposed for the early Middle Ages by recent studies is determined by the previous vision of this lagoon landscape, influenced by an historical reconstruction characterized by an excessive presence of marshes and uninviting low-lying plains (adequate, instead, for the Post-Medieval centuries). The need to correctly describe this landscape is not connected so much to an understanding of the natural context, but rather to the definition, in a historical framework, of the potentially attractive features (for the local economic and productive resources), and the negative environmental factors (such as the gradual formation of marshy swamps).

It is with a view to this that a new multidisciplinary study has got under way within the framework of nEU-Med, to reconstruct the actual size and extent of the Scarlino lagoon area, and the morphological characteristics of the Vetricella context[17].

However, a number of initial pieces of information, to define the former medieval landscape, have been analysed also in the previous territorial study, enabling us to already draw up certain preliminary proposed reconstructions, to be implemented with the ongoing research. An initial phase of the study already carried out has included an analysis of the available cartographic sources, involving a range of differing kinds of representation, not purely designed to document the landscape, and above all being of a later date compared to the chronological range of our study[18]. High documentary value is to be found in map-making of the first few decades of the 19th c, connected in particular to depictions of the Grand Ducal Land Register (the so-called *Leopoldino*) or to the later instruments for planning the land reclamation and drainage schemes in the Grand Ducal era, both being instruments depicting a territory which was frozen in time since the Late

2003. For a recent study of the archaeological indicators of port activities, see the contribution by Emanuele Vaccaro (below).

[16] Thus, for example, from the territorial references present in a privilege of Pope Clement III in favour of the Bishop of Grosseto Gualfredo, dated 12 April 1188 (Ceccarelli Lemut 1985, p. 45 note 130).

[17] Research in progress by Pierluigi Pieruccini and Davide Susini, members of the nEU-Med team.

[18] In the course of the study made during the aforementioned doctoral research, cartographic documents showing all the coastal zone were consulted (more administrative than geographical documents), as were documents linked to the need to depict smaller-scale features, mostly connected to local land management, and early drainage works. For a detailed overview of the cartographic study carried out, see Marasco 2013b, pp. 69-80.

Medieval period. Observation of these maps made it possible, for example, to define the forms of gullies and bodies of standing water, useful for a retrospective reconstruction of the original morphology (above, *fig.* 2).

Moreover, in these depictions one can still see, around the marsh, elements of agrarian divisions and rural roads which today are fossilized in anonymous gullies or drainage channels, bearing witness to a previous landscape no longer having any relationship to the current context. One interesting representation, for our purposes, shows a road near Vetricella which, tracing a curve, crosses the fields north of the marshy area, presumably showing a route situated on the edge of the former lagoon area.

While cartographic data allows us to identify elements which are still active, or the traces of generic, older features, it is harder to give an absolute chronology to these possible landscape lines. In some cases, integrating cartographic findings with an observation of traces picked up by remote sensing (aerial photos, and LiDAR analysis[19]) has made it possible to exclude the antiquity of some features, or, equally, to suggest that some former water courses may have predated the modern era.

Useful chronological information can be gleaned from the distribution of archaeological finds, which in part help to compile a diachronic picture of anthropic features and, therefore, of potential areas of dry land.

Field-walking has found intense frequentation for the area of the former lake throughout the ancient period, linked to the natural resources of the coastal area, both in the form of settlements and production sites. In particular, significant salt production activities are attested archaeologically in proto-history, and intense metallurgical processing in the Etruscan and Roman periods (Cucini 1985, pp. 272-299; Aranguren, Castelli 2006). The particular industrial vitality of the area, for that matter, is determined not only by the natural morphology of the land, with an extended coastal zone, a gulf which is easy to navigate, and a large inland lake, but also by its proximity to the mining areas of Massa Marittima and the island of Elba.

Furthermore, over the centuries, on this territorial foundation, an important network of transportation and communications developed, such as the main roads along the coast or around the lake, and the maritime routes of *Portus Scabris*[20].

Accordingly, for the Classical period, the archaeological findings delineate a landscape consisting in a habitable low-lying plain that was economically active, the fertility of which one must imagine was ensured by intense, organized farming, with the necessary control of the network of water-courses. Despite certain initial signs of decline as of the 2nd-3rdc AD, the Late Antique period yields a picture of relative survival for some main sites (villas and farms) and for few smaller farming nuclei (Marasco 2013b, pp. 137-150). Given also the continuity of attestations in the iron-working area along the causeway behind the dunes, and the vitality indicated at the harbour of *Portus Scabris* (Vaccaro 2011) and at the nearby villa at Il Puntone, one can state that the socio-economic fabric was still fairly solid by the end of the 5thc (albeit in changed forms).

However, the finding of most interest to this research relates to the layout of local geography in the transition to the Early Medieval phase and the subsequent centuries, when previous research suggested a substantial absence of material indicators, with one last context frequented up until the start of the 7thc (at the La Pieve site, near Scarlino Scalo), and a few sporadic signs of frequentation in the Full Medieval period (Cucini 1985, pp. 300-302).

The new indicators, acquired between 2007 and 2009, do not show significant contractions of the anthropized territory in the plain, due to possible marshlands, recognizing a complex of around 20 sites between the 8th/9thc and the 12thc.

After an evident reduction in material evidence between the 6th and 7thc, as of the 9thc one sees a greater visibility of organized human activity. Both in the plain north of the lagoon area (namely the Vetricella area) and in the sector toward the hills of Scarlino, several small or medium-sized contexts have been identified datable to between the 9th and 10thc.

Spatial analysis of these attestations shows, at least in the areas which have been analysed in more detail, such as Vetricella, a coherent and organized distribution, both in regards to the anthropic element as well as the natural landscape. The Vetricella context itself, situated not far from the former course of the river Pecora and the possible lagoon area, manifests in its position a conscious and voluntary relationship to "water" (in its various forms), allowing us to also contemplate the possibility of a specific strategy for exploiting that territory.

Moreover, around the site there is a network of contemporary contexts, differentiated by material size and with very clear topographical relationships, also distributed in a coherent way with regards to the slight mounds of dry ground, and the small depressions prone to flooding, evidenced in 3D surveying of the terrain (Marasco 2013a, pp. 62-63) (*fig.* 3).

Observation of the material characteristics of these contexts reveals the presence of an initial band of smaller sites at a distance of 150-200 m from the site of Vetricella, yielding not only pottery finds but also indicators of metal-working (mainly smithing slag), and a second area of larger sites located at a distance of ca. 700-800 m (Marasco 2013b, pp. 266-274; Marasco 2012, pp. 715-716). In this second band, specifically, we find both sites identifiable as individual settlement/production nuclei, and apparently aggregated site complexes, which were potentially still located within the area of influence of Vetricella. In particular, these include two areas of material (UT24/25 and UT17/18) which have been investigated further[21] to try to determine the size and type of human frequentation attested to by surface finds. Indeed, in both cases, field-walking revealed not only the

[19] The analysis was conducted using the LiDAR survey produced by the Ministry for the Environment and Protection of Land and Sea, as part of the Extraordinary Environmental Remote Sensing Plan. New, more detailed findings may be made with the new research phase promoted as part of the nEU-Med project.

[20] For a reconstruction of the main Roman roads, sited alternately, by different authors, along the coast or in the inland plain, see the analyses proposed in Cambi 2004 and Celuzza *et al.* 2007.

[21] The investigations, which are part of the activities of the new nEU-Med project, envisage the use both of geophysical surveys and geochemical analyses, as well as the repetition of new field-walking (with the coordination of Dott. Lorenzo Marasco and Dott.sse Luisa Dallai and Vanessa Volpi, respectively).

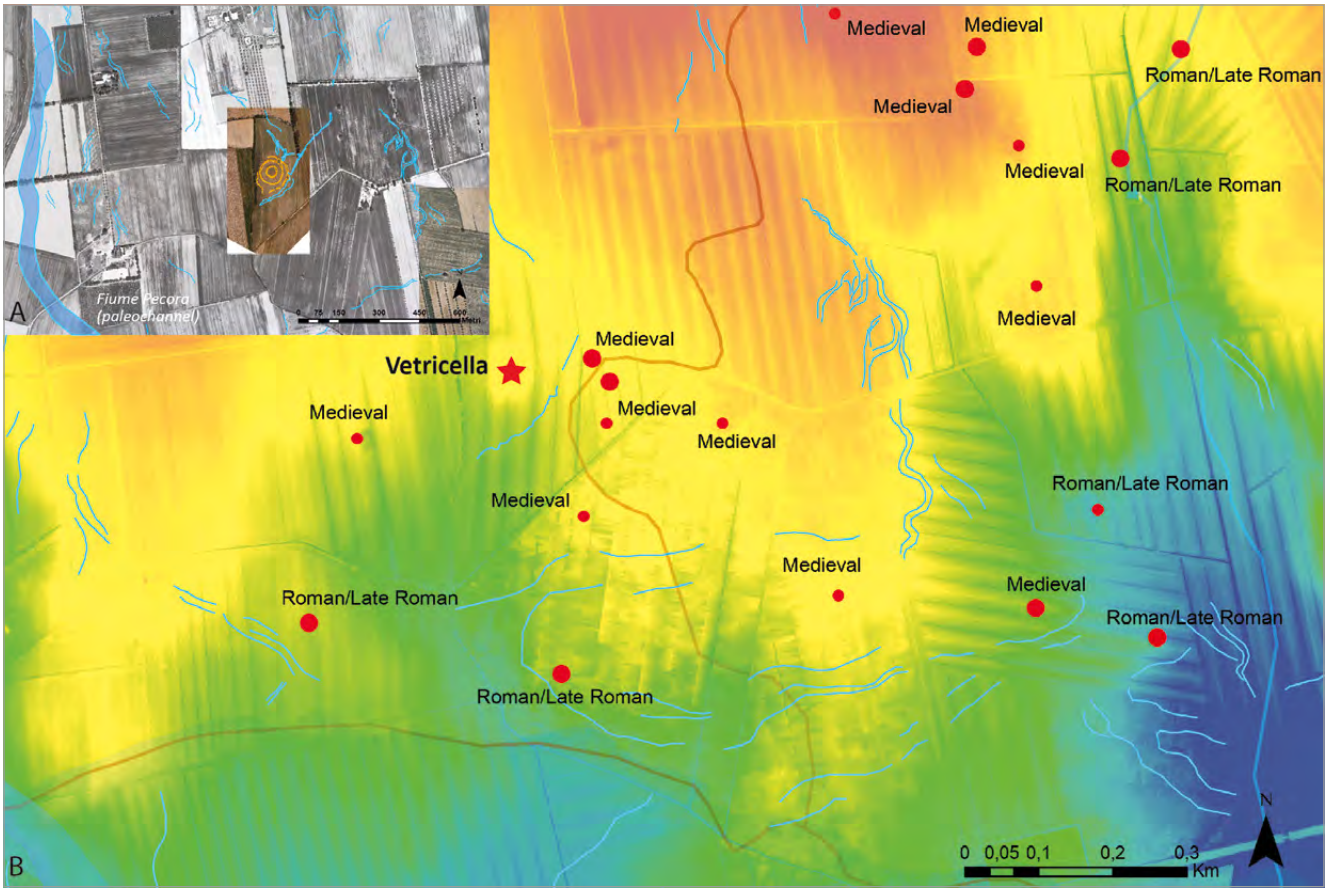

fig. 3 – Morphology of the Vetricella context, elaborated from public LiDAR data, with the distribution of archaeological indicators identified by fieldwalking activities. A different topographic relationship between the medieval sites (major and minor) and settlements of the previous periods is highlighted, as well as the particular position of Vetricella. In light blue, and in the box at the top, the features identified by aerial photos and connected to paleoalvei or ancient watercourses (such as the original course of the Pecora river).

presence of common ceramic material and stones, but also indicators of metallurgical activity (smithing slag and ore fragments) and, in the case of UT17/18, also the presence of human bones[22]. In this latter instance, we are looking at a particularly interesting context, which, owing to its material characterization, could be associated with a medium to large sized settlement nucleus, inevitably related to the fortified site of Vetricella. Moreover, in this case too, its location corresponds to the original micro-morphology of the terrain, which sees it positioned on a low micro-elevation surrounded by a depression formed by a former water course.

In the case of most of these contexts, albeit within the limits of a chronological framework based on an analysis of coarse pottery, we see a substantial absence of pottery wares connected to the full 12thc. The consequent interpretation, namely a decrease in the number of settlement sites on the plain, as well as suggesting the establishment of new systems of local territorial management and resource control, would also correspond to the contemporary development of the nearby fortified hilltop villages, including Scarlino itself.

This pattern of settlements and landscape, proposed on the basis of archaeology for the Early Medieval period, would also somehow be matched by corresponding references evident in the written documentation belonging to the Full Medieval period[23]. Indeed, although these documents do not set out to describe the contemporary landscape, the references to the economic and productive activities connected to the lake and the lagoon area are an indirect testimony to the fact that the plain was perceived as a positive resource.

References to the lake of Scarlino and its value for local economic activities can be inferred, for example, in two deeds., dating to the mid-11th and the end of the 12thc, where, together with the presence of the inland body of water, there is also mention of an extensive series of rights connected to its exploitation (Ceccarelli Lemut 1985, p. 36 note 72, and p. 71 note 53).

Also, in documents as late as the start of the 13thc, albeit in the presence of references to the appearance of *new marshes*,

[22] Still to be clarified is the interpretation of the relationship between these scatters and another large scatter of Roman-era ceramic material and brick/tile, situated just 105 m away, and datable to between the 2nd and 5thc (Marasco 2013b, pp. 151-152, 266-270). We must also mention the presence of a nearby Roman necropolis, partially investigated in the past, and located a few hundred metres away, which appears to have been in use until the 3rdc AD (Cucini 1985, p. 222 n. 139).

[23] Here a brief presentation of the indications derived from the known historical written documentation is offered. On the other hand, reference should be made to the specific studies envisaged within the nEU-Med project for a more detailed historical-documentary analysis of all the material available, in particular for the Early Medieval period. As a first in-depth analysis, see the contribution by Simone Collavini in this volume.

one clearly perceives the image of a plain that was active in regards to agriculture and production activities, with a navigable lake and bodies of water referred to as valuable economic resources and food resources (Ceccarelli Lemut 1985, p. 7 and p. 71 note 49).

The navigability of the *Lake* of Scarlino is still attested to in the second half of the 14thc, as a galley (*galea*) in the retinue of Pope Gregory XI took refuge there during a storm (*ibid.* p. 71 note 54), while there are no more specific references to the possibility that the lagoon was used for ships sailing for short tracts along the coast.

Only by extending the analysis to include later documentation does one seem to be able to glimpse larger traces of that irreversible process which is thought to have consolidated the distinction between an area occupied by the smaller body of standing water (what remained of the original lake) and a marshy area. In a series of deeds. dating to between 1491 and 1530 for renting the *padule* (marsh) mention is made of an obligation to maintain the banks and gullies flowing into the marsh, to ensure a good water level (Azzarri, Rombai 1985).

It is in later documents, from the end of the 15th and 16thc, that we find more and more references to a plain divided between land and water, to a landscape composed of ditches and water channels, fords and crossing places and above all to marshes, swamps and the activities necessary to defend the reclaimed land (Pinto 1985). In terms of archaeological finds, after the contraction seen in the 12thc, farming estates on the plain begin to yield later medieval ceramic material only up until the 15thc.

L.M.

3. VETRICELLA EXCAVATION: STRATEGY OF NEW 2016 CAMPAIGN

The commencement of the ERC nEU-Med project has marked a vital breakthrough in the continuation of research at the site of Vetricella and the surrounding landscape, with a significant expansion both of the spatial size and the methods of investigation at our disposal[24]. The archaeological site of Vetricella has increasingly emerged as one of the main contexts in the whole coastal zone, at least in the reconstruction of the socio-economic organization in the Early Medieval period. Its general characteristics were already recognized in the first years of research, but only now is it possible to comprehend in detail its stratigraphical complexity, and analyse its historical significance. After outlining the historical landscape in which we have to imagine the site of Vetricella, we can now set out the main stratigraphical data yielded by the excavation, and the strategy adopted to compile this data[25].

This strategy has obviously taken into account both the historical questions relating to the nEU-Med project and the resultant practical aspects, not only in terms of the greater availability of resources, but also in terms of the necessarily well-defined and "limited" timeframe for investigation (compared to the total size of the site).

The aim of the new 2016 excavation campaign was to resume the previous investigations, extending the investigated areas, in an attempt to comprehend, within the project's time limits, the chronological period of frequentation of the site as well as its material and functional transformations. Setting out from the previous findings, the investigation was commenced with an initial reopening in May, and an extensive investigation in the following months of September and October. With the use of a mechanical digger, the old excavation sectors were expanded, and a single large area was created (more than 1,500 sq m.), corresponding to the surface area enclosed within the inner circular feature (*fig.* 4).

In stratigraphical continuity with this central area, two identically positioned sectors were then extended to the east and west, the latter sector intercepting the large intermediate ditch. An exploratory trench was also dug to the west, making it possible to extend the investigation also towards the final circular defensive feature, clearly identified by the geophysical surveys. Thus, this layout made it possible to obtain an initial, continuous vision (although limited to the size of a trench) of the stratigraphical deposit over almost all of the surface of the site, measuring almost 110 m long. Thanks to the section obtained thereby, it was possible to identify in the ground the original profile of the site (although partially altered by modern farming), and the original raised elevation which must once have allowed the central zone to stand out above the surrounding terrain.

Initial work in the large area involved the removal of arable levels with the use of a mechanical digger, to make it level with the strata reached in the earlier investigations, and to then decide where to proceed with the actual excavations. Throughout these activities, reference was made to the site grid, established in 2009 (each square having sides 10 m long). This grid was regarded as fundamental not only for the documentation of the stratigraphical findings, but also to correctly overlay geophysical surveys, and to excavate the ploughed layers. Indeed, as already stated, modern farming activities have had a major impact at the site of Vetricella, with the loss of large portions of the horizontal stratigraphy (this can clearly be seen in the deep plough cuts in the deposit, down to the depth of sterile earth strata). Right from the outset, this situation made it necessary to attach a certain importance, to any material finds which might be located in farming levels, especially significant for the final, higher, occupation strata. Accordingly, the site grid proved to be vital for the localization of material found on the ground surface, also during the mechanical removal of ploughed levels, to a particular topographical zone, which may have been linked to a specific function.

The subsequent excavation strategy followed the multidisciplinary formulation of the project as a whole, being adapted to a combination of different excavation techniques, based on differing methodologies, and aimed at securing different types of information. The overall planning involved a combination of excavation techniques which attach a special importance to

[24] So far, eight excavation campaigns have been conducted at the Vetricella (including the 2017 campaign which has just ended.), with the excavation area totalling an overall size of almost 2,000 sq. m.

[25] It must be stressed that the archaeological research is still under way, and that Vetricella has proved to be more complex than initially estimated. Thus, while the sequence based on stratigraphic relationships is to be regarded as a fact, the reconstruction proposed for it will certainly have to be revisited and added to, as the investigations proceed.

fig. 4 – Aerial view by drone (UAV) of the excavation of Vetricella at the end of the 2016 campaign (photo by ATS srl of Siena). In evidence, the structures that characterize the site in the most important periods of frequentation: the central tower (1), the internal ditch that was later transformed into the basement wall (2), the deep intermediate ditch (3) and the external ditch with enclosure function (4). In the background, the portion of the plain once occupied by the *Lake* of Scarlino (later become *Padule*, ie swamp).

the vertical dimension with techniques giving more importance to the horizontal dimension, in an attempt to reconcile an understanding of the large stratigraphic deposit with the necessity of dealing with a considerable mass of information within a relatively short space of time. This combination made it possible to integrate findings from exploratory trenches (step-trenching), aimed at analysing the stratification of deep deposits, with the spatial relationships between finds and the structural elements, obtained by applying the traditional methods of large-scale stratigraphic excavation (Renfrew, Bahn 2006, pp. 96-100). Thus, the demands of vertical and horizontal analysis were met also by keeping a series of portions of unexcavated ground (as witnesses), so that the various strata could be identified and correlated to each other also in their vertical profiles. Second, this formulation made it possible to preserve some exposed sections enabling specialists in other fields (archaeobotanists, geologists etc., see below) to collect the samples required for their studies.

Methodologies were also adopted in the sphere of techniques of archaeological documentation designed to allow the largest possible amount of information to be recorded directly in digital format, with the use of three-dimensional surveying on the basis of photogrammetry, and the recording of the vertical dimension of stratification[26].

[26] The work on photogrammetry documentation, and rendering the results in three-dimensional format, was conducted by Dott. Giulio Poggi and Dott. Mirko Buono, members of the nEU-Med project team.

In terms of operational detail, the 2016 excavations involved the completion of the archaeological investigations begun in the previous campaigns, in order to verify, at a larger scale, the previously proposed reconstructions of the site's layout (*fig.* 3b). Work was then done on completing the investigation of later stratigraphies in the area previously called Sector III (eastern portion), in which a feature was identified with a probable foundation groove for a horizontal joist, and in the central zone of the site (previously called Sector I). In this sector the robber ditch of the large central building was found, as well as some floors relating to the life of this building.

Continuation of the excavation in the central area, around which the whole site seems to have been developed/structured, revealed the entire perimeter of the large tower-shaped building, identifying more precisely its quadrangular layout. The internal surface of the building was divided into four parts, and alternately excavated, in a "butterfly wing" pattern, in order to obtain an immediate and statistically valid understanding of its earlier phases. Work continued also in the area immediately outside of the tower, in particular in the western and southern portions, where horizontal levels linked to the construction of an outer wall were identified and on which the 2016 excavations halted (the 2017 campaign, which has just ended, resumed from these levels).

In line with this phase of the stratigraphic sequence, work was also resumed with the opening of two large exploratory

N°	Campione	Lab. Code	Concentrazione 14C (pMC)	τ_{rc} (years BP)	Età Calendario (years AD – 1σ) 68.2% probability	Età Calendario (years AD – 2σ) 95.4% probability
1	ERC VET CSN 506	Fi3453	86.01 ± 0.68	1210 ± 55	710 (9.4 %) 750calAD 760 (58.8%) 890calAD	670 (87.8%) 900calAD 910 (7.6%) 970calAD
2	ERC VET CSN 670	Fi3436	87.17 ± 0.52	1103 ±46	890 (68.2 %) 990calAD	810 (95.4%) 1030calAD
3	ERC VET CSN 633	Fi3372	87.43 ± 0.46	1080 ± 40	890 (17.2 %) 920calAD 940 (51.80%) 1020calAD	880 (95.4%) 1030calAD
4	ERC VET CSN 710	Fi3498	87.45 ± 0.48	1077 ± 44	901 (16.0 %) 921calAD 950 (52.2%) 1015calAD	780 (0.5%) 788calAD 875 (94.9%) 1031calAD
5	ERC VET CSN 450	Fi3367	87.58 ± 0.47	1065 ± 40	890 (14.2 %) 920calAD 960 (54.0%) 1020calAD	890 (95.4%) 1030calAD
6	ERC VET CSN 608	Fi3378	87.91 ± 0.51	1035 ± 45	900 (6.6 %) 920calAD 960 (61.6%) 1040calAD	890 (87.4%) 1050calAD 1080 (8.0%) 1150calAD
7	ERC VET CSN 644	Fi3437	88.13 ± 0.53	1015 ± 47	970 (55.8 %) 1050calAD 1090 (10.1%) 1120calAD 1140 (2.3%) 1150calAD	890 (5.2%) 920calAD 940 (90.2%) 1160calAD
8	ERC VET CSN 542b	Fi3369	88.17 ± 0.41	1010 ± 35	980 (65.4 %) 1040calAD 1100 (2.8%) 1120calAD	900 (1.4%) 920calAD 960 (73.8%) 1060calAD 1070 (20.2%) 1160calAD
9	ERC VET CSN 755	Fi3447	89.20 ± 0.59	918 ± 50	1030 (68.2 %) 1170calAD	1020 (95.4%) 1220calAD

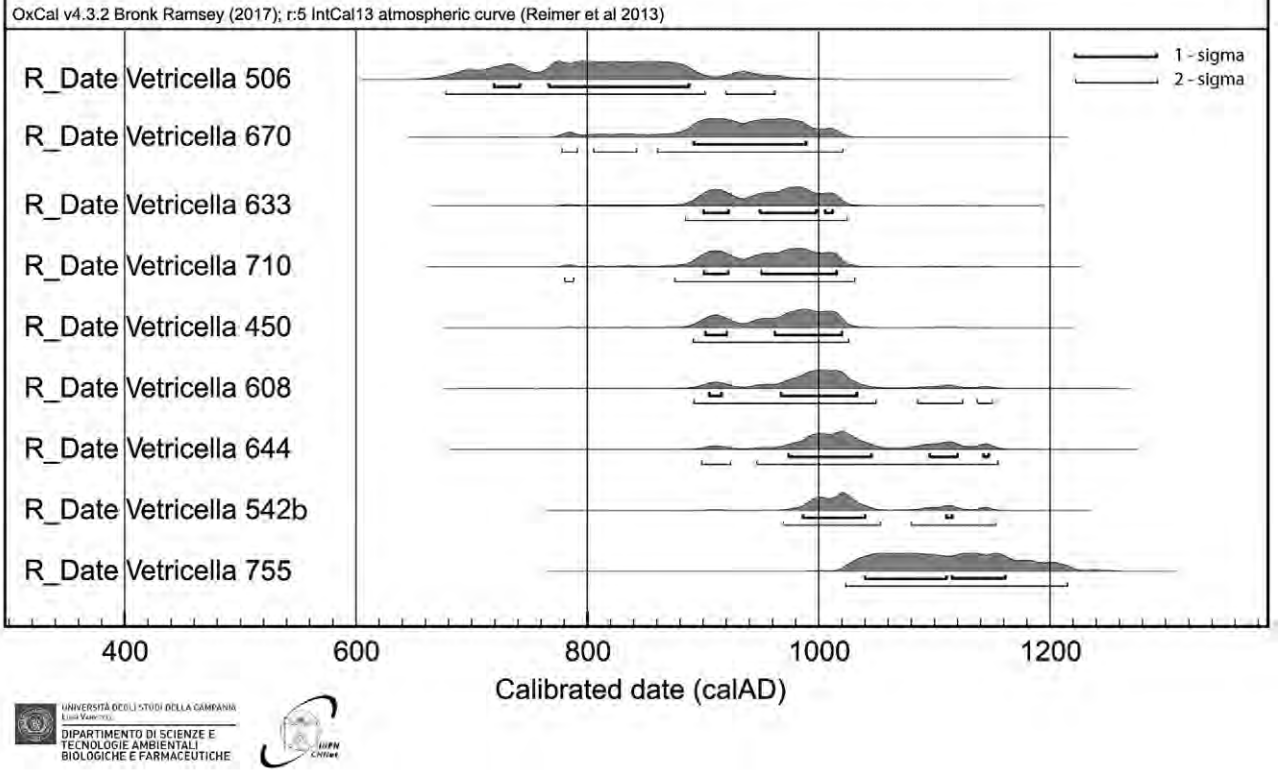

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fig. 5 – Table summarizing the results of the radiocarbon dating cited in the text, with distribution of the respective calibration curves, both at 1σ and at 2σ (by Dr. P. Ricci, Department of Environmental, Biological and Pharmaceutical Sciences and Technologies of the University of Campania "Luigi Vanvitelli, coordination Prof. C. Lubritto).

trenches (trenches 2 and 3), aimed at understanding the relationship between the hypothetical foundation plinth of the previous defensive outer wall and the surrounding stratigraphy. The two trenches were created at the northern and southern edges of the previous Sector III (with a southwest/northeast alignment for trench 2, and a northwest/southeast for trench 3), on either side of the inner circular feature, being respectively of 11.5×2 m and 19×2,7 m in size. The vertical sections exposed during these excavations provided excellent indicators to better understand the entity of the buried deposit, which the open-area excavation subsequently helped to reconnect, while also contributing to specify its

size as well as setting the grounds for its interpretation and subsequent reconstruction.

The subsequent 2017 campaign saw the continuation of excavations aimed at revealing the exposed deposit levels located in the large central area (to understand the entire stratigraphic sequence, through time), as well as the exploration of new parts of the site, both within the circular defensive features and in the outermost area.

One last point relates to the formulation of procedures for the interpretive reconstruction of the stratigraphic deposit, and above all for a definition of the reference chronologies. A large part of investigative activities involved the gathering and processing of a large number of small finds recovered over the course of the excavation, covering an extremely wide and varied range of different types of material[27]. Although important and significant references for absolute chronologies are set to be obtained from specific studies of the various classes of objects, the narrow chronological period within which the site of Vetricella seems to have developed (which is not easily inferred on the basis of the finds alone), and the frequent portions of stratigraphies in secondary deposition, have made it necessary to recur to a significant number of radiocarbon datings. Working in collaboration with specialists in the sector, organic samples were gathered systematically during the excavation process, so as to be successively processed and selected on the basis of the main stratigraphical issues encountered in the sequence (*fig.* 5)[28]. As will be illustrated in the paragraph below, we are able, so far, to refer to nine analysed samples, each with its own radiocarbon date, and we can thus anchor the stratigraphic sequence to a considerable number of absolute chronological benchmarks.

A.B., S.G., S.L., C.L., P.R.

4. THE VETRICELLA EXCAVATION: INTERPRETATION OF THE STRATIGRAPHIC DEPOSIT (2007-2016 SEASONS)

Despite the fact that the archaeological excavations at Vetricella are still under way, and that, to date, so far only a limited portion of the area potentially occupied in the Early Medieval period has been studied, an initial attempt at reconstructing the stratigraphic deposit brought to light so far, integrating findings from the earlier campaigns with the more extensive results from the 2016 season, will be here preliminarily illustrated.

Given the complexity of the stratigraphy that has emerged thus far, and the necessarily provisional nature of certain inferred interpretations of the sequence (where the direct stratigraphic relationships do not allow to refine the reconstruction), in the following two paragraphs we will attempt to separate the actual stratigraphic context from the subsequent interpretive analysis. The former, specifically, will be dealt with in summary form, as far as possible, referring to the main elements in the sequence, and the chronological macro-articulation which have so far been identified. To this end, it is advisable to refer to a number of aspects already highlighted in the previous paragraph, particularly in regards to the final phases of the site (which feature the most compromised stratigraphies) are only partially visible, and to the difficulty of relating discontinuous stratigraphic elements.

The proposed stratigraphic sequence is based on the identification of four occupation Periods (plus a fifth Period for the contemporary era), distinguished on the basis of the direct relationships within the deposit, and of those considered as the most representative material features (both in terms of material complexity and historical significance) (*fig.* 6).

However, it should be emphasized that, in several circumstances, the distinction between the individual Periods has not always been in clear material terms, and indeed the entire sequence could almost be regarded as set within a single process of occupation, albeit with frequent additions and variations. This view is in part also connected to the reduced timespan in which it appears possible to distribute the stratigraphic context under investigation, characterized in material terms by a fairly rapid sequence of interventions, in a relatively narrow space of time[29].

The data compiled thus far do not seem to indicate particular functional transformations in the context in question, where, despite well-documented structural changes, the main features expressed by the material evidence seem to be basically unchanged through time.

The first finding relates to the configuration of the site of Vetricella, analysed by a geomorphological study carried out in parallel with the excavation itself. This was found to be composed of some interventions of carryovers and artificial accumulations which are clearly identified in the sequence, but which were added to a low, naturally occurring mound, generated by an original alluvial fan of compacted gravel which extended south toward the lagoon depression[30]. The site's natural configuration, together with its position as regards the surrounding local geographical context, are to be regarded as the initial crucial features for a historical reconstruction of the context.

Taking this particular morphology of the site as our reference point, and the natural landscape reconstructed in the pages above, the first occupation recognizable in the stratigraphy is currently attested only by a few indicators,

[27] Since the first years of excavation, the site of Vetricella has yielded a large number of material finds, especially ceramics and metals, with characteristics such as to immediately suggest a possible function of control/collection of moveab resources. See now the findings reported in *para 5* below, and, for ceramic products, the preliminary data analysis in the article by Dott.ssa Luisa Russo elsewhere in the present volume.

[28] The radiocarbon analyses, with preparatory work and subsequent dating of the samples, were coordinated by Prof. Carmine Lubritto, and carried out by Dott.ssa Paola Ricci at the sample preparation laboratory at the Department of Environmental, Biological and Pharmaceutical Sciences and Technology at Campania's "Luigi Vanvitelli" University, and by Dott.ssa Maria Elena Fedi and Dott.ssa Lucia Liccioli at the AMS facility at the INFN – LABEC lab (Nuclear Techniques Laboratory for the Environment and the Culture Heritage) in Florence.

[29] As explained below, the absolute chronological references provided by the found material culture, and consolidated by radiocarbon dating, define the significant strata to a duration of less than two centuries (at present, datable to between the mid-9th and the mid-11thc). It is still not possible to say much for the oldest contexts (Period 1), thus far identified in limited areas.

[30] See the considerations proposed in para. 2 above, and the environmental overview proposed in the article on the geomorphological study of the territory, in this same volume.

Vetricella - final excavation plan (2016 campaign)

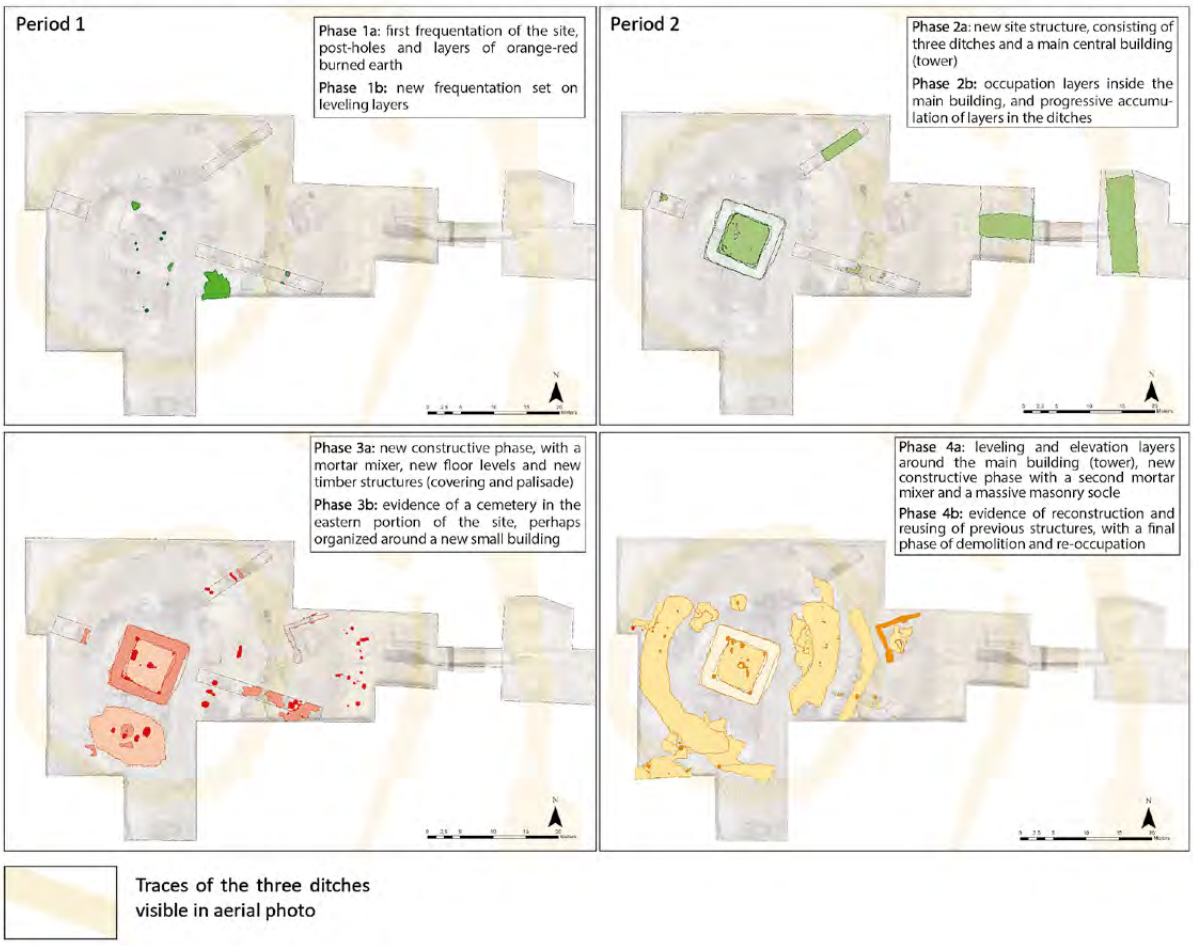

fig. 6 – Vetricella: composite final excavation plan (campaign 2016) and sequence of period plans, with representation of the main stratigraphy (graphic documentation by L. Marasco and G. Poggi).

hypothetically datable to the first few centuries of the Early Medieval period (Period 1)[31].

This was a phase of occupation of which we can see only a few small portions, and which is identified above all by the fact it stands above the natural ground level of the mound (it is not currently possible to infer any operations involving a levelling of the ground), and from its relationship to later stratigraphies, which it predated.

In detail, this occupation is represented by at least two different phases, occurring one on top of the other, the first evidenced by a number of circular cuts and zones with major signs of combustion, the second by an initial activity of artificially raised levels, and flattened surfaces for habitation or walkways. These features were mostly concentrated in the central part of the site, being partially removed by later interventions, and they currently display limited stratigraphies. The scant presence of horizontal stratigraphies, and the fact they occur directly above the natural sterile level, mean that at present no precise chronological attribution is possible, nor can any suggested interpretation be advanced regarding the nature of the context.

It is interesting to note that the transition between the two different phases seems to be connected to a possible reworking of the site, with holes being filled in, and the ground surface being extensively and homogeneously levelled, associated with a slight increase in the ground level. These strata, which are grey-black in colour, are of limited depth but extend across a considerable area, and display a highly organic composition, and a plastic consistency (US 495, 669, 672, 817). It is not yet possible to suggest whether these features may be related to a profound anthropization or to a natural, organic origin, or to define the right sequential relationship with the following occupation period. Indeed, it is not yet clear whether this levelling of the ground is unconnected with the structural changes of Period 2, or whether it is somehow a preparation for them.

Unfortunately, its functional interpretation is also hindered by the fact that this deposit would also constitute the ground level for the subsequent phases of occupation activities, with a resultant intermingling of the different uses and of their respective material indicators. Despite this difficulty in deciphering the correct association between these features, we can identify a series of repeated traces of occupation on this new level, with reddish and blackened zones, isolated levels of stones, and at least one ground level composed of lime mortar on the eastern edge of the central elevation (US 536, in trench 3).

The picture thereby delineated certainly seems to be consistent with a set of structures made of perishable material, although we cannot presently identify their nature or size, even with reference to the subsequent features which marked the site's limits.

The presence of at least one ground level composed of mortar could, by itself, indicate a high-profile form of occupation, although this is yet to be defined in more detail, but it is not yet possible to determine its relationship with possible features in the central part (the initial indications as to the presence of a possible building in the centre of the mound are to be associated with Period 2).

Despite the scarcity of material indicators and possible chronological signposts, one interesting absolute chronological "anchor" could be derived from a stratum related to the transition phase to the subsequent period, when the addition of a new infill layer, of clayey soil (US 535), associated with a sooty combustion stratum (US 506), seals the previous mortar level. Radiocarbon analysis of a sample taken from this activity has provided a date range of 760 to 890 AD (58.8%)[32], which can be interpreted as a significant reference for the commencement of the new occupation, with which these same stratigraphies may also be associated.

The variations in the stratigraphic sequence reveal how significant interventions to reorganize the site were introduced on top of the context described above. Owing to their structural complexity, these are identified with the phase marking the start of a new interpretive period (Period 2). It is as well to reiterate that the association of the individual stratigraphies in distinct periods cannot always be based on direct relationships, and accordingly the scanning of their sequence, and the respective occupation phases, is also sometimes the result of hypothetical considerations, requiring checks and future supplementary data. The material phenomenon which significantly distinguishes this hypothetical "construction" phase is the creation of the three concentric defensive ditches, a combination of deep excavation interventions, and accumulations of natural earth.

The construction of the three ditches represents an example of individual events devoid of a direct relationship (also in view of the scale of the intervention, and the current state of investigation), but, as regards interpretations, these are necessarily seen as being in association with each other, owing to the evident corresponding aspects, in terms of topography and site layout, which they display.

Regardless of the stratigraphic relationships preserved in the ground (which have only survived for the smallest ditch), the layout of each ditch seems to display, in its regular topographical concentricity, a clearly unified design, also independently of any (non-identifiable) sequential construction pattern. The two inner ditches have a width of around 6.5 m, and are almost 2.5 m deep, with an estimated diameter of around 39 m and 77 m respectively, while the third, outermost ditch has yielded a width of around 4.5 m and a proven depth of just 0.8 m, with a diameter of around 116 m[33] (see below *fig.* 10).

[31] At the current state of research, we prefer to suspend any definition of a possible older anthropic presence at the Vetricella site, in particular as regards the finding in a residual deposit, and thus potentially out of context, of material datable to the Etruscan and Roman periods. These are terracotta and metal finds which, although in some cases of considerable interest, cannot be reliably interpreted at present.

[32] The following are the complete dating references: sample Fi 3453, 1210±55 BP with calibration 1 sigma 760-890 AD (58.8%); 2 sigma 670-900 AD (87.8%). For details relating to this and subsequent radiocarbon dates, see the summary table in *fig.* 5.

[33] It should be specified that these measurements have so far only been recorded inside the exploratory trenches dug in the eastern sector of the excavation. The extension of these dimensions also in the sectors not yet investigated is based on an approximate estimate anchored to the initial material data, and the measurements made on the traces identified by remote sensing.

In terms of stratigraphical relationships, it is possible to identify a valid sequence only for the innermost defensive ditch (US 417-706), which cuts the deposit of the previous period, while the cuts of the two outer ditches yield relationships only with the natural ground level and with the arable stratum. It was only possible to document the construction procedure in the case of the internal ditch, but we can advance it as a hypothesis also for the two larger ditches, despite the fact their stratigraphies have not been preserved. Indeed, the cut of the ditch led to the excavated earth (a large stratum consisting of silt and gravel) being piled up on both its sides, with the resultant formation of a raised bank acting as a small rampart.

It is from the stratigraphic relationships of the inner ditch that it is possible to obtain some absolute chronological indications for this phase, since it is found to post-date both the aforementioned US 506 (see above) and a new level of carbon (US 670), connected to the formation of the outer ridge, dated by radiocarbon analysis to between 890 and 990 AD (68.2%)[34].

While for the three ditches it seems possible to suggest they belong to a single delimiting feature which must have surrounded the raised part of Vetricella, and which, at least in the deeper ditches, also expressed a clear defensive function, it is harder to identify the material characteristics of the hypothetical main structure that we have to imagine at the centre of this enclosed area (*fig.* 7a).

Indeed, in the raised centre of the site, the stratigraphies associated with this period are only identifiable in vestigial strata which attest to the existence of a possible interior space, greatly altered by modern farming and not clearly associated with possible perimeter structures. Here, the only material traces found which can be related to possible structures actually betray an "absence" of material, being linked to the remains of a later phase of robbing (Period 4), involving the stone- and wood-built building which we imagine was constructed, in the form of a tower, in Period 3. Only hypothetically, and given the absence of pre-existing traces, can we suggest that the tower-like building, which in the stratigraphic sequence is positioned further forward, may testify to the continuation of a pre-existing topography and site layout in which a similar building must have stood, right from the start, in the middle of the three ditches.

This previous building would thus have had a similar, quadrangular design, with an internal space of not less than approximately 6.8 m for each side, and a total surface area of around 46 sq m (we cannot exclude the possible presence, as far back as this period, of a building with more than one storey) [35].

Also, as regards the possible occupation phase of the central interior space, unfortunately, the particular aspect of the stratigraphic deposit, distinguished by a reduced stratigraphical series, by the repeated use of just a few ground levels, and, lastly, by the large-scale removal of soil levels by modern ploughing, does not make it possible to easily distinguish the occupation levels in the individual periods[36]. Therefore, the creation of a large elliptical pit near the western side of the interior space, perhaps designed to store containers, and the discovery on occupation level US 215 of two denari (coins) from the Pavia mint, bearing the name Berengario I[37], are only hypothetically linked to this phase of the site's occupation.

As yet no large traces of occupation have been found in the portion of the site corresponding to the outside of the central building. This is certainly in part due to later interventions involving the removal or levelling of the deposit. Indeed, stratigraphy formation activities have only been recorded inside the two innermost ditches, where there is a gradual accumulation of erosion strata and intentional infills, coming one on top of the other (*fig.* 7b). These layers consist mostly of silty-sandy earth, with a considerable presence of finds (mostly ceramic material and animal bones), and they display differing characteristics as regards their manner of formation and grain size between the inner ditch and the middle ditch[38]. Indeed, it seems that a gradual accumulation and slow erosion is identifiable for the first ditch, also with signs of possible maintenance (US 529, 530, 531, 532, 611, and 752), while in the middle ditch one sees silty-clayey strata associated with the presence of water, whether standing or slowly running water (US 399).

On top of these deposits, especially in the area of the inner ditch and the central part, a series of "construction" interventions has been documented which, on the basis of the material impact recorded by excavation, have been interpreted in relation to a new occupation period (Period 3), albeit in structural continuity with the previous phase.

The first stratigraphies of this period are found to be clearly associated with work aimed at reorganizing both the structures already present and the vacant spaces available for use, and they share a common material feature in the presence of abundant mortar. Analysis of the stratigraphy has identified a new, more organized policy for managing the site, also facilitated by the conservation of a quantitatively greater series of archaeological indicators. The discovery which can perhaps sum up the initial phase of the new period

[34] The following are the complete dating references: sample Fi 3436, 1103±46 BP with calibration 1 sigma 890-990 AD (68.2%); 2 sigma 810-1030 AD (95.4%)

[35] As outlined below (in reference to Period 3), four hollows were identified in the room in the tower-like building for wooden supports. These were shallow and arranged in the internal corners of the building. In the absence of clearer stratigraphic indicators, these features are not related to possible previous wooden structures, but to elements integrated with the later masonry socle.

[36] We cannot exclude, for certain moments in the life of the building, the use of floors that were removable, or consisting in perishable materials, such as wooden boards. For a better study of the nature of the interior deposits, and the processes whereby they were formed, micro-morphological and micro-stratigraphic analyses are under way on the occupation layers (under Prof. Pierluigi Pieruccini, Department of Earth Sciences, University of Turin, and Dott. Davide Susini, Department of the Physical, Earth and Environmental Sciences, Siena University).

[37] Despite the match between this chronological indication and the related sequence anchored to radiocarbon dates, it should be specified that, in this case, the layer was substantially altered by subsquent farming, with a necessarily reduced level of reliability. Also, worth noting are other coin finds made in the same area of the tower-like building, in later levels or as residual finds in ploughsoil: four other denari of the same type, as well as two denari issued in the name of Hugh and Lothair (931-947) and a denaro in the name of Hugh, Marquis of Tuscany (951-967). For these coin finds, please refer to a first presentation inserted in Benvenuti *et al.* in this same volume.

[38] At present, given the limited size of the area investigated with an exploratory trench, the deposit of the outermost ditch was not equally legible, since, being shallower, it allowed the formation of a less developed deposit.

fig. 7 – Documentation of the stratigraphic deposit investigated in the 2016 campaign, with main section of the excavation area (a, Section A-A') and sections of the trenches open across the internal ditch (b, Section B-B' and C-C') (graphic documentation by S. Greenslade, S. Leppard, L. Marasco and G. Poggi).

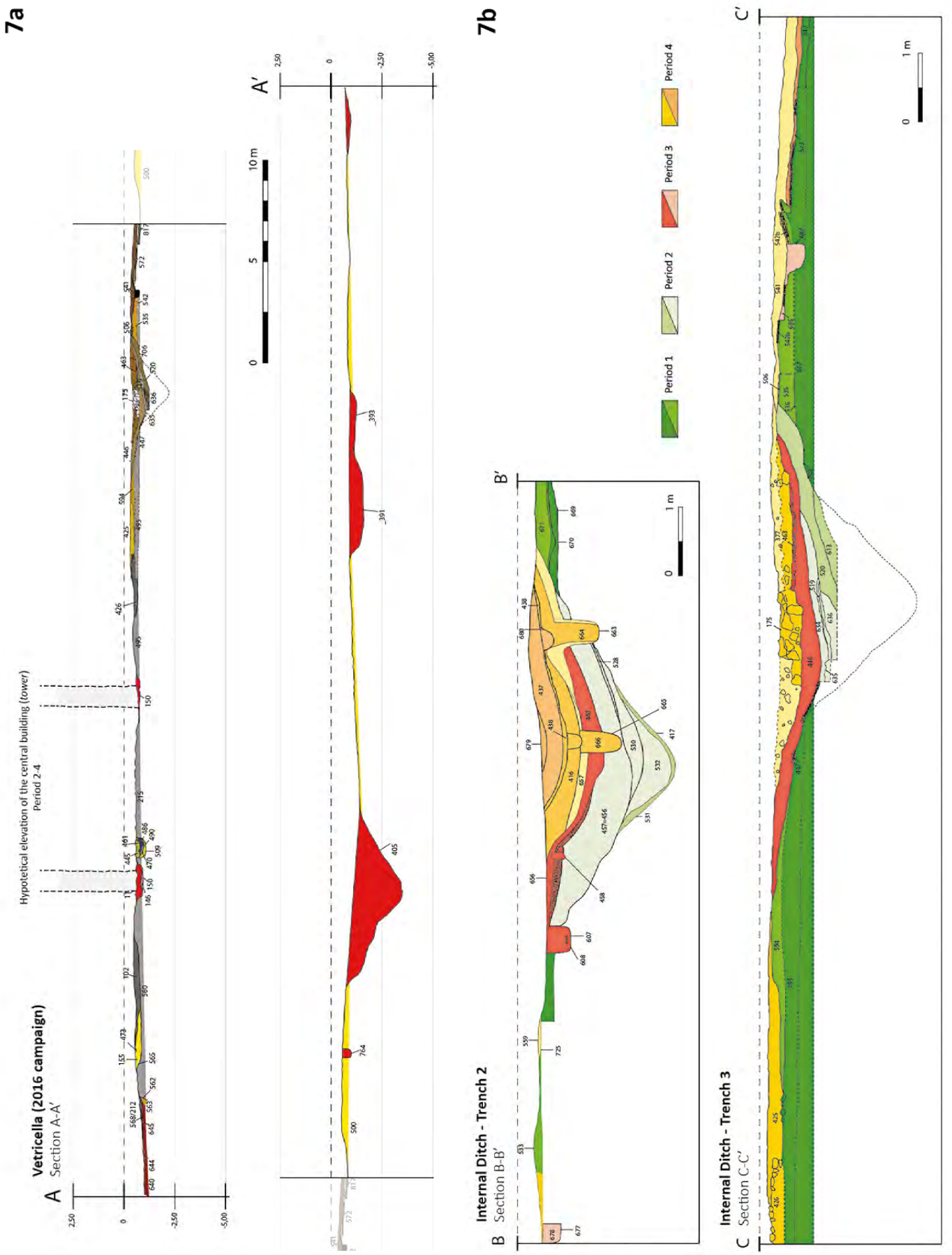
7a
A Vetricella (2016 campaign)
Section A-A'
Hypotetical elevation of the central building (tower)
Period 2-4
A'
10 m
0
5
2,50
0
-2,50
-5,00
7b
Internal Ditch - Trench 2
B Section B-B'
B'
Internal Ditch - Trench 3
C Section C-C'
C'
Period 1
Period 2
Period 3
Period 4
1 m
0

fig. 8 – View of the mortar mixer and of the mortar-clad decking, placed in front of the tower. In the background, the perimeter of the building testified by the rubber trench; in the foreground some pits related to a wooden structure (a). Detail of the area around the central tower, with evidence of the alignments of large pits for a wooden structure (maybe some kind of a timber loggia) (b).

is the creation of a large emplacement for mixing mortar, outside the hypothetical central building (US 581), and by the creation, all around, of a large flat area, surfaced with lime mortar (US 633 and 700) (*fig.* 8a).

It is not yet possible to determine in detail what interventions can be dated to this construction phase, although the presence of the mixing device, and the resultant availability of construction mortar, may be an indicator that some of the features identified were contemporary[39]. As a hypothesis, suggested also by possible consistency in construction, we can attribute to this phase the addition of a socle made of mortar and stones in the perimeter of the central building (US 466), which survives only in a small section in the northeast corner. This may have been an addition to existing construction solutions to provide additional support for a first floor.

[39] After an initial preliminary study of the composition of the mortar, aimed at identifying possible means of establishing an association between the different structural elements, a further, more detailed study is now under way, to verify what initially appears to be mineral-petrographic homogeneity.

Remnants of a surface made with lime mortar, apparently acting as surfacing material, similar to the material used to surface the open space outside the tower, were also found close to the cut of the inner ditch, where the final infills seem to be sealed by a layer of mortar, spread over both the bottom and the sides of the ditch (US 447 and 455). Moreover, in trench 3 it was noted that similar mortar surfacing seems also to continue outside the eastern edge of the cut, forming a level sloping slightly to the east (US 542a).

To complete the construction, on at least three of the four sides of the central tower (the northern side has not yet been investigated.), three rows of large holes are dug (average diameter: 0.6 m), which can be interpreted as post-holes for large wooden timbers (*fig.* 8b). The position of these interventions in the sequence is supported by the fact that the cuts are made directly in the mortar mixer, determining that it was no longer in use, and in the surrounding surfaced area. Indeed, the contemporary relationship seen between one of these cuts (US 589) and the last layer of surface mor-

tar seems to indicate the transition from one intervention to the other. The new structural aspect of Vetricella tower would tentatively suggest that in the course of Period 3, the contemporary presence of the central tower-like building, already having a possible masonry-built socle (although we do not know whether this was wholly, or only partly, created at this time), a series of ground levels surfaced with mortar, extending also to the inner ditch, and a series of large wooden features around the building[40].

In this reconstruction, we can also place the indicators gathered near the middle ditch, which has infill layers containing broken-up mortar, and a possible functional replacement by a new defensive feature. This is another series of large circular cuts, which are fairly deep (0.7-0.8 m) and are distributed in the form of a ring, perhaps constituting a palisade.

As to date, we can refer to a piece of charcoal found within the mortar surfacing of the space outside the tower (US 633), which has provided a possible chronological fix of between 940 and 1020 AD – 1σ (51%)[41].

In Period 3 the stratigraphy directly associated with occupation of the area and accumulated occupation deposits is slight, due to both the impact of recent ploughing and the levelling of the ground in the subsequent period. Little as a result can be determined about what kind of activity was conducted at the site. However, it has been possible to recover several contexts which help towards an initial chronological framework. These date the occupation phase in this period to the second half of the 10thc. Inside the tower, for example, a sunken hearth was found in the south-western corner (US 450), which yielded a radiocarbon date of between 960 and 1020 AD – 1σ (54%)[42].

Further indicators of habitation are situated on the succession of mortar surfaces outside the tower and the ditch (US 526, 554, 572), in particular with the creation of a number of pits with a large diameter (1.2-1.4 m) but of limited depth (0.30-0.40 m). The possible function of these is yet to be determined.

It is from the mortar surfacing outside the ditch (US 542b=1349) that a sooty residue comes which was sampled in the ground surface and subjected to radiocarbon analysis. This yielded a further chronological marker of between 980 and 1040 AD – 1σ (68.2%)[43].

Although the carbon 14 dates offer a time range which also covers the first few decades of the 11thc, the fact that this phase likely belongs wholly within the 10thc is also suggested by evidence that it predates a subsequent stratigraphical context, identified in the eastern half of the excavation area. This comprises a series of burials directly in the ground, distributed between an inner band alongside the ditch, and an outer band above the mortar surface US 542a. These features indicate a form of use which, given their distribution, does not seem to be merely occasional, although at present it does not offer sufficient clues for understanding how it is to be interpreted historically. Pending the examination of data from the new 2017 campaign[44], at present we note the presence of eight burials, of which two are aligned north-south, parallel to the internal edge of the ditch (US 608 and 710) and six are aligned east-west, positioned on the outer levels (US 413, 773, 774, 775)[45].

The direct relationships of some burials make it possible to map the stratigraphic sequence fairly clearly, being situated in a sort of transition between the stratigraphies referred to above and the following, Period 4 stratigraphies. Radiocarbon analysis conducted on two inner burials (US 608 and 710) has significantly yielded a fairly consistent chronological reference, respectively dating to between 960 and 1040 AD – 1σ (61.6%) and between 950 and 1015 AD – 1σ (52.2%)[46].

It is not yet clear whether the remains of a structure created near the burials outside the ditch, attested to only by a robber trench, which has left its rectangular perimeter visible (US 135 and 136) may have some relationship with this cemetery use. This building, perhaps made of perishable material, and with its walls probably set on top of horizontal beams (ground sills), was also reused in the following period, and thus it is not easy to interpret.

The transition to the following Period 4 is evidenced by a series of stratigraphic elements in which, viewed in as a whole, can be associated with a final transformation of the site. The salient features of this series of activities seem, in this case too, to suggest precise plans to reorganize the central area, which are put into effect by means of rather large-scale and well-structured interventions. Following a possible removal of the previous stratigraphy, there is a complex activity of fill, using salvaged earth brought specially to the site and covering all of the central part of the context, with an orderly accumulation of new layers forming a kind of ring-shaped mound around the tower (US 112, 131, 181, 425, 426). The material data from these various strata, the composition of the earth and the material it contained, confirm in some cases the removal of previous occupation stratigraphies from some parts of the site[47], while in other areas it is clear that natural sterile earth was brought in from the surrounding land. This soil, characterized by a yellow colouring and by a silty texture with abundant gravel, allows us to also associate with this the

[40] In the case of these features, we still lack an overall understanding of their structure and layout. Currently, therefore, any suggested reconstruction must take into account both of a linear layout, possibly connected to a structure abutting the body of the tower, and a ring-shaped layout, possibly acting as a defensive palisade.

[41] Sample Fi 3372, 1080±40 BP with calibration 1 sigma 940-1020 AD (51%), 890-920 AD (17.2%); 2 sigma 880-1030 AD (95.4%)

[42] Sample Fi 3367, 1065±40 BP with calibration 1 sigma 960-1020 AD (54%), 890-920 AD (14.2%); 2 sigma 890-1030 AD (95.4%)

[43] Sample Fi 3369, 1010±35 BP with calibration 1 sigma 980-1040 AD (65.4%), 1100-1120 AD (2.8%); 2 sigma 960-1060 AD (73.8%), 1070-1160 (20.2%), 900-920 (1.4%).

[44] In the course of the latest excavation campaign, which ended in November, a much larger number of new burials was investigated, further confirming that the area was not merely used on an occasional basis.

[45] Of these, worth mentioning is the presence of three infant burials (US 773, 774, 775) in a separate area, just within the northern edge of the excavation area. All the burials have already been the subject of initial documentation and a preliminary study as part of a Master's degree thesis in Archaeology at Siena University (Dott. Alessio Grazzi).

[46] Sample Fi 3378, 1035±45 BP with calibration 1 sigma 960-1040 AD (61.6%), 900-920 AD (6.6%); 2 sigma 890-1050 AD (87.4%), 1080-1150 (8%); Sample Fi 3498, 1077±44 BP with calibration 1 sigma 950-1015 AD (52.2%), 901-921 AD (16%); 2 sigma 875-1031 AD (94.9%), 780-788 (0.5%).

[47] These cases involve residue mixed with anthropized strata, the latter being black in colour, with charcoal, abundant stones, and a high incidence of finds (sherds, animal bones and metal finds).

fig. 9 – At the top (a), a portion of the masonry socle with stones arranged in a bed of lime mortar, above the fills of the internal moat (in the foreground, is visible the previous mortar coating covering the edge of the ditch). Below, view of the fireplace found on the north side of the tower (US 755), then partially destroyed by the rubber trench (b).

dismantling of the wooden features of the previous period (the possible external palisade, and the row of holes in the ground around the tower), achieved by removing the timber posts and filling in the post-holes.

The creation of a second mortar mixer (US 247) is another part of the new overall reorganization of Vetricella, as is the definitive concealment of the inner ditch with the construction of a massive masonry socle made of stones and mortar (US 175). This feature is composed of parallel lines of stone elements laid transversally (its thickness may have been around 2 m). Despite the fact it was partially levelled, the socle does not seem to have been of any great height (*fig.* 9a). Pending new stratigraphical evidence, the real appearance or function of this structure cannot yet be determined (whether it had an upper part made of perishable material, and whether it was present along the full circumference of the previous circular ditch), whereas it does seem clear that it served to delimit the central tower. Moreover, in order to define the area further, we might also attribute to this phase some first surfaces of stones laid in a structural way all around the masonry socle, apparently to serve as ballast with a consolidatory function.

This intervention seems to to reach even larger size in the following phase, when there is even a sort of plundering of the masonry socle, and reuse of the robbed material to expand the surrounding ballast (US 404, 559-725, 378, 652, 697, 792). On top of the previous stonework, now levelled, stones and broken-up mortar were piled, to create a further ground surface suited to allow rainwater to run off. The creation of this ground surface appears to be part of a new overall layout, attested to by remnants of rows of stones or small structures made of dry-stone walling and earth.

The fact that these strata constitute a levelling of the ground does not enable us to correctly interpret the material they contain, material which in some points is especially rich in pottery and metal finds. In the case of the latter, specifically, there is an abundant presence not just of finished and semi-worked items, but also of traces associated with metal-working, such as forge slag and red (iron-rich) soil, although the finds are not currently distinguishable between those in primary deposit and residual finds from earlier periods.

In some areas, it is possible to connect this reorganization of the site to a specific change of purpose, perhaps sustaining activities already present, as happens for example in the western sector of the excavation, where, atop the new ballast, a number of well-structured points have been recognized which were burnt. These can be associated, in one instance, with a small forge (US 644). A radiocarbon date from a piece of carbonized wood found inside it provides a valid time range of between 970 and 1050 AD – 1σ (55.8%)[48].

In this whole series of events, the continuity of habitation of the central tower, which is still seen to be the landmark building around which the various interventions take place, is attested to by the presence of a new sunken hearth on the northern limit of the interior space (US 755) (*fig.* 9b). This feature was perhaps already present in the past (as would be attested to by a sequence of several levels of charcoal), but in its final phase it has yielded a radiocarbon date of 1030-1170 AD – 1σ 68.2%)[49].

This last feature, cut by the robber trench of the tower (US 118 and 150), provides an useful reference point for including the final phases in the life of Vetricella in the sequence, phases which are characterized by a full-scale dismantling programme. While throughout the area we see the filling in of the holes and cuts connected with the last wooden elements, in the case of the tower and the external structure, close to the cemetery area, there was a planned demolition.

Specifically, in the central building there is an extremely precise robbing intervention, with the removal of all the structural elements, both of the perimeter elements and corner posts, with the salvaging of all the stones This includes the creation of a careful pile made of the debris (mixed with stratigraphic remains) within the robber trench. On the basis of the stratigraphic information gathered, this final phase does not seem to have led to further relevant activities, and in the rest of the site this was achieved simply by progressively terminating all occupation activity here. Nothing stratigraphically significant occurred thereafter until the plough marks left by modern farming (Period 5).

[48] Sample Fi 3437, 1015±47 BP with calibration 1 sigma 970-1050 AD (55.8%), 1090-1120 (10.1%), 1140-1150 (2.3%); 2 sigma 940-1160 AD (90.2%), 890-920 AD (5.2%).

[49] Sample Fi 3447, 918±50 BP with calibration 1 sigma 1030-1170 AD (68.2%); 2 sigma 1020-1220 AD (95.4%).

5. CONSIDERATIONS AND ANALYSIS

The aim of this final paragraph is to be an opportunity for a recap of the most significant archaeological findings outlined above, without the aim of coming to definitive analytical conclusions, but rather of sharing certain considerations generated by the very quality of the information which we are working on, and offering bases for analyses projected towards the continuation of the research.

Emphasis has been placed at several points on the preliminary nature of many of the findings outlined, which are mostly the products of investigations still under way, or still the subject of in-depth analysis. Although the investigation context has already been studied in depth by previous research, especially as regards the local territory and settlement patterns, the new course of the nEu-Med project is stimulating the production of a far larger mass of information, as well as new interpretations of previous findings.

This article has aimed to present the current state of research in the territorial complex of the Val di Pecora, with a proposed historical reconstruction which is already fairly complex as regards the early medieval archaeological landscape, and with a detailed schematization of the excavation indicators recovered at the site of Vetricella.

The first element which emerges clearly (also in relation to the contributions by my colleagues in the following articles) is the strong relationship revealed by archaeology between the site of Vetricella and the surrounding landscape. This relationship does not consist merely in the obvious relationship between the settled area and the particular coastal 'lagoon' context in which it stands, but also in the establishment, by the site itself, of a specific network of sites which looked to it (see above *fig.* 3). At present, this network of relations can only be suggested on the basis of field-walking and remote sensing, but it does indeed seem to be presumable from the topographical relationship between the individual archaeological contexts, and from the fact that the material culture is chronologically contemporaneous.

This interpretation once again raises the question of what nature and function we are to ascribe to the site of Vetricella on the basis of its stratigraphy, all the more so in light of the fact that the documentary sources are substantially silent regarding this particular geographical area[50]. The site's proximity to an area included among public patrimony interests since the Lombard era, being also the location of the royal *curtis* of Valli cited in the 937 dower of King Hugh to Berta and Adelaide, are facts which are significantly borne out by the interpretation of the archaeological indicators provided in these pages[51].

Indeed, despite the fact that the proposed stratigraphic sequence is still only partial compared to the site's potential complexity, some of its material characteristics may already be outlined in fairly precise forms, in a hypothetical connection with a manifestation of authority. Overlooking for the time being its initial appearance, which cannot be analysed in the limited stratigraphy that has been investigated, it is more than clear that Vetricella's historical significance is expressed in the construction of the first set of defences, with three concentric ditches, the original visual impact of which we must imagine as being far greater than that rendered by the 2005 aerial images, evocative though these are. Thus, in this material, tangible form we should also see a communications aspect, and a meaning which we would go as far as to suggest was almost "representative", in the sense of the expression of a precise message through a well-defined and planned form.

This is a further aim, on top of the purely functional purpose of a fortification, which would seem to be expressed in particular in the material appearance of the outermost ditch, which encloses a surface of more than 1 hectare, but being of such limited depth as to suggest that its purpose was not exactly defensive.

The distribution of the three ditches, the design and planning of which was exceptionally regular, situated around a well-defined centre, would thus suggest a predefined structural plan. Although the excavation was only able to position and measure some parts of the three ditches, the analyses currently under way to measure their diameters seem to suggest the interesting use, as the unit of measurement, of Liutprand's *foot* (44 cm), which can be seen in correspondence by "multiples" between the three concentric features (*fig.* 10)[52]. In addition, a far from secondary aspect is the implementation of such a project, which, one may suppose, must have represented an operation of considerable technical and practical complexity. It is assessments such as this which, albeit in the absence of direct stratigraphic indicators, lead us to posit the presence, already at the time when the ditches were dug in Period 2, of a landmark feature located in the centre of the mound (see above for further considerations). This structure would have had a square plan, and possibly a tower-like appearance, only partially legible among the succession of later forms, which, in archaeological terms, would bear witness to an antecedent of those *towers* already attested to in the Maremma area in the final decades of the 10thc[53].

[50] See, again, the summary overview in the present volume by Simone Collavini and Giovanna Bianchi. For confirmation of the difficulty in identifying possible archive references for the Vetricella area, see also the interesting proposals put forward in the past Farinelli 2013, pp. 103-105, although these are now superseded partly by ongoing research.

[51] In light of the new archaeological findings at Vetricella, it is conceivable that the place-name reference identifying the royal curtis (*Valli* or Valle) may be related to the large lagoon depression in which our site stands (*valley*, in fact), rather than to the hilly area of the later castle of the same name, obtaining an interesting interpretative starting point. Regarding the castle of Valle, and its curtis origin, see the analyses in Farinelli 2007 repertoire n. 17.01 and in Ceccarelli Lemut 1985, p. 37 note 67. For an analysis of the documentary references to the large-scale presence of public holdings in this area, especially between the area of the Pecora and the Colline Metallifere, see Simone Collavini's essay in this volume and Ceccarelli Lemut 1985, p. 31 and Farinelli 2007, pp. 76-85. Regarding the king's donation, see the detailed analysis in Vignodelli 2012.

[52] For the analysis, reference was made to the metrical correspondence of the unit of measurement proposed in Brogiolo 2013, in relation to the study of early medieval building techniques. Although the structural elements are not preserved, it seems that the same metrical reference may also be identified in the dimensions of the central building, although we can only go by the remains identified in its robber ditch.

[53] These involve a number of well-known documentary references reporting the presence of towers in relation to a number of curtis centres in the Maremma coastal area. In particular, in a document dating to 973 there is mention of a "turris" in relation to the fortified *curtis* of Lattaia (at the castle of Montemassi) and the curtis of Caliano, along the lower Ombrone. A third tower-like building is mentioned in a 996 document relating to the curtis that was the property of the Bishop of Lucca at San Vito in Cornino, near Piombino lagoon. For the

fig. 10 – The general planning of the Vetricella site, with indication of the possible metric references used for its construction: the *Liutprando*'s foot, apparently used in a regular sequence of multiples.

In the first few years of investigation, an initial analysis of the particular morphology of Vetricella and its material culture already highlighted the exceptional nature of this context, although, as stated earlier, including it in the traditional interpretive model of an early manifestation of the seigneurial institution in the Early Medieval period[54]. The very proximity of the intriguing local place-name of *Castellina* (which has survived to now identify the excavation area) had had a partial influence in this historical interpretation, and also in the identification of a possible reference to the seigneurial *moats* found in France. However, the chronology affirmed by the abundant material culture which has been found, and which was immediately connected to functions other than a simple settlement site (as, for example, a control site), has always indicated a 9thc horizon, earlier than the horizon commonly attested for such fortifications, not only in the area of Italy[55]. As regards the numerous and well-studied examples in France, where the historical value initially attributed to the phenomenon of feudal *moats* is well-known (Noyé 2013; Bourgeois 2013, pp. 463-464), the case of Vetricella seems rather to be in line with the forms and 9thc chronologies of the circular fortifications in the Lower Rhine and the Netherlands (Christie, Herold 2016; Tys, Deckers, Wouters 2016)[56], with reference not so much to the major circular sites (Tys, Deckers, Wouters 2016, pp. 179-183; Bourgeois 2013, p. 468) but rather to the smaller circular fortifications, often set up in order to control and defend surrounding territory (Tys, Deckers, Wouters 2016, pp. 175-176, pp. 185-186).

Initial indications for parallels have also led, as a hypothesis for the continuation of the research, to a reconstruction of the possibile relationship between the construction, toward the mid-9thc, of fortifications similar to our context (*towers*) and the exercise of a public control of coastal areas and water-courses, in some cases in relation to specific defensive strategies (as suggested, for example, for the coastal defence duties assigned to the Marquis of Tuscia, Adalberto I), or

respective documentary references, see the historical and archaeological analysis provided in Marasco 2013a, pp. 57-59.

[54] The references here are to Marasco 2009; Bianchi 2010; Creighton 2012, pp. 94-45, and to the points made above in pp. 57-58.

[55] For an attempt to set out a brief overview of the Italian context, see the results of the Conference held at Scarlino in 2011, entitled *Fortificazioni di terra in Italia. Motte, tumuli, tumbe e recinti* (Settia, Marasco, Saggioro 2013), with an interesting updated overview also of certain areas in Europe (contributions by G. Noyé, C.H. Kelland and T. Baranowski).

[56] Initial work on studying contexts with formal 9thc features and chronologies similar to Vetricella had already identified a number of possible references in northern Europe, with particular regard to north-eastern France and the Rhine area (Marasco 2013a, p. 66; Id. 2009, p. 327). These lines of analysis require further development, also in the light of subsequent fieldwork.

to possible functions for tax collection and the residence of public officials[57].

These approaches to interpretation, albeit in the form of preliminary analyses, seem to offer approaches to interpretation also for the historical reconstruction of our site.

However, further discussion of the study must wait as further definition of the creation and functional evolution of the site of Vetricella is made with reference to settlement evolution in Tuscany. We shall only highlight the particular formal characteristics and its uniqueness compared to the usual fortified structures known in this area (not only with reference to the more traditional hilltop sites, but also as regards other early medieval lowland fortifications, see Marasco 2013a, pp. 63-66). At present, for the image of Vetricella between the 9th and 10thc, we cannot cite more substantial excavation findings to back up these analyses of the meaning of the first defenses, and indeed we can only interpret it indirectly as the tangible manifestation of some aristocratic or royal power.

It has been seen that there is no shortage of possible indicators of activity and control of the structures present, and that the finds made may already suggest, in this phase, a possible function of gathering generic commodities (some of the coin finds already date to this period, for example). The topographical position of Vetricella itself, for that matter, standing in relation to a more or less nearby lagoon area, but with a high potential in economic and productive terms (halfway between the coast and the hills, and near a conceivably still active road network), displays a clear strategy aimed at control. We know from historical and archaeological findings that the coastal territory around Vetricella had a potential for the exploitation of local resources, both of traditional metallurgy (owing to its proximity to sources on the island of Elba and in the Colline Metallifere) and as exploitation of arable areas and lagoon areas, salt production no doubt being one of the resources in question.

As regards salt itself, unlike the case of the nearly Piombino Lagoon (see the report on the site of Carlappiano, above), in the case of Vetricella we do not possess evidence of any economic or productive nature, despite the fact that its morphological and environmental characteristics displayed the same potential as the other coastal lagoon areas (the aforementioned case of Piombino, or *Lake Prile*, near Grosseto). Documentary information on the salt trade, rather than specifically salt production, is found in the area of Scarlino only in the Later Medieval period[58]. We can only speculate that possible salt-works, mentioned in a document dating to 772, in relation to estate holdings in the hinterland, may have existed in this part of the coast (Kurze 1974, I, nn. 19-20; Ceccarelli Lemut 1985, p. 26 note 3). The information currently coming from the excavation would thus seem to underline a different strategic purpose, connected to the control and management of a system of products. It is possible that also attributable to this same purpose is the formation, between the 9th and 10thc, of that network of sites identified in the area around the excavation, and which it is proposed came directly under the site.

This interpretation of Vetricella as a site established by a strong authority, and as a site with prominent characteristics, remains valid also for the period identified as Period 3 in the stratigraphic sequence, datable as of approximately the mid-10thc. Here the strata uncovered indicate the creation of a full-scale monumental site, facilitated by high-technology equipment, the mortar mixer, identified outside the central tower. In this case, too, we are looking at an archaeological feature which, on top of the material aspects of its form and function, is also of value as an indicator of specific socio-economic and cultural contexts, which it is possible to associate with a highly specialized and probably non-local workforce (Bianchi 2011; Cagnana 2011). In this connection, it is significant that the second mortar mixer at Vetricella in the following period has basically a similar design, but was clearly created with less skill, and with inferior technical qualities, manifesting perhaps the presence of workers from a different background.

Certainly, the visual impact of Vetricella in this phase must not have been inferior to the previous phase, if we consider not just the presence of the central tower-like building, but also the internal surfaces lined with mortar, and the large wooden structures identified both around the tower and close to the middle ditch (in this case with a possible palisade function). It is not altogether rash to suppose that perhaps this very period, Period 3, was when the site of Vetricella expressed its most incisive material manifestation, presumably also in relation to a moment of real historical importance.

Once again, the limited stratigraphic data do not allow a good reconstruction of what types of activity were conducted within such a complex and structured place, and what function it had in relation to the surrounding settlement/production nuclei.

There were, already in this period, some indicators which could suggest a particular productive vocation of the site, connected to those metal-processing activities which, in almost every century, have represented a sort of natural vocation for this area[59].

In light of this, it becomes even more likely that we are to interpret as residual the huge amount of metal material found especially in the levels belonging to Period 4, comprising a considerable variety of finds, finished and semi-worked products, and processing waste (forge slag). In general this is a complex of finds which, at the end of the 2016 campaign,

[57] The relationship between the appearance of circular fortifications with a tower, and defence against possible threats from the sea, characterizes, for example, initial approaches to interpretation for the origin of many "moat" or "ring-shaped" sites in Flanders and the Rhine area (see references, *above*, to Tys, Deckers, Wouters 2016 for an up-to-date reinterpretation). A similar function as structural features for the defence and control of assets and public resources, in particular in riverine and coastal areas, has also been put forward for a number of *towers* in the area of Veneto attested to around the mid-9thc, in one case with an express connection to the initiatives of Adalberto I of Tuscia (Brogiolo 2016, pp. 468-470; Castagnetti 1991, pp. 48-49). In the case of a *tower* at Badia Polesine, which is suggested as being of early medieval date, emphasis is also placed on the relationship with tax-collection for river transit over the Adige, and generally on the management of the passage of boats (Brogiolo 2016, p. 470).

[58] See the points made in Ceccarelli Lemut 1985, p. 71 note 54 in reference to a 1336 document mentioning the fact that boats with cargoes of salt moored at the port of Portiglione, near the Scarlino lake.

[59] On the metallurgical vocation of the territory of Scarlino and the gulf of Follonica, ever since the Etruscan era, see (among the most recent articles) Cambi, Cavari, Mascione 2009, with particular reference to the Scarlino area in Aranguren, Giachi, Pallecchi 2009.

totalled more than 750 pieces, distributed across the various periods, but with a greater concentration in Periods 4 and 5, due to the operations of removal and levelling recorded in those levels. Future campaigns must aim to identify the original deposits from which these finds came.

This considerable wealth of finds is also found for the other types of material, in particular for pottery finds (more than 20,000 fragments) and animal bones (around 10,000 fragments), which, given the absence of indicators which may be connected to a settlement, can only support the hypothesis that we are dealing with a centre which acted as a reference point for local economic and productive activities. Also, the presence in this same period of an orderly, well-defined burial area (possibly datable to the end of the 10thc), whilst no building of worship has been identified yet, could confirm that Vetricella had a prominent role over the surrounding system of settlements.

The aforementioned events, the new organization of the site, the occupation strata, and the layout of the burial area are all events which took place in a fairly brief space of time, a sign of an important place which was repeatedly at the centre of new initiatives. The use of fill and the levelling operations in Period 4, along with the setting up of the new mixer, and the systematic dismantling of the previous wooden structures, are also expressions of a well-planned and coordinated site reorganization, although it lasted only a short time. The construction of the stone and mortar masonry structure, probably acting as a socle, was robbed not long afterward, the material being scattered to form a new rubble-paved area. All these interventions were fairly significant, and at present seem to reaffirm the interest in these structures, and in their continual reorganization. The creation of small forges on this new level of stone debris, which allowed rainwater to drain away, if placed in relation to the presence of residual material, could indicate the continuation, with differing forms and on differing scales, of previous productive activities[60].

In view of this reorganization, we must attach significance to the constant survival of the central tower-like building, which remains a solid point of reference around which, in the form of a ring, all the aforementioned activities (at least up until around the mid-11thc) are situated. Further confirmation of this significance may also be seen in the final phase of abandonment, in which the only stratigraphic evidence amount to the systematic dismantling of the tower itself. Both the masonry parts of the perimeter walls and the large corner wooden support posts were completely removed, while no robbing for reuse is seen in the remains of the socle, or in the stone rubble paving. Thus, in the phase of the site's dismantling, we would see an indication of the particular value (including the symbolic value) of the central building, which evidently must have come to an end the moment when the whole site lost its function.

If we place this event in the context of the surrounding landscape, it is not insignificant that the contexts identified in field-walking in the Pecora plain also do not yield many finds datable after the second half of the 11thc. This is further confirmation of the fact that the archaeological findings bear witness not simply to the end of an important individual site, but rather to the end of a whole socio-economic system. Verification of these proposed interpretations will rest with continued research, and the necessary comparison with the gathering of new data.

At the end of this interpretative overview, we can highlight some of the main problems still unanswered (of which, indeed, there are many) which will constitute the salient points of our research agenda.

From the point of view of stratigraphical findings, and the possibility of using them to put together a historical reconstruction, the size and type of the first frequentation of Vetricella certainly remains to be clarified. This part of the archaeological deposit has so far been revealed only to a limited extent, and in a form mostly altered by later activities. At present the absolute chronology of this first real occupation is yet to be specified (this is currently thought to date to between the 8th and 9thc), as is its functional characterization, and whether this is to be referred to a nucleus already designed for control and management, or whether it is rather to be associated with a context that is closer to the nature of a settlement site.

By contrast, the interpretation of the stratigraphic sequence of Periods 2 and 3 appears clearer. For these periods, we believe that Vetricella can already be identified as a centre for the management and administration of the resources of a specific territory, of smaller or larger proportions. If this proves to be true, we hope to be able to verify, in archaeological terms, whether specific production activities may also be part of this management and control, as early as some point between the 9th and 10thc. Particular examples of such activities could be those connected to the exploitation of mineral and metallurgical resources. The surprising quantity of finds and material indicators that can be related to this sphere of production can be interpreted, despite their residual nature, as initial possible testimony to a context which requires more exploration of the stratigraphy.

Similarly, the stratigraphy attributed to Period 4 itself will require a more precise understanding and chronological interpretation, to be arrived at by an expansion of the excavation, and new relationships to absolute chronological references. Indeed, it seems clear that the intense sequence of activities which make up this latter period could be better broken down in the light of new stratigraphical information, perhaps also with the identification of a longer periodization.

Finally, an extension of detailed archaeological investigation is to be regarded as necessary. This should include the territorial context surrounding our site, both immediately adjacent to the fortified area, and in contexts that are further away. An archaeology-based reconstruction of both the environmental context (with a more precise identification of the location of the lagoon areas) and of the network of contemporary settlement sites is to be regarded as crucial for a more solid understanding of the historical role of Vetricella, and of the "system" which has been suggested as having existed.

L.M.

[60] Only the continuation of investigations will clarify the meaning of the finds and stratigraphy datable to this period, and also their relationship to the numerous indicators of metallurgical activity also from the external area, south of the site.

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Abstract

The coastal territory of Scarlino has been at the centre of in-depth archaeological studies for several decades. These began with the investigations at the castle of Scarlino started by Riccardo Francovich in 1979, which have continued up until today with projects to study archaeological landscapes, and with stratigraphic investigation at the early medieval site of Vetricella. Since 2016 the start of the new nEU-Med project has given new momentum to research work, and has stimulated the exploration of new approaches to the archaeological interpretation of medieval landscapes. One of the issues subject to this new exploration is the archaeological context of Vetricella, a fortified site of exceptional historical value, located in the Pecora river plain, near a former salt-water lake, and a hypothetical area of marshland. Over the years, the historical reconstruction of the landscape has clearly revealed the particular environmental characteristic of this area, where the presence of land and water, side-by-side, is found to have been more of a resource than a negative element. Documentary findings attest, for this same territorial context, the fact that it belonged to a large-scale holding of public origin, directly connected in the course of the 10thc to sovereign power, and to its management of local resources. The layout that characterizes the site of Vetricella, with three defensive ditches, is seen, as of the 9th and 10thc, as a tangible manifestation of this system for controlling and managing the local area, in direct relation to what was happening in the neighbouring areas of the Cornia valley (with the ancient Piombino Lagoon) and the territory of Massa Marittima (with the nearby Colline Metallifere hills). The excavation under way at Vetricella has reconstructed a complex sequence of construction and fortification interventions, centred around a "ring-shaped" morphology with a tower-like structure in the middle, which currently seems to be the site's main feature. The stratigraphical investigations have yielded a surprising number of finds and material indicators, both in terms of pottery wares, and numismatic and metallurgical finds, providing valid grounds for an interpretation of the site of Vetricella as a real place of power, designed for the control of the economic resources of an entire area, and of the productive activities associated with them. The continuation of the investigations is aimed at defining in an even more detailed way the origin of this site and the evolution of its historical function, both in relation to the contemporary archaeological landscape and to the dynamics that seem to mark its end, in the course of the 11thc.

*Emanuele Vaccaro**

LONG-DISTANCE CERAMIC CONNECTIONS: *PORTUS SCABRIS* (PORTIGLIONI-GR), COASTAL TUSCANY AND THE TYRRHENIAN SEA

1. INTRODUCTION

The transformations of the Western Mediterranean systems of exchange between Late Antiquity and the Early Middle Ages have been at the centre of a lively debate for decades. In recent years, both historians and archaeologists by means of different evidence produced interpretative models that emphasised concepts such as continuity and rupture. Trying to produce both broad and in-depth analysis of the Mediterranean patterns of change between the 5th and 10thc AD is not an easy matter, as the degree of regional (and micro-regional) variety is wide and articulated. Nevertheless, much effort has been made recently attempting to integrate historical, archaeological and ecological datasets with the aim of producing Late Roman through to Early Medieval Mediterranean histories in which large and small scales talk to each other effectively (Horden, Purcell 2000; McCormick 2001; Wickham 2005).

Nowadays, no one familiar with the study of the ancient systems of trade would doubt about the necessity of comparing and integrating the datasets produced by terrestrial archaeology with those yielded by underwater research when attempting to define the extent to which a given territory at a given time was connected to the broader maritime routes (Beltrame 2012, pp. 17-35). As such, this paper takes an integrated approach combining and confronting the small scale represented by the harbour at *Portus Scabris* and the middle/large scale of the Tyrrhenian sea-routes in the period AD 300-1100.

By using pottery as a proxy for the reconstruction of long-distance contacts and processes of redistribution of both foodstuffs and craft-products, I aim to contextualise the economies of the micro-region of southern Tuscany investigated by nEU-Med in the broader Tyrrhenian framework. In doing so, I will pinpoint the varying rhythms of maritime connections engaged by this territory through the evidence provided by its main gate on the sea.

2. *PORTUS SCABRIS*: THE CONTEXT

Wide portions of the Tuscan coast are not suitable for the construction of substantial sea-ports as they are characterised by the presence of sand-dunes; therefore, the regional geomorphology forced local communities to make persisting use of the very same places for the location of landing-places in the long-term. This, of course, does not necessarily entails that it is impossible to establish a chronological sequence for the use of these harbours, which, in fact, according to the available archaeological evidence show fluctuations in terms of human activities. From this point of view it is also worth bearing in mind that archaeological work at and nearby the Roman and medieval harbours of Tuscany is neither systematic nor extensive. This, in turn, largely depends upon the logistical constraints related to the modern use of some of these sites that impede or at least make particularly difficult the application of archaeological research, as it is often the case for long-lasting settlements. Fluctuations in the use of the Roman through to medieval harbours of coastal Tuscany can be mostly analysed through the ceramic evidence. This evidence is particularly fruitful when yielded by excavation at these sites, although it is no less valuable if it is produced by both a combination of excavation and surveying the territories situated behind the harbours, where the arrival of imported commodities points to the inclusion of that specific area in the wider system of Tyrrhenian trade.

Recent work on the central Tyrrhenian coast, between Puteoli to the south and Cosa to the north, pointed out that the introduction of the Roman hydraulic concrete determined the development of the «maritime façade» of the area, characterised by a complex hierarchy of Roman harbours of different size, all relying on this new building technique (Schörle 2011). The establishment of a hierarchy is based upon the complexity of infrastructures, particularly moles, wharves and other facilities (such as large warehouses) that could be accommodated at the harbours, as well as on an estimation of the size of ports and harbours. This analysis shows well the sophistication of this coastal infrastructural system which, despite the presence of very large sea-ports such as *Portus* (234 ha) and Puteoli (67.9 ha), was largely composed of a number of harbours related to cities and private villas, whose size ranged between 1 and 30 ha (Schörle 2011, pp. 95-97).

Unfortunately, no similar work has been carried out on the harbours of the northernmost stretch of the Tyrrhenian coastline, where *Portus Scabris* is located, and virtually no precise measurement of the size of the harbours is available which would be used for their hierarchisation. This is particularly due to the lack of publications of the overall plans of these harbours, as a consequence of less intensive archaeological research on this specific topic.

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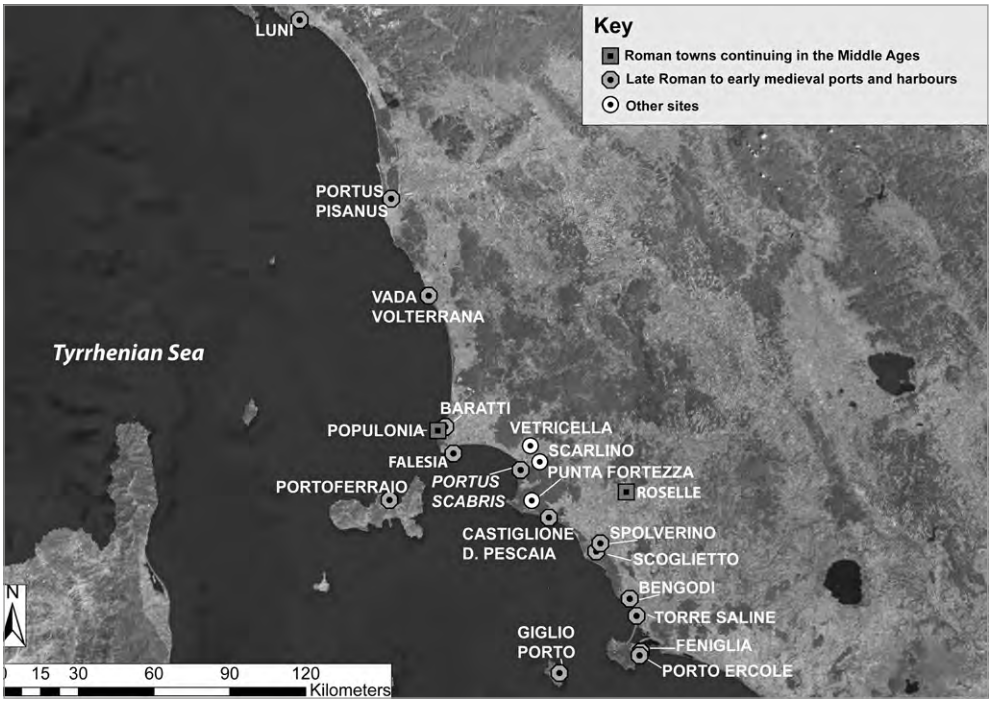

fig. 1 – The late antique and early medieval system of ports and harbours along the Tuscan coastline.

Moreover, in most of the cases it seems clear that the harbours of the coastal area between Luni to the north and Cosa to the south were represented by small and medium landing-places more suitable to dock small vessels of low tonnage (*fig.* 1). In these cases docks could easily be far less prominent than concrete structures and just made of perishable materials. For a diachronic overview of the late Roman and early medieval harbours of the coastline of Tuscany we can mention from north to south: Luni, *Portus Pisanus* (Santo Stefano ai Lupi, LI), Vada Volterrana, Baratti, Falesia (Portovecchio at Piombino), Portoferraio, *Portus Scabris*, Castiglione della Pescaia, Bengodi, Torre Saline, Feniglia, Port'Ercole and Giglio Porto (Citter *et al.* 1996, pp. 133-134).

To these, at least for the 5th and 6thc AD, the landing site of the cave at Scoglietto at the mouth of the Ombrone river must be added (Vaccaro 2011, pp. 96-103). The presence and efficiency of a well-connected landing site here is indirectly confirmed by the establishment, at the nearby site of Spolverino, of a Domitian through to mid 5thc AD craft-working site specialising first in glass production and later in metalworking, that took advantage of the proximity to the maritime routes for the marketing of its products (Sebastiani 2014). Excavations at Spolverino yielded a substantial mid-to-late 5thc AD ceramic assemblage, whose composition shows that at least some 55% (52 MNI) of the in-phase (93 out of 96 MNI) vessels are represented by amphorae imported from various sources (Tunisia, Spain, Portugal, Sicily, Asia Minor, Cilicia and Cyprus). This ceramic evidence attests to the use of the landing-site at the mouth of the Ombrone into the later 5th AD[1]. In reconstructing the overall system of late Roman and early medieval harbours of the study area, it needs to be considered that new work on the ceramics from the late 1940s-1950s excavations at the Arx of Cosa identified a small amphora assemblage pointing to the arrival of Mediterranean commodities well into the late 6th/mid 7thc AD (*infra*). These materials may support the hypothesis of a prolonged use of the sea-port of Cosa into our period.

Overall, the distribution map (*fig.* 1) of the late antique and early medieval harbours of the Tuscan coastline reveals the persistence of a well-organised system of small to medium-sized landing places particularly suitable for coastal tramping or *cabotage*[2], rather than the existence of large sea-ports that would better serve long-distance trade. *Fig.* 1 also shows that in some cases the proximity of the landing places opposite to each other was aimed at ensuring safe docking even in hostile weather conditions characterised by headwind and tailwind. The closeness between a series of harbours along the same route should have been well known by the sailors who sought never to lose sight of land. The use of tramping routes in the Mediterranean represents a long-lasting pattern between Antiquity and the Late Medieval/Early Modern periods (Horden, Purcell 2000, pp. 123-143). Nonetheless, the role of *cabotage* should not be overestimated to the detriment of long-distance connections between major ports and emporia. In the Hellenistic and Roman periods, in fact, it seems that the role of long-distance routes was of great importance and a very large portion of trade is likely to have been based on them. This is revealed by the evidence yielded by ship technology, by the sizeable investment in the construction of large sea-ports in concrete and by the composition of cargoes of the ancient shipwrecks (Wilson 2011, pp. 53-54). In most of the cases, the archaeological data shows that the system of Late Antique Mediterranean

[1] See Vaccaro 2015 for the assemblage; particularly p. 215, tab. 4. The number of imported amphorae could be even higher if some of the unidentified amphorae (8 MNI) and/or the generic Italian ones (2 MNI) would belong to in-phase materials.

[2] In general, for the importance of *cabotage* in the Mediterranean between the 7th and 9thc AD, on the basis of the lives of saints and pilgrims see McCormick 2001, pp. 483-500.

ports was inherited from the Roman times, being available very little evidence for the construction of brand-new infrastructures to support the late antique maritime networks. On the contrary the early medieval emporia, mostly located in northern Europe, tells a completely different story that had its origins in the 7thc and came to an end between the 9th and 10thc AD (Augenti 2010, p. 142).

Portus Scabris is first mentioned in the late 3rd/early 4th AD *Itinerarium Maritimum* along the route connecting Rome and Arles. The site is said to be located between the river Alma to the south (*ab Alma flumine Scabris, portus, mpm VI*) and the port at Falesia to the north (*a Scabris Falesia, portus, mpm XVIII*) (Cuntz 1929). Scholarly tradition, on the basis of toponomastic and medieval textual evidence, located *Portus Scabris* at the bay of Portiglioni, at the mouth of the Pecora river (Ceccarelli Lemut 1985). A plea dated to AD 1055 refers to the existence of a *curtis* at *Portilione* and describes some of its features and facilities *cum casis, capellis seu territoriis, et lacu, et piscaria, et portu* (Manaresi 1960, pp. 222-224). This attests for the persistence of an harbour at the site; an evidence matched for the 11thc AD by the archaeological datasets (*infra*).

In the early 2000s the site of Portiglioni was at the centre of intensive building activities for the reconstruction and expansion of the tourist marina. The construction of the new marina was both preceded and paralleled by rescue archaeological work on the seabed that would have been later affected by dredging operations necessary to reach the depth for the installation of the new facilities. Archaeological work was directed and undertaken by the Soprintendenza Archeologia della Toscana. The harbour basin of Portiglioni was subdivided into a virtual grid with grids measuring 100×100 m, each of them was identified by a letter. This provided a georeferenced system to plot the materials later collected by rescue archaeological survey and monitoring of building activities (Vaccaro 2011, pp. 113-116). Following preliminary research and underwater surveys, underwater test excavation was undertaken at four different areas located in front of landward dock. Despite the limited extension of the sondages, they yielded useful information on the volumes of commodities reaching the site at different times. The archaeological evidence from these areas showed the continuing use of the landing place between the late 3rd BC and the 5th AD with a major concentration of imports in the late Republican period and progressive decrease in quantities from the 1st and 2ndc AD onwards (Bargagliotti, Cibecchini 2003). Nonetheless, as we shall see, the use of the harbour at Portiglioni experienced a much more prolonged use than that based on the aforementioned small excavations. Persisting and (possibly) intermittent exploitation of the landing-place is detectable in the archaeological record well into the Medieval and Early Modern periods, although the intensity of trading activities seems to have been significantly lower than the later 3rd BC through to 1stc AD.

It is particularly worth noting that neither underwater surveys nor excavation at *Portus Scabris* produced any evidence for the presence of concrete buildings at the harbour. However, in two different excavation tests (one characterised by late Republican deposits and one with early imperial materials) wooden poles probably used to moor small to medium-sized ships were detected (Bargagliotti, Cibecchini 2003). Although sondages were too limited to provide conclusive evidence for an in-depth analysis of the material features of *Portus Scabris*, the absence of concrete buildings near the dock at the periods that, according to the ceramic evidence, coincided with those of major use of the site (late Republican and, to a lesser extent, early imperial) is telling. This evidence suggests that *Portus Scabris* belongs to the category of simple harbours characterised by modest facilities made of perishable materials rather than to the category of true large seaports, in which the construction of complex concrete structures such as piers, moles and breakwaters reflects large investment (Camilli, Gambogi 2005). In the end, the location of the bay of Portiglioni, well-protected from the winds of the 3rd and 4th quadrants ensured safe docking and a series of infrastructures in perishable materials requiring small investments would have been sufficient for the ships sailing along the routes of coastal tramping. The outline of the coast, on its own, offered natural shelter and the establishment of a harbour here may have taken advantage from the fact that it was the only access to the inland saltwater lagoon, known up until the 19thc AD as *Stagno di Scarlino*. Overall, the absence of concrete infrastructures at *Portus Scabris* (as at many other sites) should not lead to an underestimation of its importance. Indeed, the period between the 6th and 9thc AD is characterised by the systematic use of decomposable materials in the construction of seaports and harbours even in the case of the largest emporia of northern Europe (Augenti 2010, pp. 55-105).

3. POTTERY FROM UNDERWATER DEPOSITS AT *PORTUS SCABRIS*: AN OVERVIEW

Apart from the materials yielded by the four underwater sondages situated in front of the landward dock, the vast majority of findings was collected by rescue archaeological activities undertaken during the operations of seabed dredging and the installation of the structures for the new marina. Therefore, through the use of the virtual grid laid down on the area of the bay, a more or less precise position of these materials is known, but their stratigraphic context and sequence are lost. It results in needing to treat these ceramic assemblages like those collected by field walking or underwater surveys.

The lack of a stratigraphic sequence entails that all the chronologies discussed here are based on the intrinsic dates offered by ceramics, which of course vary significantly from one class to another (e.g. finewares are much better dated than most of the coarsewares). Despite these methodological issues and objective limits of a study of ceramic assemblages devoid of their relative sequence, the large amount and wide time-frame of the materials from *Portus Scabris* made it a unique opportunity for analysing the fluctuations of the imports at one of the better-connected harbours of the Tuscan coastline in the *longue durée*. Research focusing on the late antique and medieval materials was carried out in 2004 and 2005 through a fruitful collaboration with the *Soprintendenza Archeologia della Toscana* and the preliminary results were

extensively published in 2011 (Vaccaro 2011, pp. 113-155). Between Fall 2016 and Winter 2017, the rest of the materials that in 2004-2005 was stored in an inaccessible depot was eventually made available for the completion of the study. Similarly to the analysis undertaken in 2004-2005, new work focused on the period encompassing the 4th through to 12thc AD producing new interesting materials that follow into this long period; at the same time the previously analysed materials were revisited and reconsidered in light of increasing knowledge and refinement of chronologies of the late antique and early medieval pottery. The datasets presented here are necessarily partial as they do not include the ceramics dated from before AD 300 and after AD 1200, as such they lend themselves to a fine-grained quantitative analysis of only the commodities that reached the site between the late Roman period and the central centuries of the Middle Ages. A longer view, encompassing the information produced by all the underwater materials from *Portus Scabris*, would be of formidable importance for the diachronic reconstruction of maritime trade in the central and western Mediterranean as very few other harbours and ports can boast such a long-lasting use and, as a consequence, richness of materials. However, the nine centuries that will be discussed here offer an interesting long-term perspective that coincides with a period of marked transformations in maritime trade. This period begins with the slow but progressive decline of Late Antique Mediterranean trade in foodstuffs and commodities visible in the archaeological record and includes the development, from the later 10thc AD, of a new system of connections that seem to be more restricted both in volumes and in its geographical boundaries.

Although the late Republican through to mid-imperial materials from *Portus Scabris* have not been analysed yet, some preliminary quantitative data is available for the amphorae. By using the RBH (rims, bases and handles) criterion, as used in the analyses presented here, it was estimated that a total of 1250 amphorae were collected by rescue archaeology activities at the site. According to the report produced by commercial archaeologists working for the Superintendency at *Portus Scabris*, late Republican amphorae (intended as those dated between the late 3rd and late 1st BC) account for 650 MNI[3].

My work focused on materials dated from AD 300 onwards and produced these numbers: 248 MNI attributable to the 4th to 7th AD and 7 MNI dated from the later 7th/early 8th and 12th AD. This means that the remaining portion of amphorae (345 MNI) are very likely to fall into the period comprised between the 1st and 3rdc AD. Although the reconstruction of this figure is tentative and should be checked through accurate analysis, it seems more or less plausible according to what I have seen in the depot where the quantity of early to mid-imperial amphorae seemed to be slightly higher than that of the late antique ones. The presentation of these datasets in *fig.* 2 shows that the highest peak in amphorae at *Portus Scabris* occurred in the Late Republican period when the economy of Tyrrhenian Italy was particularly vibrant and wine production was targeted to large-scale exportation. As such, our site may have served as an important commercial hub for both inland redistribution of wine circulating by the sea and as a port-of-call for coastal tramping. If our calculation is correct, in the early to mid-imperial period the amount of amphorae at *Portus Scabris* was almost halved in comparison to the 3rd-1st BC. A decrease in the amphora count in the early imperial period compared to the late Republican times is in accordance with the evidence produced by the underwater sondages at the site (Bargagliotti, Cibecchini 2003).

New work on the Mediterranean shipwrecks between 1500 BC and AD 1500 shows a progressive and sizeable growth between the 2nd and 1stc BC, although the highest peak is reached in the 1st AD, then the evidence begins to decline significantly since as early as the 2nd AD (Wilson 2011, pp. 33-39). This pattern conforms with *Portus Scabris* as regards the growth of commodities in circulation in the late Republican period and then the decrease starting in the 2ndc AD, although the 1stc AD peak is not documented in our record. It is not easy to provide an explanation for this discrepancy without an in-depth analysis of the all amphorae predating AD 300, as it could offer more detailed phasing of the materials for both the late Republican and early imperial periods. In the 1stc AD, the harbour may have been a little less intensively used as a consequence of a slight decrease in the overall number of sites in its hinterland interested in purchasing Mediterranean imports. However, in spite of the diminishing quantities of 1st to 3rdc AD amphorae, relative percentages remained high with some 27.6% of the 1250 amphorae.

The late antique amphora pattern at *Portus Scabris*, with a progressive decrease of specimens in comparison to earlier periods, aligns with the broader western Mediterranean picture. This shows a diminishing number of traded commodities as well as of shipwrecks, with an accentuation of the phenomenon from the early 6th AD (Augenti 2010, pp. 31-53; Wilson 2011, p. 36, figg. 2.5 and 2.6). Virtually, only 0.56% (7 MNI) of the all 1250 amphorae from *Portus Scabris* falls into the long period encompassing the later 7th and 12th AD. This testifies to a marked change in the transport container technology with a preference for wooden barrels generally observed throughout the Mediterranean (Beltrame 2012, pp. 198-199), and a significant reduction of maritime trade that reached its lowest figure in the 8thc (Wickham 2005, pp. 720-759). This discussion of the long-term amphora figures at *Portus Scabris* is necessarily brief and serves as a background for the finer-grained and chronologically narrower (AD 300-1200) analysis presented in this article.

Before focusing in greater detail on the network of connections engaged by our site between Late Antiquity and the Middle Ages, some considerations on the methodology used to process and present the ceramic data as well as some overall figures seem in order. My work on the underwater ceramic assemblages from Portiglioni focused on diagnostic fragments (rims, bases and handles) and used, when applicable, the EVE (evaluated vessel equivalent) criterion

[3] I am grateful to Samanta Castelli from the *Cooperativa Archeologia* of Florence, the archaeologist in charge for the supervision of rescue archaeology work at the site, for providing me with the site report and quantified data of both overall and late Republican amphorae.

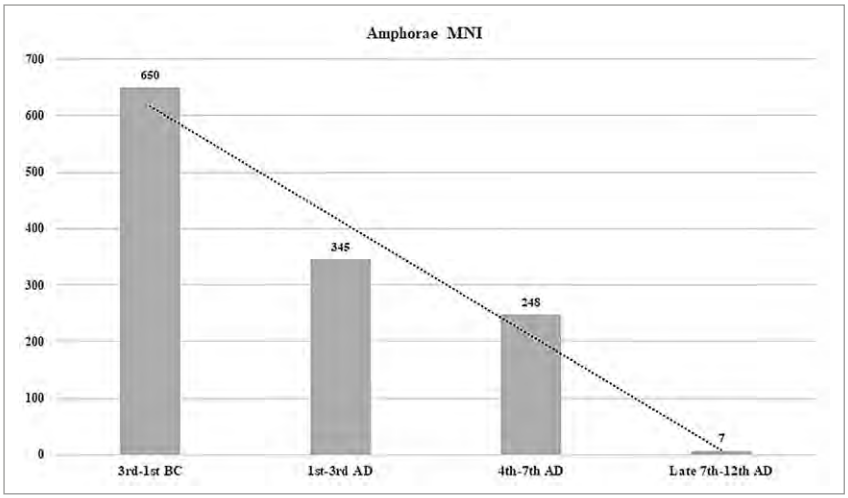

fig. 2 – The amphora record of *Portus Scabris* between the Late Republic and Middle Ages.

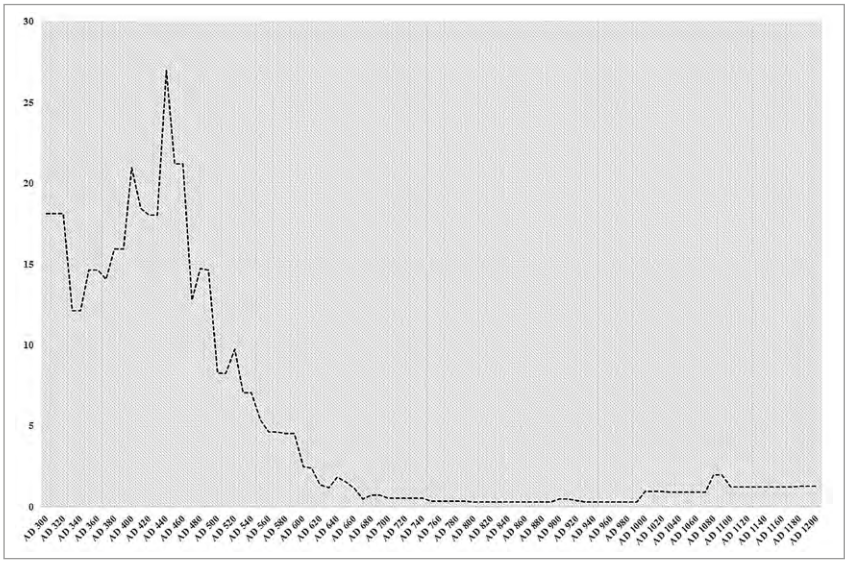

fig. 3 – The ceramic profile of *Portus Scabris* in the *longue durée* through the application of the IWM (Individual Weighted Means) method. X axys = decades; Y axys = value.

to determine the minimum number of individuals falling into our period. Analysis was applied to all ceramic classes including finewares, amphorae and coarsewares and allowed for the identification of a total of 491 MNI dated from between the 4th and 12th AD (Appendix 1). The dates for both Late Antique Mediterranean finewares and amphorae relied upon the thorough understanding and accurate chronologies available for these classes[4]. A few late antique imported coarsewares were identified (and dated) by comparison with similar specimens from well-dated contexts. As for the period between the later 7th and 12th AD, finewares are extremely rare (*infra*). The ceramics of this chronology at *Portus Scabris* are mostly represented by coarseware and, to a much lesser extent, by amphorae. The medieval materials from our site offer, in most of the cases, less narrow dates than the late antique ceramics.

To produce a diachronic profile for *Portus Scabris* and point out the fluctuations of imports in the long period AD 300-1200, the individual weighted means (IWM) method was used as it has demonstrated significant potentials in the long-term analysis of pottery, particularly African Red Slip (Fentress, Perkins 1988; Fentress *et al.* 2004). However, this method has also proved its efficacy when applied to more complex ceramic assemblages composed of a variety of classes (Vaccaro 2012, p. 124). Clearly, IWM work better with narrow-dated ceramics like finewares, as the chronology of each type often falls into half a century or even less. Nonetheless, amphorae and even coarsewares, whose dates tend to be wider particularly for the Medieval times, can be standardised and analysed by IWM producing interesting results. Once a date is attributed to a specific vessel, its value is spread over the period in which it is dated. In order to ease the data management and make the analysis more understandable, decades rather than single years are used.

As such, I multiplied each annual value by ten in order to obtain the value of each vessel during the decades covered by its date; this process is applied to the all ceramics selected for the in-depth study. The overall analysis is then visualised in a graph that shows the study period subdivided by decades on the x axis and the value per decade on the y axis. Therefore, the curve in *fig.* 3 describes the ups and downs of the volumes

[4] The chronologies for ARS and Tunisian amphorae are mostly based on Hayes 1972; Bonifay 2004 and Reynolds, Bonifay, Cau 2011, while those for Eastern Mediterranean amphorae rely upon Pieri 2005 (when the bibliography for identification and dating is different it is cited in the text). The dates for Italic amphorae are those presented in Vaccaro 2011, pp. 141-145.

of underwater ceramics at *Portus Scabris* in our period and allows for a quick understanding and quantification of the site's connections in a long-term perspective.

4. LATE ANTIQUITY (4TH-7TH AD)

As for Late Antiquity, the analysis of maritime connections at *Portus Scabris* relies upon 449 vessels extrapolated from the total amount of materials collected by underwater archaeological work. Late antique ceramics, their precise quantification is in Appendix 1, are subdivided as follows: 248 amphora MNI (55.23%), 191 ARS MNI (42.53%) and 10 MNI of imported coarseware (2.22%). *Tab.* 1 shows a breakdown of amphorae by sources and points out the preponderance of Tunisian transport containers (44.75%), immediately followed by those from Italic regions (41.12%), and a much smaller percentage of Eastern Mediterranean imports (14.11%). The predominance of Tunisian amphorae is not surprising as it matches the data from the vast majority of Tyrrhenian sites where the distribution of Tunisian goods took advantage of both the fiscal system of the *Annona* at least until AD 439, when the Vandals conquered Tunisia, and the network of free commerce (Wickham 2005, pp. 728-741; Murialdo 2007; Vera 2010). Unsurprisingly there is also an absence of imported fineware different from ARS: importation of PRS (Phocean Red Slip) to Tyrrhenian Italy between the 5th and 7thc AD was extremely limited (Martin 1998).

The high percentage of Italic transport containers is somehow misleading being biased by the considerable density of the Empoli amphora (late 3rd to 5th AD), produced in the middle Arno valley and in the *Ager Volaterranus* and documented with as many as 98 MNI and several variants. The spatial distribution of this amphora across the gridded bay of Portiglioni shows that some 43.8% or 43 MNI of these containers were found in a very circumscribed area, likely to suggest the presence of a beached shipwreck in that specific location (Vaccaro 2011, pp. 141-143). The ship with the Empoli amphora cargo was probably directed to Rome where the Empoli wine-amphora is well-documented at 5thc AD contexts (Vaccaro 2014, p. 14).

Fig. 4 shows both the cumulative curve for all the late antique ceramics at the site and the values for each single ceramic class (Tunisian amphorae, ARS, Italic amphorae, Eastern Mediterranean amphorae and imported coarseware) to point out the overall fluctuations of the volumes of traded commodities and those characterising single groups. The general curve shows the significant volume of imports, although with ups and downs, from the beginning of our study period in AD 300 up until the early 5thc. What happens in the first half of that century is particularly noteworthy: the curves for ARS and Tunisian amphorae – the best-documented classes – differ from each other significantly, although one would expect similar patterns as they are supposed to be traded on the same ships. In fact, in the central decades of the 5thc ARS peaks up significantly whereas Tunisian transport containers decrease to levels slightly lower than the 4thc. This apparent anomaly requires further explanation. The ARS rise in the mid-5thc AD is produced by the overlap of types introduced by Tunisian potters in that period (e.g. dishes Hayes 61B3 and flanged-bowls Hayes 91B) with others, whose production begun some decades earlier and continued well into that century (for instance large bowls Hayes 67B and dishes Hayes 61A, Hayes 61A/B3 and Hayes 61B1). At the same time, after the disappearance around AD 450 of some Tunisian amphora types, such as Africana IIIB, Africana IIIC and *spatheion* 1 well-attested at the site, the amount of transport containers from that region whose production began in the mid or second half of the 5thc AD is markedly lower in the underwater assemblages.

What do these figures entail in terms of systems of trade? Why do Tunisian amphorae and ARS show different patterns of distribution? Answering these questions is not an easy matter. Ceramics are very valuable to analyse long-term economic patterns through the study of their volumes, but when the study comes to a small period as in our case (the central decades of the 5thc AD), one has to be even more aware than usual of the limitations of the sample at disposal. Bearing in mind these limitations, the anomaly of ARS and Tunisian amphorae distribution demands explanation. The location of *Portus Scabris* and its features (mostly the absence of concrete infrastructures) suggest that the site served in both the Roman and later periods as a port-of-call along a series of different harbours north of Cosa used for coastal tramping. Therefore, the materials documented here do not reflect the long-distance connections, based on open-sea sailing, from two very distant ports. Fineware and amphora imports should have reached the site through the system of successive harbours north of the closest major sea-ports of Ostia and *Portus*[5], where smaller cargoes would have been assembled on the basis of the demand expressed by northern Tyrrhenian consumption sites. The sailing-routes branching out from the two large ports of Rome and moving northwards were based upon commerce rather than being controlled by the Roman state. The higher presence of ARS in the mid-5thc, as opposed to Tunisian amphorae, may simply mean that fineware was still requested by the communities of the hinterland of *Portus Scabris* in significant amounts, whereas the demand for Tunisian foodstuffs such as olive oil and fish-sauce was diminishing. Indeed, a decrease in the number of surveyed sites yielding Tunisian amphorae was identified in the mid 5thc AD in the nearby coastal area located between the Alma valley to the north and the Osa valley to the south (Vaccaro 2011, pp. 82-85).

However, the last forty years of the 5thc AD coincide with a marked fall in the quantity of ARS compared to the years around AD 450, a pattern shared with several other Italic regions (Wickham 2005, pp. 730-735). Tunisian amphorae reveal a slight increase between the later 5th and early decades of the 6thc, although the quantities are not as high as those reached in the first half of the 5thc. The period between the late 5th and early 6thc also registers an increase in the number of Eastern Mediterranean transport containers (particularly LR1B amphorae from Cyprus and Cilicia). At the end of the 5thc AD, the production of the Empoli amphora came to an end. The other Italic amphorae, whose chronology may cover

[5] For the role of these major ports in the processes of maritime redistribution in the Roman period see Wilson, Schörle, Rice 2012.

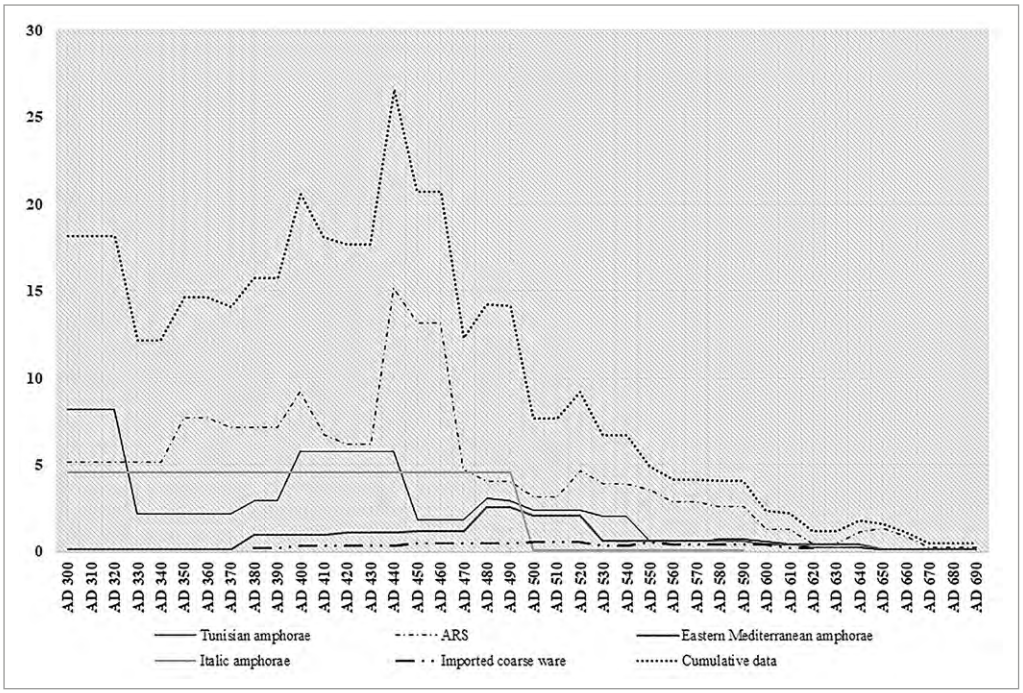

fig. 4 – The late antique pottery from *Portus Scabris* analysed through IWM (Individual Weighted Means): breakdown of data by ceramic class and overall curve.

Provenance	MNI	% of total late antique amphorae
Tunisia	111	44.75
Italic regions	102	41.12
Eastern Mediterranean	35	14.11

tab. 1 – Quantification of late antique amphorae.

this period (3 MNI of a long-necked version of the wine-amphora Keay 52 from southern Calabria), are too broadly dated (5th-early 7th AD) to make sure about the time they reached the site (Vaccaro 2011, pp. 144-145).

Pottery suggests continuing use of the port at least until the early years of the Graeco-gothic war, when the harbours of *Tuscia* became of great strategic importance to the Byzantine army to guarantee food supply to the troops deployed in central Italy (Procopio, Lib. III, X). However, immediately after the 540s the decrease in ceramics is dramatic and all the second half of the 6thc shows levels of pottery connections much lower than any other preceding period of our analysis. Roughly, the mid 6thc AD at *Portus Scabris* marks a significant turning point for its involvement in maritime trade. As we will see, very few ceramic vessels covering the period between the late 6th and 7thc are attested. Such a marked decrease in sea-trade is confirmed by the distribution of imports at both rural and urban sites in the nearby micro-region between the Alma and Osa rivers. There, Mediterranean amphorae and ARS reaching the late 6thc AD are extremely rare with a handful of vessels from in-depth analysed contexts at the town of Roselle and even less in the countryside (Vaccaro 2014, pp. 12-14). Around AD 600, that territory was completely cut-off from what was left of the Mediterranean trading system.

Between the later 6th and 7thc AD, imports continue at *Portus Scabris* but in very small quantities: some examples may be instructive from this point of view. ARS, documented at the site with as many as 191 vessels datable from the 4th to the 7thc AD is possibly the best study-case showing long-term marked decrease. Indeed, only 19 MNI (or 9.9%) of the all vessels refer to ARS types produced between well into the 6th and the 7thc *tab.* 2 shows the clashing comparison between very late ARS attested at the site and that yielded by the late 7thc AD context at the Crypta Balbi (Saguì 2002), which to-date represents the largest and most-widely connected deposit ever excavated in Italy for this era. The latest products of Tunisian potters, such as dishes Hayes 105 and Hayes 109 (*fig.* 5, nn. 9-15), are documented at our site with very few specimens whereas at the economically privileged site in Rome they are largely attested up to the eve of the Arab conquest of North Africa. Particularly striking is the fact that these late forms, occasionally documented at the harbour, have not been identified so far neither in field surveys nor at excavations undertaken in its hinterland. The same can be said for the latest amphorae from the harbour, imported from Tunisia and the Eastern Mediterranean. The Tunisian Keay 61D and another form documented by an *ombelicato* base, likely to belong to the type S. Antonino 47/Bonifay *globulaire* 3 (*fig.* 5, nn. 7-8) dated to the later 6th and 7thc AD, are documented through one specimen each. Two more Tunisian specimens belong to the large transport container Keay 62F/G dated from the 6th to the early 7th AD (*fig.* 5, n. 6).

Eastern Mediterranean sources provide three specimens showing morphological similarity and fabrics varying both in colour and texture. The colour vary from reddish to brown, whereas the textures range from semi-fine micaceous to quite coarse, with abundant limestone in one case and rare mica, and quartz, limestone and grey inclusions in the other (*fig.* 5, nn. 4-5). Both shapes and fabrics suggest an identification with a type documented at Butrint in the third quarter of the 6thc AD and assigned to the Samos-orbit group (Reynolds 2010, p. 109, *fig.* 6 h). Slightly later (late 6th-7th AD) is the date of a variant of the Samos cistern wine-amphora in a typical soapy micaceous fabric which has parallels with early 7thc specimens from a deposit at Nicopolis in Greece (Reynolds,

	Type	Date	MNI	% of MNI
Portus Scabris (19 MNI produced between into the 6thc and the 7thc AD)	Hayes 99B bowl	Second quarter 6th-early 7th AD	8	42.1%
	Hayes 87C/109 dish	Last third 6th AD	2	10.52%
	Hayes 104B dish	Mid/late 6th AD	3	15.78%
	Hayes 104A3 dish	Late 6th/mid 7th AD	1	5.26%
	Hayes 105A dish	Late 6th/mid 7th AD	1	5.26%
	Hayes 105B dish	Mid 7th AD	2	10.52%
	Hayes 105C dish	Second half of the 7th AD	1	5.26%
	Hayes 109A dish	Late 6th/mid 7th AD	1	5.26%
	Type	Context of finding	MNI	% of MNI
***Crypta Balbi* in Rome** (547 MNI from the late 7thc AD deposit)	Hayes 91D flanged-bowl	Late 7th AD deposit	12	2.19%
	Hayes 99C bowl	Late 7th AD deposit	163	29.79%
	Hayes 101 bowl	Late 7th AD deposit	14	2.55%
	Hayes 108 bowl	Late 7th AD deposit	26	4.75%
	Hayes 105 dish	Late 7th AD deposit	86	15.72%
	Hayes 106 dish	Late 7th AD deposit	6	1.09%
	Hayes 105/106 dish	Late 7th AD deposit	11	2.01%
	Hayes 109 dish	Late 7th AD deposit	229	41.86%

tab. 2 – Comparative analysis of the latest ARS at *Portus Scabris* and ARS from the late 7thc deposit of the Crypta Balbi in Rome (Crypta Balbi: after Saguì 2002, p. 38, tab. 3.).

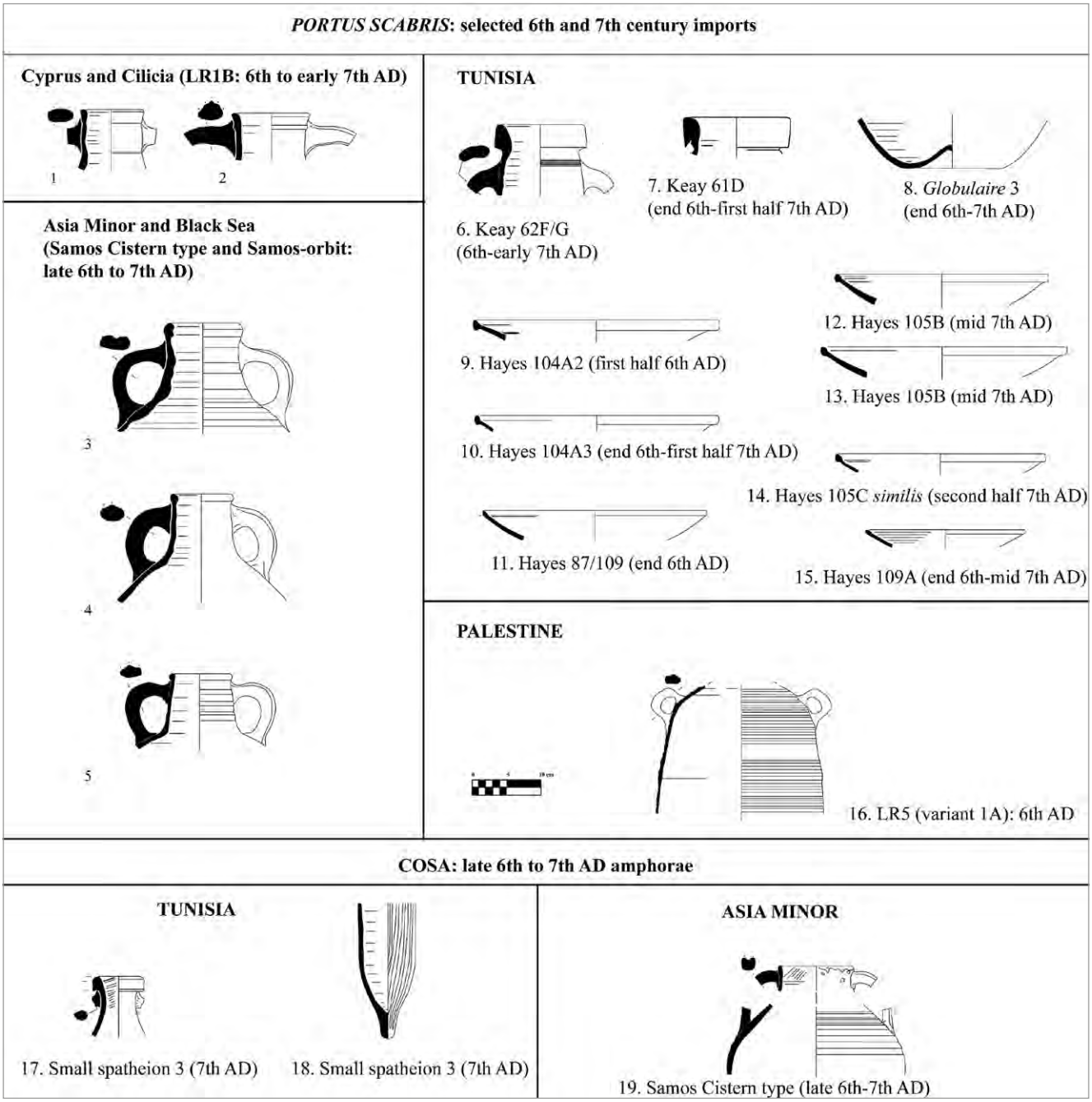

fig. 5 – Selection of the 6th and 7thc ARS and amphorae from *Portus Scabris*, and the recently identified late amphorae from the Arx of Cosa.

Pavlidis 2014, p. 462, *fig.* 9, n. 3.), although the handles of our vessel are wider (*fig.* 5, n. 3). Other late amphorae are represented by four specimens of LR1B, dated from the 6th to the mid 7th AD (*fig.* 5, nn. 1-2), whose porous yellowish-orange fabrics characterised by frequent small limestone inclusions and voids may be assigned to a Cilician production. Finally, at least three specimens of LR5 bag-shaped amphora carrying the celebrated white wine from northern Palestine are documented. Two of these are simply attested through handle/wall fragments preventing us from establishing a closer date than the 5th to 7th AD, one, however, only misses the rim and the body shape suggests its identification with the 6thc variant 1A (*fig.* 5, n. 16).

The absence of any of these materials at the rural sites in the environs of *Portus Scabris* suggests that their attestation in the underwater deposits does not relate to commercial activities aimed at redistributing them to the local communities. The territory of the Pecora valley seems to have been excluded from Mediterranean connections as early as the 6thc AD, whereas the persisting but possibly intermittent use of the harbour into the 7thc points out the continuity of the network of northern Tyrrhenian successive ports-of-call supporting the *cabotage* routes. Other privileged sites would have benefitted from the persistence of this system of trade in the later 6th and 7thc AD. In fact, the 6thc marks the decline and then the disappearance of Mediterranean imports at most of the Tuscan sites both on the coast and even more markedly in the interior. The few late 6th to 7thc AD imported bulk goods from the underwater deposits of *Portus Scabris* seemingly reflect operations of cleaning of the cargoes from broken materials, although those cargoes were directed elsewhere.

Very few sites, particularly ports and cities continued to yield a limited number of Mediterranean commodities (particularly from Tunisia) (Zanini 2003). However, exceptions where the amount of imports is still overwhelming in the 7th AD did exist. The most notable one in the northern Tyrrhenian is probably the Byzantine *castrum* at S. Antonino di Perti, which depended on extra-regional and particularly Mediterranean trade for its supply in foodstuff and craft products (Murialdo 2001, pp. 301-307). Here, the arrival of substantial volumes of amphorae from Tunisia and the Eastern Mediterranean and ARS does not reflect the system of free trade, rather it was controlled directly by the state given the strategic and military importance of the site as one of the main Byzantine strongholds of Liguria.

In this respect, it is worth considering the recent identification of a small group of late 6th to 7thc AD amphorae at another military site: Cosa. The late amphorae, identified by new work on the ceramics from the 1940s-1950s excavations on the Arx, are represented by two MNI of the Tunisian small *spatheion* 3[6] and by one Samos Cistern amphora with the typical shape and the soapy micaceous fabric (*fig.* 5, nn. 17-19). The site of Cosa, turned into a *castrum* at the time of the Graeco-gothic war, had not previously yielded ceramics later than the mid or late 6thc AD (Fentress, Gruspier, von Falkenhausen 2003, pp. 72-80; Fontana 2003, pp. 307-319). This new discovery, although quantitatively limited, tentatively suggests that the *castrum* continued to be used after the Lombard conquest of Tuscany and maintained occasional Mediterranean connections into the 7th AD.

5. EARLY MIDDLE AGES (8TH-10TH AD)

The radical political, cultural and economic transformations occurred in the Mediterranean and in the central European regions in the 6thc have been at the centre of strong debate among archaeologists and historians over the last two decades (Hodges 2006, pp. 19-27). Increasing knowledge of material culture and particularly ceramics has allowed for a more accurate understanding and contextualization of patterns of change pointing out that the 6thc represented a point of no return, possibly even more than the 7th AD. Production and distribution patterns changed as a direct consequence of changes occurred to demand and the pan-Mediterranean trading system underwent a process of astonishing fragmentation and regionalisation making hardly possible to develop a broad narrative.

Regional diversity was, of course, important in the Roman period as well, but the 6thc seems to have coincided with a phenomenon of de-globalization particularly accentuated in the West. The fine-grained analysis of the underwater pottery at *Portus Scabris* has affirmed this (mid) 6thc AD rupture. Nonetheless, the site was still occasionally used in the 7thc and later. *fig.* 6 shows the curve of ceramics at the site in the period AD 700-1200 and allows for a more in-depth observation of the fluctuations over this time span. However, in order to understand the actual volumes in a longer term perspective this curve needs to be compared with the one encompassing all periods of our analysis (*fig.* 3). In the 8th through to the later 10thc AD, the quantities of materials yielded by the underwater deposits is dramatically tiny and this is visible in *fig.* 6. Nevertheless, when observation moves on to the *longue durée*, decline of commercial activities detectable in the material record is far more impressive, since it reaches by far the lowest levels ever observed.

Comparing volumes of late antique trade with those of the Early Medieval period, using archaeological datasets only, may be very misleading. Indeed, it has to be emphasised the impact on sea-trade of the transformations in container technology and the progressive shift from amphorae to wooden barrels. Barrels are already documented, particularly in iconographic and textual sources, in the mid-Roman period but their usage seems to have incremented later on (Beltrame 2012, pp. 195-199). Accurate re-analysis of Mediterranean shipwrecks, supported by refined statistical methods applied to as many as 1646 study-cases, reveals an early medieval pattern very similar to ours at *Portus Scabris*. The amount of shipwrecks dated from the 8th to the 10thc AD is significantly lower than the 7th BC, and quite incomparable to the period between the 2nd BC and 5th AD (Wilson 2011, p. 36, figg. 2.5-2.6.). However, as Andrew Wilson rightly pointed out the increasing switch from amphorae to wooden barrels in the second half of the 1st millennium AD, particularly in the West,

[6] The two MNI are characterised by slightly different fabrics one of pale brown colour is levigated with very rare tiny quartz and the other one of light yellow/brownish colour has rare tiny limestone and quartz inclusions.

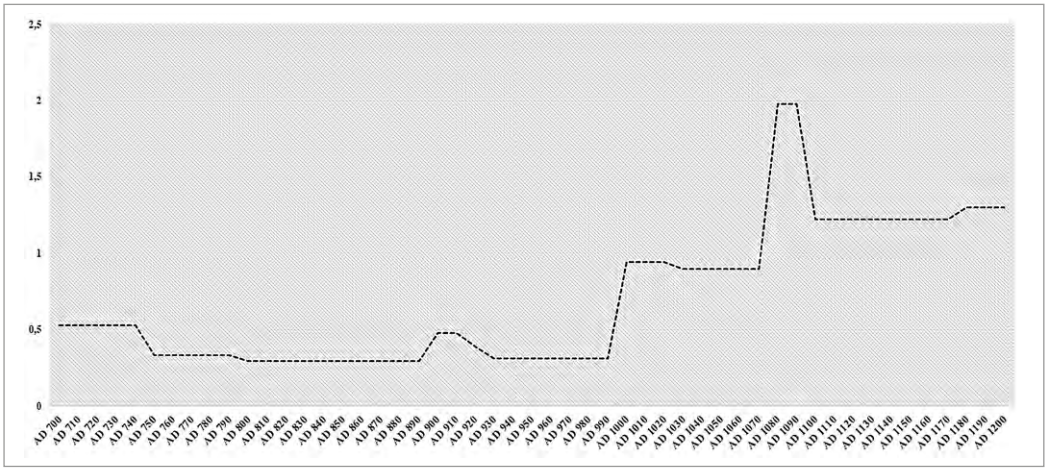

fig. 6 – The late 7th to 12thc materials from *Portus Scabris* analysed through IWM (Individual Weighted Means).

suggests some caution when thinking that «the early Medieval decline was as sudden or complete as the graphs would seem to suggest» (Wilson 2011, p. 37). Michael McCormick, on the basis of the evidence offered by lives of saints and travellers, proposed a re-intensification of maritime connections in the 9thc based largely on coastal *cabotage*, rather than on open-sea sailing (McCormick 2001).

Archaeology, however, has not so far shown the same pattern through its sources, at least in the Western Mediterranean (Augenti 2010). This discrepancy between historical and archaeological datasets requires further investigation and careful thinking on how different sources should be combined to produce a more comprehensive broader narrative.

At the site-scale of *Portus Scabris* possibly five MNI of early medieval amphorae were identified, although, as well as in the later 6th and 7thc, none of these has ever been found at excavated and surveyed sites in its hinterland. These amphorae refer to different provenances, some of which have been determined through minero-petrographic analysis[7]. The high level of fragmentation of most of these specimens makes particularly challenging their precise identification, although four of them seemingly relate to globular types. One of them, in a porous semi-fine yellowish/red colour fabric has a short tronco-conical neck and a slightly everted rounded rim; the handles have an oval section (*fig.* 7, n. 2). This specimen is likely to come from a source in north-eastern Sicily and has close morphological similarities with the later 7th to 8thc AD globular amphorae derived from LR2/LR13 (Toniolo 2007, pp. 101-102, particularly tav. 5), therefore I suggest a similar date. Another vessel has a very levigated light brown fabric and may come from an Aegean source; this has oval-section handles and a slightly thickened rounded rim on a short neck (*fig.* 7, n. 5). Its shape is similar to a late 7th/8thc specimen from Torcello (Toniolo 2007, p. 102, tav. 5, n. 5a2). Large thick handles and an everted triangular rim characterise another specimen in a quite levigated reddish fabric with whitish skin (*fig.* 7, n. 4), showing close parallels with amphorae manufactured in southern Calabria in the 8th and 9thc (Capelli, Lebole 1999, p. 76, fig. 1). However, its fabric is not compatible with that origin and rather suggests production at another source, perhaps in North-Eastern Sicily or in Tripolitania. The last amphora of hypothetical globular shape has a reddish/yellow levigated fabric with frequent voids, thick strap handles and a rounded slightly everted rim. This specimen also bears red painting on both the rim and one handle (*fig.* 7, n. 3). Its origin is uncertain, but the shape is compatible with late 7th and 8thc AD products. The last amphora of Early Medieval date is a late version of the Keay 52 type manufactured in southern Calabria and in North-Eastern Sicily. This short-necked variant has a pointed slightly hooked rim and oval-section handles (*fig.* 7, n. 1), and finds precise parallels in the deposit of the first half of the 8thc of the Crypta Balbi in Rome (Romei 2004, p. 280, tav. I n. 3). To the aforementioned amphorae we should add a coarseware closed vessel, perhaps a small storage amphora, with whitish skin and combed decoration referring to types produced in Lazio and documented in Rome in the 8th and 9thc AD (*fig.* 7, n. 6) (Romei 2004, p. 296, tav. IX and p. 304, tav. XIV). Interestingly, none of these materials and in general no early medieval amphora imports are documented in 8th and 9thc deposits at Lucca, the largest and most important town of northern Tuscany in this period. Therefore, more than a doubt persists on the actual destination of the few imports from *Portus Scabris*; one possibility we cannot rule out is that they simply represented part of the crew's equipment that was not aimed to commercialisation.

The absence at our site of the Miseno amphora type produced in the Bay of Naples between the later 7th and 8thc is worth mentioning. The circulation of this amphora used to trade the high-quality wine of the Phlegraean Fields seems, however, mostly circumscribed to a system involving sites and estates being part of the holdings of the Roman Church. Indeed, its distribution is largely localised in the coastal areas between Rome and western Sicily, to which findings from Cagliari (De Rossi 2005) and the recent underwater ones at Porto Canale and Capo Malfatano, still near Cagliari should be added (Sanna, Loro 2013). The attestation of the Miseno amphora type at western Sicilian sites is explainable taking into consideration their presence in the return cargoes of ships, which had previously transported the sorely needed Sicilian grain to Rome. North of Rome, indeed, the Miseno globular amphora seems to be documented through just one

[7] Minero-petrographic analysis was carried out by C. Capelli (University of Genova), whom I thank for providing the preliminary results.

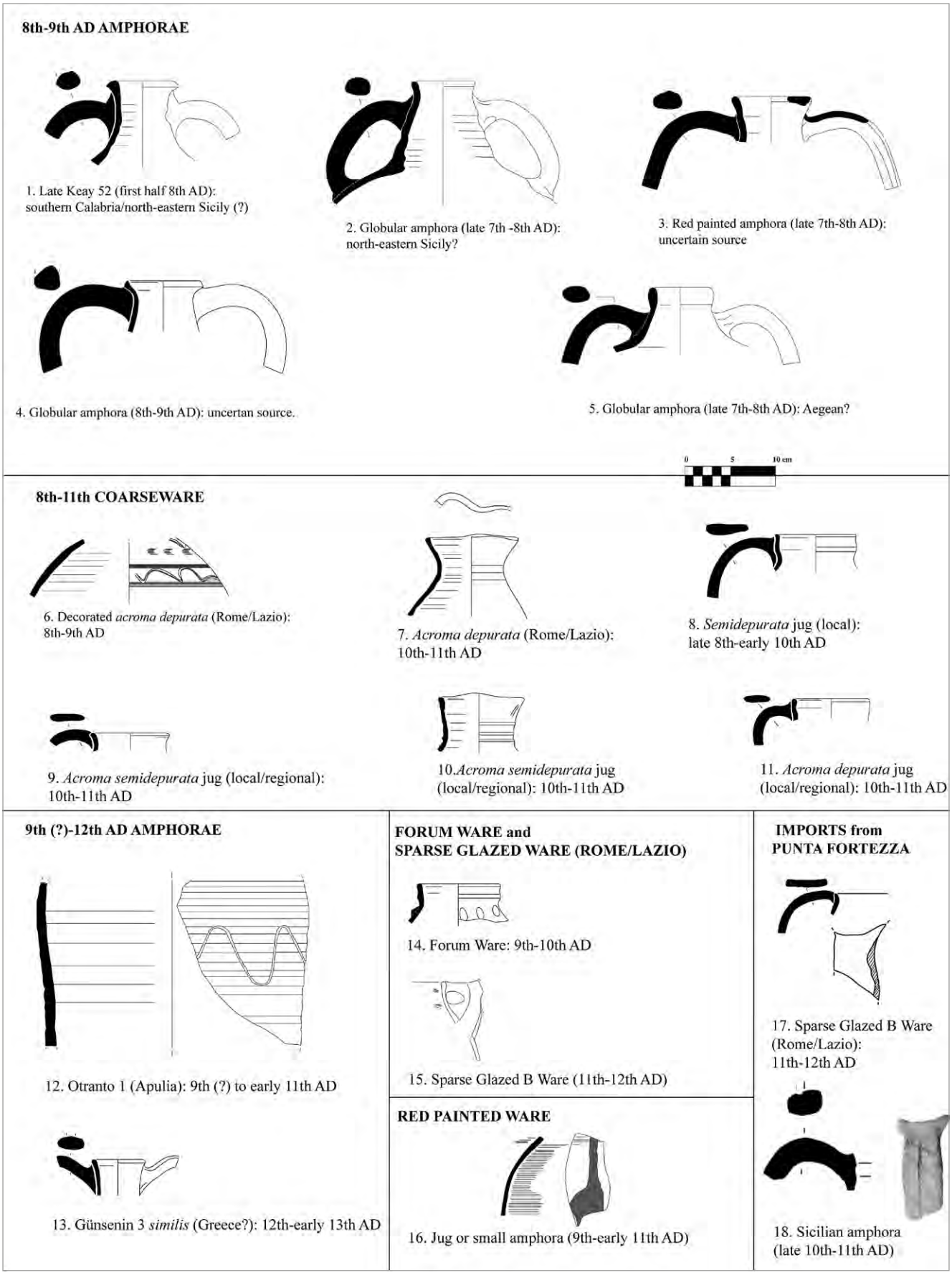

fig. 7 – Selected medieval materials from *Portus Scabris.*

specimen in a late 7th to 8thc AD context at Piazza dei Miracoli in Pisa (Alberti, Costantini 2015, p. 165, tav. 5, n. 15). To this evidence, should be probably added in light of the morphological features, although only minero-petrographic analysis can ascertain the source, the specimens from the aristocratic and widely connected hilltop-site of San Peyre in Languedoc dated between the later 7th and the first half of the 8thc AD (Pellecuer, Pène, Mathieu 2002).

For a slightly later period, another amphora type is present at *Portus Scabris*: one ribbed large body fragment, characterised by wavy line incised *pre-cocturam* and by a fairly purified brownish/yellow fabric, is identifiable with the Otranto 1 type from southern Apulia (*fig.* 7, n. 12). The presence of this amphora, produced between the 9th (?) and the early 11thc, is not surprising since it has been documented elsewhere in the northern Tyrrhenian (Genova) and in Southern France (Marseilles and Southern Corsica) (Vroom 2014, pp. 102-103). The site engaged sporadically in long-distance contacts until the 12th/early 13thc AD trade, if my identification of one rim/handle fragment with the Günsenin 3 type is correct (*fig.* 7, n. 13). The fragment has an undistinguished rounded rim, rising oval handles[8] and a very pale brown fabric with occasional tiny white and graysh inclusions. This amphora, manufactured in central Greece, is documented occasionally in Italy and southern France (Vroom 2014, pp. 98-99).

In Tuscany, the evidence for early medieval single-fired lead-glazed pottery, named *vetrina pesante* and produced in Rome and Lazio in the case of Forum Ware, offers quite a different picture, being frequently attested through a few MNI at various coastal and subcoastal sites of the region. The presence of this class has been detected at Cosa (Cirelli, Hobart 2003, p. 322, fig. 144), Poggio Cavolo[9], *Portus Scabris*, Vetricella[10], Podere Aione (Cucini 1989), Populonia (Dadà 2011; Gelichi 2016) and, to the north, at Pisa (Abela 1993, 2000; Meo 2014) and Lucca (Berti *et al.* 1992). The distribution of *vetrina pesante* along the Tuscan coastline was clearly centred upon coastal tramping, rather than on long-distance trade, showing the efficiency of the system of successive ports-of-calls. For the circulation of *vetrina pesante* along the Via Francigena in inland Tuscany, where the overall quantities are lower than on the coast, it has been rightly proposed that it mirrors the route used by pilgrims to and from Rome. Therefore *vetrina pesante* may simply represent souvenirs or gifts occasionally purchased in Rome (Molinari 2003). However, coastal distribution seemingly follows a different trading pattern, in which the *Portus Pisanus* possibly represented the main hub for the redistribution of these commodities to Pisa and Lucca and far north to Liguria[11] and southern France (Bonifay, Paroli, Picon 1986). Another route branching off from *Portus Pisanus* may have supplied sites in eastern Corsica and northern Sardinia (Milanese *et al.* 2004-2005). The central role of the *Portus Pisanus* in the redistribution of *vetrina pesante* and Sparse Glazed Ware produced in Lazio and Rome towards consumption sites of the northern Tyrrhenian and southern France is indirectly confirmed by the significant presence in 9th to early 11th AD contexts from urban investigations in Pisa. One example is significant: at the excavations in Via Cavalca, *vetrina pesante* from Rome/Lazio is documented with as many as 2% of all the ceramics in the second half of 9th/early 10thc with an increase to up to 5% in the second half of the 10th (Meo 2014, pp. 100-104).

The finding of a single fragment of a jug with a thick, bright olive colour lead-glaze and a decoration of applied petals (*fig.* 7, n. 14) is particularly important, as, to-date, represents the first discovery of Forum Ware from an underwater deposit and further reinforces the hypothesis of the use of *cabotage* routes for its northern Tyrrhenian distribution. *Vetrina pesante* from Rome/Lazio should have been a middle-range luxury good required by aristocratic groups in the context of 9th and 10thc dining practices. Apart from the 'anomaly' of Pisa with its relatively high quantities of *vetrina pesante*, another site is worth mentioning. The medieval re-occupation of the Acropolis of the Etruscan and Roman town of Populonia produced some medieval ceramic assemblages whose composition clashes with contemporary sites of the area. As shown in *fig.* 8, the overall number of table and storage wares is higher than kitchenware between the 9th and early 10thc AD with some 73.6% of the all MNI. At the same time *vetrina pesante* and Sparse Glazed Ware from Rome/Lazio are documented with as many as 3.9% MNI in the 9th-early 10th AD and an increase to 5% in the 10th and 11th AD. The presence of one specimen of a lead-glazed chafing-dish, used to heat up food next to the dining table and usually associated with aristocratic dining habits, reinforces the idea that these assemblages belong to a privileged socio-economic context (Dadà 2011).

S. Gelichi convincingly related the high quality of the 9th to 10thc ceramic repertoires of Populonia with the presence of the Aldobrandeschi family in a crucial phase of their political rise, immediately after Hildebrand II was appointed count of southern *Tuscia* and particularly after the passage of the *Iudiciaria Populoniensis* under the Aldobrandeschi around AD 857 (Gelichi 2016, p. 363).

It is also worth noting the presence at *Portus Scabris* of a handled jug, whose semi-levigated fabric suggests a local origin; the shape is very similar to types documented at excavated sites of the area dated from the late 8th to the early 10thc AD (*fig.* 7, n. 8)[12]. In addition, a generic date between the 9th and the early 11thc AD and a regional origin can be attributed to two red painted closed vessels (possibly small storage amphorae or large jug) in a fine light red fabric (*fig.* 7, n. 16). The presence of these three MNI at the underwater deposits of the harbour is significant as it shows the circulation of both local and regional products in addition to the

[8] Strong morphological similarities are with specimens of the Günsenin 3 type from excavations at Venice (Toniolo 2007, p. 103, tav. 6, 6d).

[9] At Poggio Cavolo, as many as three MNI of *vetrina pesante* (possibly from Rome/Lazio) were identified in a mid/late 10thc AD context. These materials, yet unpublished, were analysed by myself.

[10] A specific quantification of the *vetrina pesante* from the ongoing excavation at Vetricella is not available yet, although a few fragments were found there (pers. comm. Arianna Briano).

[11] *Vetrina pesante* findings are documented at Noli (Frondoni 1992) and Savona (Lavagna, Benente 1992).

[12] See for instance a series of *acroma depurata* jugs with coplanar strap handle and band-shaped rim at the site of San Martino *de plano* in the Bruna valley (Vaccaro 2011; Plate CXIII, nn. 1-3).

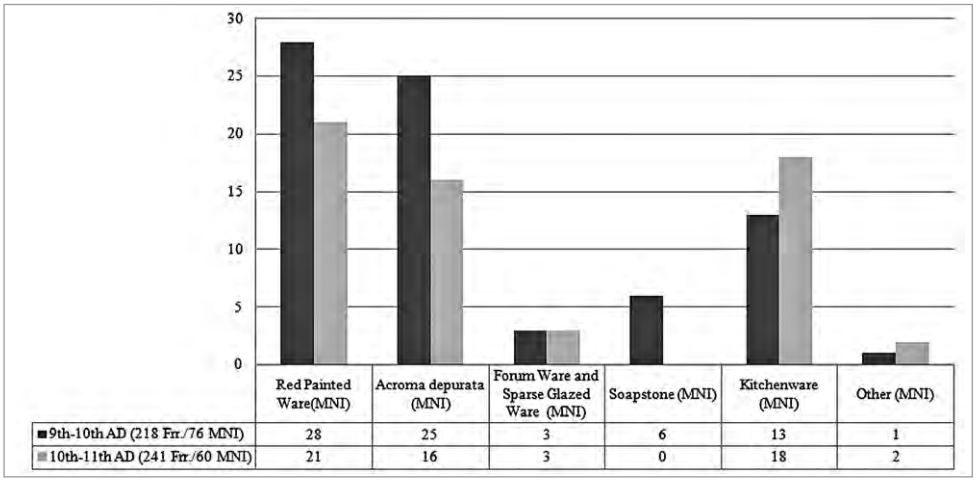

fig. 8 – The medieval pottery from the Acropolis of Populonia (data after Dadà 2011).

longer-distance ones; however, it is hard to tell, given the tiny numbers, whether these few ceramics were traded or they were rather part of the crew's equipment.

Overall, the presence of a few but significant amphora imports and *vetrina pesante* datable from the 8th to the 10thc AD at the site, beyond attesting to its persisting use as a port-of-call for medium and long-distance connections, may be the tip of the iceberg for its importance in the system of trade of perishable agricultural products. The documents from the archiepiscopal archive of Lucca offer valuable evidence for payments in kind on the part of Lucca's land estates situated in Maremma. Foodstuffs were represented by salt, pork, wine (likely to have been transported in wooden barrels) and grain. A chart of AD 768 confirms that the transport of salt and grain was based on the maritime routes and was managed by local seamen at the dependence of the bishop (*Ch.L.A.*, Lucca V, n. 1005, pp. 76-77). It is strongly possible that these foodstuffs were loaded on small or medium-sized ships departing from the harbours of southern Tuscany such as Baratti and *Portus Scabris*, just to mention a couple of them, then were unloaded at *Portus Pisanus* to reach Lucca by land. None of the Lucca's charts mentions *Portus Scabris* but the hypothesis seems very plausible.

An analysis of the spatial and chronological distribution of the shipwrecks identified in Italian and adjacent waters help put the evidence from our site in the broader context. *fig.* 9 and *tab.* 3 show a significant density of late antique shipwrecks in Sicilian and, to a lesser extent, in Apulian waters attesting for the capillarity of western Mediterranean connections until the early 7thc. The concentration of findings along the coast of south-eastern Sicily reflects the centrality of the routes passing in front of Syracuse and the increasing importance of the city in the late antique and early medieval geopolitics (McCormick 2001, pp. 582-606). Shipwrecks of the 6th to 7thc AD are also documented in the area of Marseilles, a privileged site showing wide-ranging Mediterranean connections until the later 7th AD (Bonifay, Carre, Rigoir 1998).

This pattern, however, changes drastically in the 8th and 9thc when we virtually have no shipwreck precisely datable to this period. One may think that this lack of early medieval evidence supports the ever-influential Pirenne's thesis of the interruption of Mediterranean long-distance trade as a consequence of the Arab conquest of North Africa in the late 7th AD (Pirenne 1996). Nonetheless, work on terrestrial sites and shipwrecks has shown that progressive change and decrease in the overall volume of maritime connections occurred already in the 6thc AD. Yet the absence of early medieval shipwrecks is striking and cannot be simply explained as an effect of the general decline of trade in the Western Mediterranean. It has been demonstrated that early medieval maritime connections switched from long-distance open-sea routes to coastal tramping (McCormick 2001, pp. 481-500) which may have made sailing safer with a tinier incidence of wrecks. At the same time, another issue is that of archaeological visibility: a large amount of the shipwrecks have been identified thanks to the presence of mounds of large imperishable transport containers on the seabed, to the extent one may argue that shipwrecks' graphs represent, in fact, «graphs of amphora usage» (Wilson 2011, p. 37). If transport amphorae were progressively replaced by wooden barrels (something more common in the Western Mediterranean than in the Byzantine world) it is clear that many shipwrecks are likely to escape identification, leaving us with a big question mark on the representativeness of the archaeological data at our disposal. Density of shipwrecks peaks up again in the 10thc with a significant concentration along the Sicilian coastline (particularly the western areas): the sudden increase of maritime trade was probably triggered by the commercial revolution of Kalbid Sicily in the 10th AD (Ardizzone, Pezzini, Sacco 2015; Picard 2015). On the other hand, the concentration of 10thc AD shipwrecks along the coast of southern France may reflect the intensification of maritime activities promoted by the Islamic pirates at Fraxinetum off the peninsula of Saint Tropez (McCormick 2001, p. 599).

6. CENTRAL CENTURIES OF THE MIDDLE AGES (LATE 10TH-12THC AD)

From the later 10thc AD onwards, thanks to the political and economic development of the *Marca di Tuscia*, the March itself (mainly through Pisa and its sea-port) established a number of commercial connections with trading

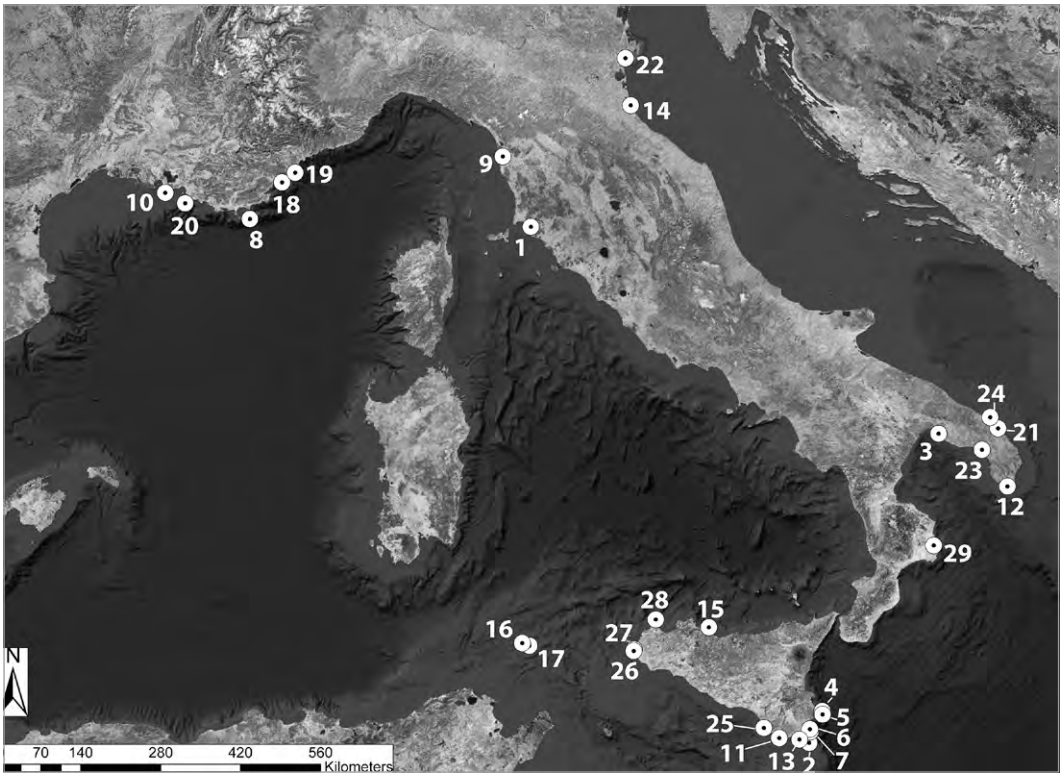

fig. 9 – Distribution map of the late antique to medieval shipwrecks along the Italic coasts and nearby areas.

N.	Shipwreck	Date
1	*Portus Scabris* (Tuscany)*	400-500
2	Capo Passero (Sicily)	400-650?
3	Taranto A (Apulia)	400-650?
4	Siracusa B (Sicily)	400-700
5	Siracusa C (Sicily)	400-700
6	Marzamemi J (Sicily)	400-700
7	Marzamemi K (Sicily)	400-700
8	La Palu (Provence)	500-600
9	Pisa "Relitto D" (Tuscany)	500-700
10	Saint Gervais B (Provence)	600-625
11	Punta Secca A-B (Sicily)	650-700
12	Secche di Ugento C (Apulia)	600-700?
13	Pantano Longarini (Sicily)	600-650
14	Cervia (Emilia-Romagna)	600-700
15	Scoglio della Formica B (Sicily)	800-1100
16	Banco Skerki (Sicily)	850-1115
17	Banco Skerki (Sicily)	850-1115
18	Agay (Provence)	950
19	Le Bataiguier (Provence)	950
20	Plane C (Provence)	900-1000
21	Torre San Gennaro (Apulia)	1100-1200
22	Borgo Caprile (Emilia-Romagna)	1000-1100
23	San Cesareo (Apulia)	900-1200
24	Brindisi (Apulia)	900-1200
25	Camarina C (Sicily)	1100-1200
26	Marsala A (Sicily)**	C. 975-1050
27	Marsala B (Sicily)	C.1075-1150
28	San Vito Lo Capo (Sicily)	C. 975-1050
29	Crotone (Calabria)	1100-1200

tab. 3 – Late antique to medieval shipwrecks along the Italic coasts and nearby areas. The chronologies of the shipwrecks are based upon McCormick 2001 and Faccenna 2006. (*) n. 1 is the hypothetical shipwreck of Empoli amphorae at *Portus Scabris*; (**) n. 26: the new date for the Marsala A shipwreck between the late 10th and mid 11th AD was provided by Viva Sacco (University of Palermo) who is currently restudying the cargo. I thank her for the information.

sites and regions of southern Italy. These included Capua, Benevento, Napoli, Amalfi, and Salerno in Campania, as well as Calabria, Apulia and Sicily (Renzi Rizzo 2010). This determined a substantial enhancement of the sailing practices undertaken by Pisa, which, rather than continuing to be mostly based on coastal tramping, started using long-distance routes. Such a development is exemplified by the significant quantity of Sicilian small-amphorae, mostly from Palermo, at all the main urban excavations in Pisa from the later 10thc AD. In the assemblages from Via Cavalca and Via Sapienza, recently examined in great detail by Antonino Meo, Sicilian amphorae are documented respectively with a total of 2% and 6% of the all MNI between the second half of the 10th and the early 11thc AD (Meo 2014, pp. 105-110). A recent thorough analysis of the distribution of the small amphorae manufactured in Islamic Sicily has shown, for the Tyrrhenian area, two possible trading systems. One based upon cabotage routes sailed along the coast of northern Sicily, touched the coastline of Calabria and Campania and only occasionally reached Rome, whereas the second one used long-distance and open-sea routes connecting Palermo with the *Portus Pisanus* (Ardizzone, Pezzini, Sacco 2015). It is indeed worth noting the absence of findings at sites along the coastline between northern Lazio and southern Tuscany with the exception of a few sherds from the medieval hilltop site at Punta Fortezza, a few Km south of *Portus Scabris* (*fig.* 7, n. 18). Pottery from Islamic Sicily is completely absent in the underwater deposits of our site, although the aforementioned potsherds from Punta Fortezza may tentatively suggest, given the proximity of *Portus Scabris*, a role of the site in the local redistribution of these imports. However, the available evidence is too tiny to

suggest any conclusive hypothesis about the trading system that allowed these materials to reach Punta Fortezza.

The period between the later 10th and 12thc AD continues to be characterised by occasional links between the harbour and Lazio/Rome. This is demonstrated by the presence of one MNI of a spout-mouthed jug in Sparse Glazed B Ware, referable to types well-documented in Rome between the 11th and 12thc AD (*fig.* 7, n. 15) (Paroli 1990), and by one trefoil-mouthed *acroma depurata* jug whose levigated light cream colour fabric suggests an origin in Roma or Lazio (*fig.* 7, n. 7). Three more MNI from the underwater deposits refer to *acroma depurata/semidepurata* jugs (one of which is trefoil-mouthed.), that can be attributed to either local or regional products of the 10th-11thc AD (*fig.* 7, nn. 9-11). The presence of at least one MNI of Sparse Glazed B Ware from field survey undertaken at the nearby hilltop site of Punta Fortezza (*fig.* 7, n. 17) suggests that this import arrived via *Portus Scabris*.

As *fig.* 3 shows, the period between the later 11th and 12thc AD coincided with a small increase in ceramics at *Portus Scabris*. Out of 42 MNI dated from the late 7th/8th and the 12thc AD, 57.14% of them (24 MNI) are represented by *acroma depurata* closed forms, such as jugs and juglets, whose shapes and fabrics suggest an origin in the area of Pisa. These vessels are dated from the mid 11th to the 12th and 13thc depending on their morphological variants (Menchelli *et al.* 1997). The presence of these materials at our site must be related to the further political and commercial expansion of Pisa between the mid 11th and 12thc AD and to the fact that part of Maremma was incorporated in the territory of Pisa, whose southern boundary was established at Castiglione della Pescaia in AD 1162 (Ceccarelli Lemut 1985, pp. 58-62). Finally, the earliest late medieval fineware documented at the site is one MNI of Spiral Ware from Campania, whose date is late 12th-13thc AD (Molinari 1990).

7. CONCLUSIONS

The underwater ceramic assemblages from *Portus Scabris* made the site an ideal context for a study of the fluctuations of maritime connections of southern Tuscany in the *longue durée*. My analysis focused on a 9-century long period (AD 300-1200) characterised by dramatic change that from the fall of the Roman West led to the emergence of the medieval world. Maritime trade, over this long period, underwent remarkable transformations that impacted significantly on the archaeological record and on our possibility of evaluating the volumes of commodities in circulation. The progressive switch, at least in the West, from durable transport containers (amphorae) to wooden barrels from the later Roman period onwards causes a drastic reduction of the visibility of maritime trade (Wilson 2011, pp. 36-37). The study of the materials from *Portus Scabris*, supported by the use of the statistical method of the individual weighted means, allowed for the production of a diachronic curve of the ups and downs of the maritime connections engaged by the site.

The analysis has shown the intensity of commercial activities involving the harbour between the 4th and mid 5thc AD, however from the later 5thc AD onwards the quantity of imports reaching the site started decreasing significantly. Nonetheless, *Portus Scabris* seems to have continued to play some role in the system of Tyrrhenian trade, based on coastal tramping, until the 540s when imported commodities that reached the site were still redistributed to the sites of its hinterland.

From the later 6th to the 7thc, the site continue to show evidence of low-intensity trading activities, but its role as a redistribution hub for the rural sites of the Pecora Valley seems to have come to an end. *Portus Scabris* was still used as a port-of-call in the network of central/northern Tyrrhenian cabotage, but commodities marketed through this route were directed to other consumption sites than those of southern Tuscany, where imports disappear completely around AD 600. A similar pattern is described by a few early medieval transport amphorae from different sources, whose presence in the underwater deposits suggests activities of cleaning the cargoes of ships temporarily docked at *Portus Scabris*. Interestingly no early medieval imported amphora has been documented so far at rural or urban sites of southern Tuscany, demonstrating that this sub-region was completely cut-off from that system of trade.

One exception is represented by Forum Ware attested for the first time at *Portus Scabris* in an underwater deposit. Its distribution, at several sites of the Tuscan coastline, suggests a circulation based on coastal tramping. Still significant, although for a later period between the 11th and 12th AD, is the presence at our site of a spout-mouthed jug in Sparse Glazed B Ware from Rome/Lazio attesting to the arrival of imports from that area by the sea. The few Early Medieval Mediterranean commodities attested at our site may, in fact, be the tip of the iceberg of far more intensive use of the harbour in the context of another system of transport, that did not leave any trace in the archaeological record. As the charts of the archiepiscopal archive of Lucca show this area of Maremma was particularly important for the food supply in pork, salt, grain and wine of Lucca; transport was organised through coastal tramping up to the *Portus Pisanus*. Therefore, *Portus Scabris* may well have been one of the harbours serving this system.

The political expansion of the March of Tuscany in the later 10thc AD determined a significant development of the maritime activities undertaken by Pisa with the intensification of long-distance connections. However, such a development does not seem to have left any trace in the archaeological deposit of *Portus Scabris*. In fact, it was only from the later 11thc, as a consequence of the annexation of part of Maremma by the Pisans, that the curve of the materials at the site rises up again. Indeed, the expansion of Pisa in Maremma brought about the large distribution of Pisan *acroma depurata* to both rural and urban sites of the sub-region. Nonetheless, it should not pass unnoticed that such increase is very tiny when compared to the rest of the curve. The values for the later 11th and 12thc AD are almost as small as those of the first half of the 7thc AD, a period in which the site had lost its role as a redistribution hub for the hinterland.

APPENDIX 1 (491 MNI)

1. Late Antiquity (449 MNI)

1.1 *Amphorae at Portus Scabris*

Tunisian Amphorae (111 MNI)

Type	MNI	Date
Africana IIC	3	Mid 3rd to 4th AD
Africana IID	8	Mid 3rd to first third of 4th AD +
Africana IIIA	24	End 3rd to early 4th AD
Africana IIIB	10	4th AD
Africana IIIC	12	End 4th to mid 5th AD
Generic Africana III	15	End 3rd to mid 5th AD
Spatheion I	6	First half to mid 5th AD
Spatheion IIA	5	Second half of 5th AD
Generic Spatheion (Keay 26)	4	5th to 6th AD
Keay 8B	1	Second half 5th to first third of 6th AD
Keay 27B	4	First half of 5th AD
Keay 35A	1	5th AD
Keay 36	1	5th AD
Keay 55A	2	End 5th-first half 6th AD
Keay 56similis	1	End 5th to early 6th +
Keay 62A	3	First half of 6th AD
Keay 62G	2	6th to early 7th AD
Keay 62Q=Albenga 11-12	4	Last third 5th to mid 6th AD
Generic Keay 62	3	Last third 5th to early 7th AD
Keay 61D	1	End 6th-first half 7th AD
Fondo umbonato type (Bonifay globulaire 3)	1	7th AD

Eastern Mediterranean Amphorae (35 MNI)

Type	MNI	Date
Late Dressel 24/transitional LR2	1	Late 3rd to 4th AD
Agorà M273	2	4th-5th AD
LR1 A	9	End 4th-5th AD
Transitional LR1 A	7	Late 5th to early 6th AD
LR1 B	4	6th to mid 7th AD
LR2B	1	Second half of 6th AD
Generic LR2	2	Late 4th to first half 7th AD
LR4 A2	1	Second quarter to end of 5th AD
LR5 (type 1A)	1	First half 6th AD all 5th-7thAD
LR5 (type 2A)	1	5th to 7th AD
Generic LR5 (red painted.)	1	5th to 7th AD
Samos Cistern type (micaceous fabric)	1	Late 6th to 7th AD
Samos family in a coarser (non-micaceous fabric)	3	Mid/late 6th AD
Ikarian amphora (?)	1	Mid 5th to late 6th AD

Italian Amphorae (102 MNI)

Type	MNI	Date
Empoli type	98	Late 3rd to 5th AD
MRA1	1	3rd to early 5th AD
Keay 52 (long-necked variants)	3	4th to 6th AD

1.2 *Imported Coarseware (10 MNI)*

Form	Type	MNI	Date
Casserole	Fulford 19	3	Late 4th to early 6th AD
Casserole	Fulford 20	1	AD 450-550
Cooking pot	Eastern Mediterranean generic type	1	5th to 6th AD
Flanged-bowl	Fulford mortaria 2	2	6th to early 7th AD
Closed form	Fulford Closed Form 16.3 similis	1	AD 550-600
Basin	Type with incurved rim; Tunisian (?) similar to Hayes 61	1	5th AD (?)
Ombelicato base	Tunisian jug? Bonifay late *Commune* 47 (?)	1	Late 4th to 7th AD

1.3 *Ars (191 MNI)*

Form	Type	MNI	Date
Dish	Hayes 50A	25	AD 230/240-325
Dish	Hayes 50A/B	15	AD 300-360
Dish	Hayes 50B	15	AD 350-400+
Small bowl	Hayes 71B	2	Early 5th AD
Small bowl	Hayes 73A	3	AD 420-475
Dish	Hayes 75	1	AD 420-450
Dish	Hayes 84	4	Mid 5th to the first quarter of the 6th AD
Dish	Hayes 58B, n. 11	1	AD 290/300-375
Dish	Hayes 61A	5	4th to early 5th AD
Dish	Hayes 61A/B3	1	First half of 5th AD
Dish	Hayes 61B1	5	First half of 5th AD
Dish	Hayes 61B3	12	Mid 5th AD
Dish	Late Hayes 61B3	2	Late 5th AD
Dish	Hayes 61C	5	Second half of 5th AD
Dish	Hayes 63	1	Last quarter of the 4th AD
Bowl	Hayes 67B	20	End of 4th-mid 5th AD
Dish	Hayes 76	3	AD 425-475
Dish	Fulford ARSW 35	1	AD 425-500
Bowl	Hayes 80A	1	Mid-late 5th AD
Bowl	Hayes 81B	1	Second half of 5th AD
Dish	Hayes 87A	1	Second half of 5th to early 6th AD
Dish	Hayes 87C/109	2	Last third of the 6th AD
Flanged-bowl	Hayes 91A	1	First half of the 5th AD
Flanged-bowl	Hayes 91B	15	Central decades of the 5th AD
Flanged-bowl	Hayes 91C	4	Mid 5th to mid 6th AD
Large bowl	Hayes 93A	1	AD 470-500
Large bowl	Hayes 93B	4	AD 500-540
Bowl	Hayes 99A	1	End of 5th to mid 6th AD
Bowl	Hayes 99B	8	Second quarter of 6th to early 7th AD
Dish	Hayes 103B	4	AD 500 to third quarter of 6th AD
Dish	Hayes 104A1	1	End 5th to first third 6th AD
Dish	Hayes 104A2	4	Second quarter to mid 6th AD
Dish	Hayes 104B	3	Mid to end of 6th AD
Dish	Hayes 104A3/ Mackensen 34	1	End of 6th-mid 7th AD
Dish	Hayes 105A	1	End 6th-first half 7th AD
Dish	Hayes 105B	2	Central decades of the 7th AD
Dish	Hayes 105C *similis*	1	Second half of 7th AD
Dish	Hayes 109A	1	End 6th-mid 7th AD
Bottle	Fulford ARSW Closed Form 2.8	1	AD 425/450 to 7th AD
Stamped decoration not related to other diagnostics	Style Hayes A(ii)	4	AD 350-420
Stamped decoration not related to other diagnostics	Style Hayes A(ii)-A(iii)	4	AD 350-470
Stamped decoration not related to other diagnostics	Style Hayes A(iii)/C-D/E	1	Mid 5th to early 6th AD
Lamp Atlante VIII A1a		1	Mid 4th to late 5th AD
Lamp Atlante VIII C2c		1	5th AD
Lamp Atlante VIII C1a		1	5th-early 6th AD

2. Middle Ages (42 MNI)

Form	MNI	Date	Source
Acroma depurata jugs	24	Mid 11th to 13th AD types	Pisan area
Red Painted closed forms	2	Generic 9th to 11th AD	Regional?
Decorated small amphora or jug in *acroma depurata*	1	8th-9th AD	Rome/Lazio
Acroma depurata handled jug	1	10th-11th AD	Local/regional
Acroma semidepurata trefoil-mouthed jug	1	10th-11th AD	Local/regional
Acroma semidepurata jug with band-rim and strap handle	1	Late 8th to early 10th AD	Local/regional
Forum Ware jug with applied petals	1	9th-10th AD	Rome
Acroma semidepurata jug	1	10th-11th AD	Local/regional
Sparse Glazed B Ware jug	1	11th-12th AD	Rome/Lazio
Acroma depurata trefoil-mouthed jug	1	10th-11th AD	Lazio
Spiral Ware	1	Late 12th-13th AD	Campania
Red painted transport amphora	1	Late 7th-8th AD	Undetermined
Late Keay 52	1	First half 8th AD	North-eastern Sicily or southern Calabria
Globular amphora with rising handles	1	8th-9th AD	Undetermined; possible sources could be Tripolitania or north-eastern Sicily
Globular amphora	1	Late 7th to 8th AD	North-eastern Sicily?
Globular amphora	1	Late 7th to 8th AD	Undetermined; possibly Aegean
Apulian Otranto 1 amphora with wavy decoration	1	9th (?) to early 11th AD	Apulia
Small amphora with rising handles similar to Günsenin 3	1	12th-13th AD	Greece?

Total Minimum Number of Individuals (MNI) dated AD 300-700: 449

Total Minimum Number of Individuals (MNI) dated AD 700-1199: 42

Acknowledgements

My new work on the materials from *Portus Scabris* was supported by the nEU-Med ERC project through a 10-month contract. I am particularly grateful to Giovanna Bianchi and Richard Hodges for their stimulating insights on my research and to Alessandra Molinari for our discussions on early medieval amphorae and *vetrina pesante*. The study was made possible thanks to the availability and kindness of Bianca Maria Aranguren, from the *Soprintendenza Archeologia della Toscana*, to whom I am particularly indebted. I also thank Valentina Leonini (*Soprintendenza Archeologia della Toscana*) for allowing me to look at the materials from old excavations at the Arx of Cosa. Any mistakes or misconceptions remain my own.

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Abstract

Located at Portiglioni (Scarlino, GR), the harbour of *Portus Scabris* was first mentioned in the Roman itinerary source *Itinerarium Maritimum*. Given its position on the sea, and its continuing use in the *longue durée*, the site represents a quintessential case study for the analysis of maritime connections entered into by the coastal areas of southern Tuscany, and more specifically by the sites of the Pecora valley, the area selected by the nEU-Med project as the sample area. Between 2000 and 2001 rescue archaeology work, undertaken by the Soprintendenza Archeologia della Toscana at the time of the construction of the new marina, collected substantial quantities of ceramics from the harbour. Ranging from the Late Republican to the early Modern periods, the ceramics lend themselves to an in-depth analysis of the volumes of commodities arriving at the site over an extended period. This paper assesses a total of 491 Minimum Number of Ceramic Individuals, to analyse how sea connections changed between the 4th and 12th c AD. Analysed materials falling into this chronological range include finewares, amphorae and table/storage coarsewares. By using pottery and analysing it by the statistical method of the Individual Weighted Means (IWM), this paper aims to link the sample territory to the wider system of Mediterranean exchange, pointing out periods of rise, decline and stagnation in volumes of maritime commodities.

Portus Scabris reveals high levels of Mediterranean connections, despite some fluctuations, well into the late 5th c AD. However, starting from the 6th c, a progressive decline in the overall number of imports is documented. Between the late 6th and 7th c AD, the few Mediterranean bulk goods that reached the site do not seem to be redistributed to rural settlements in its hinterland. Therefore, the presence of these materials in the underwater deposits seemingly reflects operations involving clearing cargoes of broken materials, even when those cargoes were bound for other destinations. The ceramic evidence shows that the lowest level of Mediterranean connectivity was reached at *Portus Scabris* between the 8th and mid-10th c AD. Nonetheless, the presence of very few (but significant) early medieval imports, including one jug of Forum Ware with applied petals, points to some episodic use of the harbour even in this period. It was only from the later 11th c AD, at the time of the progressive expansion of Pisa and its political and economic influence in Maremma, that a slight increase in imports in the underwater assemblages of the site is attested. It is not a coincidence that these products (mainly coarsewares) were manufactured in Pisa.

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POTTERY CIRCULATION AND WARES IN THE RURAL WORLD: THE COLLINE METALLIFERE AND SOUTH-EASTERN TUSCANY IN THE EARLY MEDIEVAL PERIOD

STRUCTURE OF THE ARTICLE

The research considers the area of the Colline Metallifere Grossetane and its associated coastal area, with the aim of understanding what pottery was circulating in the territory, and the presence of any centres of production during the Early Medieval period.

Here we present the lines of research within which the work is being carried out, and the preliminary findings that have emerged thus far.

The first part of the article involves an introductory overview of the historical and territorial situation in this part of southern Tuscany.

Later, we present the most significant findings that have emerged from recent excavation campaigns at Vetricella in relation to the material pottery culture, and in particular:

– the technical and formal analogy seen between undecorated wares found at the main settlement sites and in the area active during the Early Medieval period
– the affirmation of one particular closed form with handles, referred to in the literature as "small amphoras"
– the idea that it is possible to identify a production of undecorated pottery at the sub-regional scale
– archaeometric analyses (at present only petrographic analyses) on a sample of selected pottery.

Meanwhile the second part of the article focuses on sparse glazed wares, analysing certain specific aspects:

– their circulation at the sub-regional level
– the focus on the site of Donoratico (LI), from which most of the finds known thus far for this area come
– the hypothesis of possible production of sparse glazed pottery at Donoratico.

Finally, a parallel is proposed between the circulation of this pottery ware and red-dripped ware, which are contemporary but undoubtedly less well-attested in the territorial sample examined.

At the end of the article, we put forward certain considerations regarding what has been analysed, concentrating in particular on the different level of presence of locally-made and widely-circulated undecorated pottery, including the "small amphoras", and sparse glazed pottery, also produced locally, but which is limited to a small number of sites in the coastal area.

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1. INTRODUCTION

Our study looks at the Colline Metallifere area near Grosseto, and the adjoining coastal area (*fig.* 1), and is aimed at providing a picture of the lines of research which are currently under way, although it focuses on the preliminary analyses carried out on specific types of ceramics. Indeed, owing to their production characteristics and circulation, ceramics acquire a particular significance in more general historical reconstructions of the territory investigated with the nEU-Med project.

The work is part of an area of research which has received much attention over the years, and in which the main issues have included the identification and analysis of so-called local wares, characteristics of the early medieval horizon at the sub-regional scale, and on other scales. Indeed, data from the latest research, well summed up during the conference held at Spoleto-Campello sul Clitunno in 2012 (Cirelli, Diosono, Patterson 2015), bear witness, once again, to the fact that, between the 7th and 8thc, the panorama of ceramics sees a gradual change throughout the Italian peninsula. This can be seen both in forms and in production techniques, as well as in the amount of goods being circulated, in line with a trend already known in the case of several territorial contexts (Panella 1998, pp. 818-819; Valenti 1994, pp. 196-197). These include southern Tuscany too, in no uncertain terms, as shown by the overviews drawn up by Silvia Guideri for the Roccastrada area (Guideri 2000, pp. 11-18, Ead. 2001, pp. 18-19), by Emanuele Vaccaro for the Grosseto area (Vaccaro 2011), and by Francesca Grassi for the Colline Metallifere (Grassi 2010). Indeed, as far back as the mid-1980s Silvia Guideri identified a number of workshops specializing in the production of plain, undecorated pottery, made using local clays, active between the 7th and 10thc. Later on, in his overview of the landscape of Early Medieval Grosseto, Emanuele Vaccaro highlighted, as of the 5thc, a gradual reduction in imported ceramics, replaced by locally-made wares (which in many cases were imitations of the former, imported wares). This became definitive during the second half of the 6thc (Vaccaro 2005, pp. 179-182; Id. 2015, pp. 212-220).

Similarly, Francesca Grassi has identified the period between the 8th and 10thc as the moment of development in

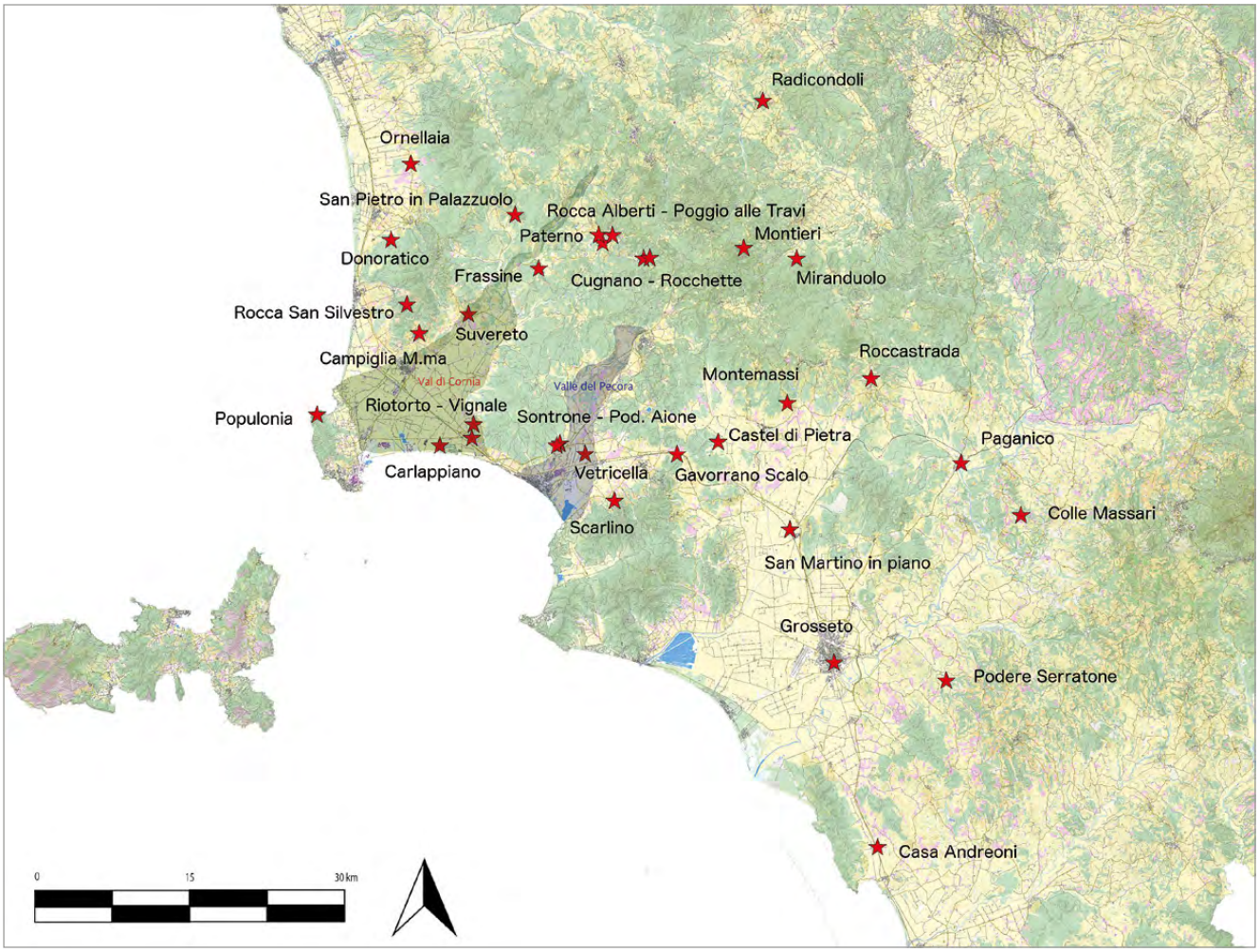


fig. 1 – Location of published and unpublished sites mentioned in the text.

local production, accompanied by the appearance of specific production techniques (Grassi 2010, pp. 12-15).

This trend could find strong support in the great availability of raw materials needed for this kind of production. Indeed, in common with a significant part of the region, the geomorphology of southern Tuscany has significant outcrops of good quality clay (Cita *et al.* 2007), an abundance of wood, and water resources which, in several cases, were exploited ever since Antiquity. Research carried out in recent years in the area covered by the nEU-Med project has brought into sharper focus the model based on the relationship between mineral resources and settlement sites (Dallai, Francovich 2005, pp. 126-142), including with greater certainty other types of raw materials, including clay. In this connection, the case study of Monterotondo Marittimo, a hilly zone in the hinterland of Follonica rich in valuable resources, has yielded very useful findings. Surface investigations[1] have revealed that the clay deposit, covering a significantly large area, near the town itself, saw prolonged exploitation right up until the contemporary era (Ponta 2009, pp. 37-38; Ead. 2016, p. 499). Traces of organization have been observed in the large quarry face located in the vicinity of La Fornace and at nearby Poggio alle Travi, where remains of aligned walls situated near piles of very pure clay, associated with imperial and late antique ceramic material, have suggested the presence of facilities designed to process this raw material. Further evidence is constituted by the presence of brick kilns, datable to the modern era, located in the immediate vicinity of the outcrop, and near Paterno, where one of the main settlement hubs in the area is situated, a reference point for Late Antiquity and the earliest Early Medieval period (Collavini 2007, pp. 330-334; Dallai 2009, pp. 41-43; Ponta 2016, p. 499).

Accordingly, in a reconstruction of the landscape of Monterotondo, clay apparently played a significant role, in common with the other resources in the local territory[2], in the socio-economic reorganization which took place between the Late Antique and Early Medieval periods, fostering the survival of sites located in the vicinity of these resources.

With a view to this, a reinterpretation of some findings already known, and the latest findings made in the case of the

[1] The investigations were conducted by the Medieval Archaeology Dept at Siena University, between 2004 and 2007, under Riccardo Francovich (Director) and Luisa Dallai (Coordinator).

[2] For this historical period, reference is made to the rich deposits of mixed sulphides and alunite, associated with hydrothermal phenomena and abundant timber, to which we must add stone resources for prehistory; for a brief account of their exploitation, see Dallai *et al.* 2009, pp. 29-56.

lower Val di Cornia, have revealed some interesting analogies; the abundance of good quality clay deposits suggests that, together with salt and fish, key resources in coastal areas[3], clay may have had an important role in the local economic system also during the Early Medieval centuries. The close proximity of the outcrops to sites with long-established occupation, identified in the area under investigation[4], which survived the Late Antique crisis and the associated contraction of settlement sites, constitutes a very significant element; this trend leads us to suggest that this same close connection between resource and settlement, well known in the Roman era, is also a feature of Late Antiquity, and acquires a significant role in the economic reorganization which took place with the socio-political changes occurring between the 8th and 10thc[5].

With a view to this, the case of Roccastrada, mentioned previously, would reinforce the hypothesis. The status of this area as more peripheral, which can be seen already in Roman times (Cambi 1994, p. 185), becomes more intensified during Late Antiquity, as shown by the gradual decline in imported goods (which were already tiny in numerical terms), an index of the fact it lay more and more outside the circuits of Mediterranean trade in which the coastal area still had a place[6].

As of the 7thc, however, a production system seems to take root in the territory organized on the basis of local clay exploitation, which plays an active role in the distribution of its ceramic products[7].

The presence of this important raw material, together with abundantly available wood, offered by the forested hills which are a feature of the Roccastrada area, constitutes a fundamental element for obtaining the amount of objects necessary to meet the demand for kitchenware and tableware in daily use, as well as other needs. As will be seen in the paragraph below, the appearance in southern Tuscany, and especially in the area covered by this article, of a particular type of closed vessel, with handles, similar to an amphora, called an 'anforetta' ('small amphora'), enables a number of hypotheses to be put forward which only further research will be able to define better. Specifically, the spread of this latter pottery type within a defined area which is not very large[8], together with its technical features (especially relating to fabric), suggests that it may be a local production specializing in the conservation, and, perhaps, also the transportation of goods circulating within a single property, which, in every respect, still seems to retain a public character[9]. The local provenance itself could, finally, be attributed to another pottery ware analyzed in this article, namely sparse glaze, which, despite still being in the phase of analysis and chronological definition, offers interesting suggestions in outlining the panorama of early medieval pottery in our area.

E.P.

2. THE PRODUCTION AND CIRCULATION OF SPECIFIC POTTERY VESSELS

The study of the contexts which are the subject of the nEU-Med project has enabled the examination of a significant sample of ceramic material from excavations, with particular reference to Vetricella (Scarlino, GR), and from field-walking. In this way, today it is possible to make a more detailed comparison between the characteristics of the pottery material from the site of Vetricella, and from the surrounding area, with the characteristics already evidenced in previous studies, carried out especially on finds from inland fortified hill-top sites (Grassi 2010).

On the basis of these previous studies, we know that in this area both wheel-made and handmade kitchenware is found, with only a small number of multifunctional forms for cooking food: cooking jars have small, flared rims, and sometimes curved, are globular, and have flat bases; flat "testi" for bread-making are the only open vessels. For food preparation, bowls with inward-curving rims are fairly common. These are sometimes decorated with incised wavy motifs, while tableware features storage jars and jugs of various sizes, with handles with curved or very squared profiles.

Furthermore, for some types of cooking pots and bowls, it is possible to find sporadic parallels also among finds from the Colline Metallifere area, especially from small sites around the town of Monterotondo Marittimo (GR). Albeit in smaller percentages, and limited to older chronologies (8thc AD), this morphological homogeneity finds parallels in the distribution for a number of ceramic paste[10] (Ponta 2011/2012).

[3] See the articles by Luisa Dallai and Paolo Tomei in the present volume.

[4] In the coastal zone and the immediate hinterland, between Gavorrano Scalo (GR) and Riotorto (LI), there are known outcrops of FAA and FAAb clays, characterized by the presence of elements which make them suited to the production of pottery, and brick and tile (Gliozzo, Iacovello, Foresi 2014, pp. 105-116). They are currently being mapped, and subjected to chemical and petrographic analyses. In the same area there are some prominent sites marked by long continuous habitation, in all likelihood connected to the major senatorial and imperial holdings located throughout the area of Populonia. A long-established interpretation places these large holdings in relation with the exploitation of local resources (Manacorda 2005, pp. 308-312), of which pottery production, and the production of brick and tile, would be very good examples (most recently Maiuro 2012, pp. 381-397); one exemplary case of this is the site of Vignale, currently regarded as the most important long-established habitation site among those known for the lower Val di Cornia, where brick- and tile-making facilities are attested (Cucini 1985, no. 235, pp. 262-265; Shepherd 2003, pp. 287-296). Similarly, a close correlation between a senatorial property and brick-making production has been suggested for the site of Il Sontrone (Follonica, GR), situated in the hinterland of Follonica, interpreted as the possible *fundus* of the *Cotta* family (Dallai, Ponta, Shepherd 2005, pp. 179-190).

[5] With the acquisition of imperial properties, or of some of these, by the new central powers, there was very probably a continuation of the production activities seen as particularly profitable and economical (Vera 1993, p. 141). In this connection, it should be borne in mind that the best-known Roman-style estate-holder in the time of Theodoric was his nephew, *Theodhad,* the owner of an enormous *fundus* in Tuscia consisting of *massae fundorum* administered by *actores,* the revenue from whom was received by the owner in the form of gold (Vera 1993, pp. 137-138).

[6] See Vaccaro (below) with reference bibliography.

[7] The analyses currently under way will also serve to better define the distribution area of the aforementioned products.

[8] The area referred to is the area bordered to the north by the lower Val di Cornia and, to the south, by the Val di Pecora with their respective hinterland areas.

[9] In this connection, see the article by Giovanna Bianchi e Simone Collavini in the present volume.

[10] The reference is currently based expressly on a macroscopic observation of the fabrics, pending a more certain confirmation given by the archaeometric analyses currently in progress at the Dipartimento di Scienze Fisiche, della Terra e dell'Ambiente, at Siena University. These ceramic bodies are semi-levigated, and are pale grey on the inside, with outer surfaces between pink and salmon, with a frequent incidence of inclusions of white calcite of varying sizes.

To make an initial comparison with the picture outlined above, and to look into analogies or dissimilarities as regards morphology, for this preliminary article a selection of finds from the site of Vetricella was made, relating to:

1. tableware vessels: one-handled jugs made of levigated, plain, undecorated clay, with a circular or trefoil mouth, and bowls made of semi-levigated unglazed pottery, with a rim bent more or less inward with various kinds of profile
2. kitchenware: cooking jars made of coarse, undecorated earthenware with an everted rim, narrowed neck and, in some cases, an upper accentuated.

The outer surfaces of these fragments often show signs of smoothing and incised decorative motifs, mostly consisting in thread patterns for cooking jars, and wave designs, single or double, for bowls and jars (*tav.* 1).

The features listed above, both in the case of tableware forms, and kitchenware, therefore confirm that the characteristics of these finds from Vetricella do not deviate much from the picture derived from previous research. By contrast, what seems to be an element which diverges from the local trend is above all the number of fragments[11] relating to tableware, for a total of 11,051 fragments found at our site in the course of the autumn 2016 excavation campaign (where 2,780 are made of levigated clay, and are undecorated, and 8,271 are of semi-levigated clay, and are undecorated, as against 3,204 fragments of coarse, undecorated pottery). This result is very much a defining feature for the nature of the site, and would help, at the current stage of research, to direct hypotheses regarding its vocation toward the conclusion that it may have been a storage site.

Similar analogies have also been found as regards technology, since an initial selection of fabric samples for semi-levigated coarseware from the site, analysed here, contains inclusions of the same nature, and has chromatic characteristics which are almost analogous to pottery from more inland areas; this similarity would also suggest similarities in ways in which food was cooked[12].

2.1 Closed vessels with handles: the 'small amphoras', classification and typology

The preliminary study of pottery finds from the Vetricella site at Scarlino has shown that the types described above appear alongside closed vessels of medium size, having an oval or globular body, a separate neck, developed in various ways, and one or more handles which tend to be strap handles, attached to the shoulder, with a presumably flat base.

This corresponds exactly to the morphological and technological type with examples already known thanks to the previous research, which enables these pots to be identified as the so-called 'small amphoras', a definition used not infrequently in published work[13] for material from contexts in south-western Tuscany (*tav.* 2).

For the area of the Colline Metallifere and the Grosseto area, indeed, there are a total of at least 50 individual examples of these forms, which have previously been identified by Lorenzo Marasco at Rocca di Scarlino (GR), by Francesca Grassi at the castles of Rocchette Pannocchieschi and Montemassi (GR), by Carlo Citter in the urban excavations in Grosseto, and most recently by Emanuele Vaccaro, who has attempted a synthesis for the Grosseto area[14] (*fig.* 2). Near Podere Serratone, Vaccaro has also identified a production area, interpreted as a kiln, owing to the large amount of pottery waste attributable to this type. The results from thermoluminescence analysis, carried out on samples found at the Casa Andreoni site, have pointed to the mid-9thc as the reference chronology.

A review of the material culture conducted in the case of some unpublished sites, such as Rocca degli Alberti (Monterotondo Marittimo, GR), and the castle of Donoratico (Castagneto Carducci, LI), in parallel with a study of the finds from Vetricella itself during the most recent excavation campaigns, has made it possible to increase the sample, adding new finds.

Indeed, 17 more examples of 'small amphoras' have now been recognized: 13 fragments in all for Vetricella, 2 for Rocca degli Alberti, and 2 for Donoratico (*fig.* 3).

The fragments are recognizable only in cases where the handle is attached to the shoulder. In the best preserved examples, the handle has a profile which tends to be of the strap handle type, or is slightly profiled, and can have a maximum width of around 6 cm, with a thickness of 1 cm.

The extremely fragmentary nature of the finds does not make it possible to establish the form in its entirety. As a result, we cannot calculate its height or capacity, or determine whether it had only one handle or more than one. With regard to this aspect, and also going back to the question of terminology, it is hard to establish whether we are looking at simple closed tableware vessels with handles, or forms also designed for transportation, as the very term "amphora" would intrinsically indicate, in line with the more classical meaning of this term.

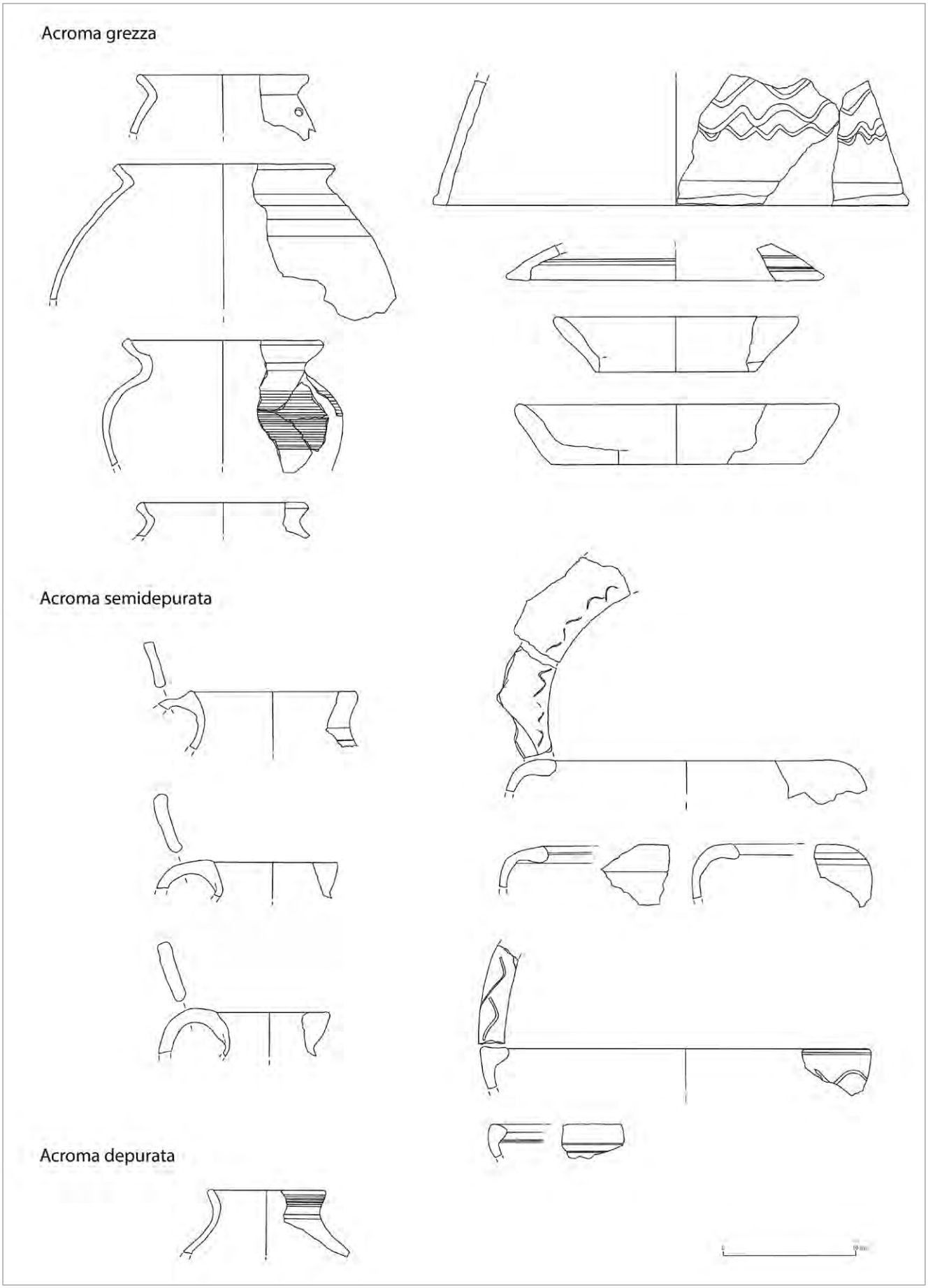
Another peculiar aspect of these vessels is their fabric. This is generally made of semi-levigated clay with the same characteristics as kitchenware, and especially tableware, with which they are associated in the same contexts and chronologies. This is very visible in the case of Vetricella, where the vessels are distinguished by fairly hard fabrics, which pro-

[11] The number reported here refers to the total of individual fragments, which were counted as part of a preliminary inventory of finds after the September-October 2016 excavation campaign, albeit without counting the minimum number of examples. Indeed, this latter statistic is currently being calculated as part of this writer's doctoral research project, entitled: *"Ceramica grezza, depurata e semidepurata: produzione, funzione e circolazione in un territorio della Toscana sud-occidentale. Colline Metallifere e territori limitrofi tra VIII e XI secolo*".

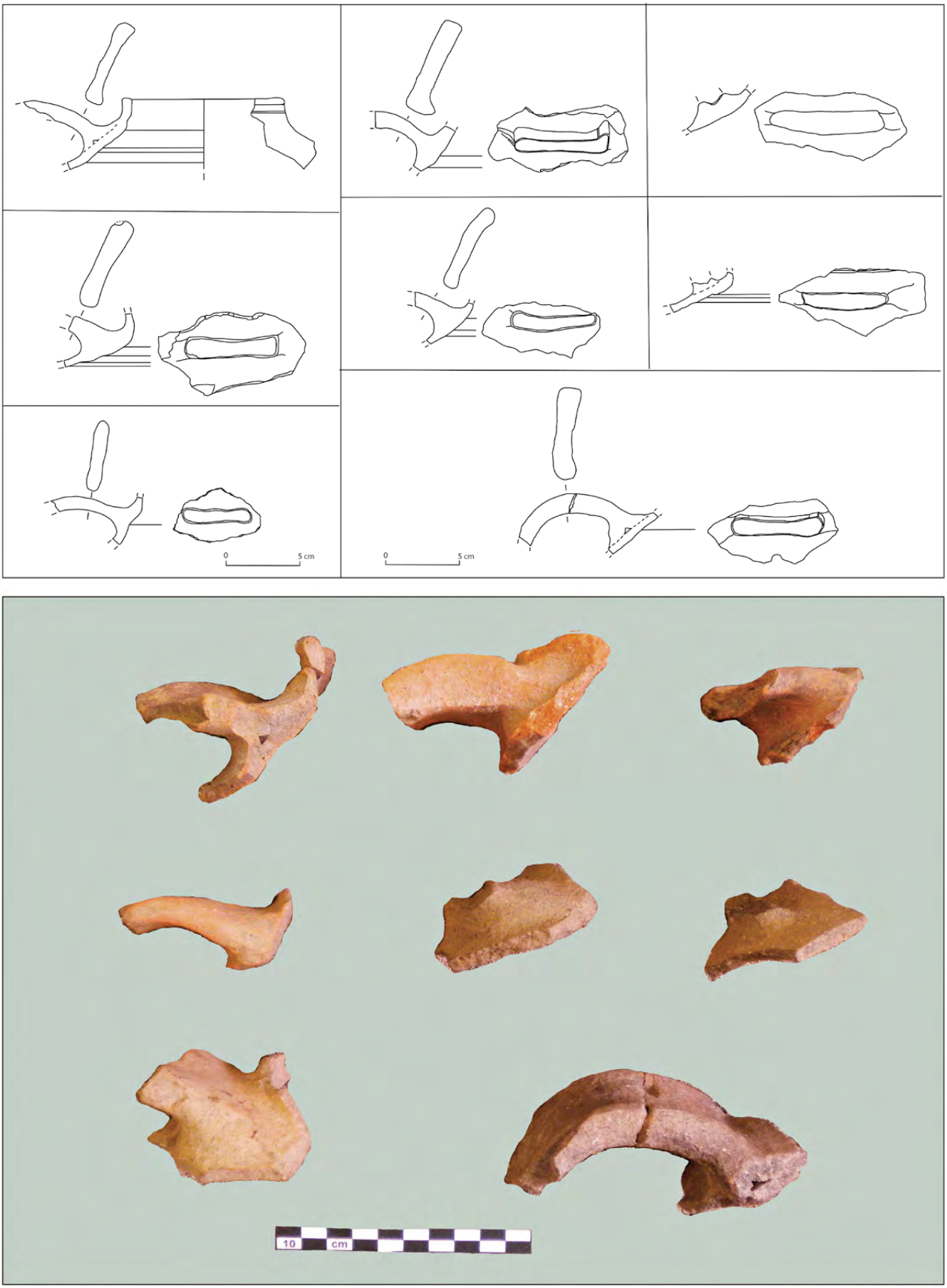
[12] Chemical and petrographic analyses of the ceramic bodies sampled for the site of Vetricella are under way at the laboratories of the Dipartimento di Scienze Fisiche, della Terra e dell'Ambiente, Siena University.

[13] The term 'small amphora', referring to specific vessels, was used in the past, as will be stated later in this article, by Carlo Citter (Citter 2007), Francesca Grassi (Grassi 2010), and Emanuele Vaccaro (Vaccaro 2011). In addition to this bibliography of published works, there is the doctoral thesis work by Lorenzo Marasco (Marasco 2013), currently unpublished.

[14] The known examples were identified by: L. Marasco (Marasco 2013), who found 12 at Scarlino (including one 8/9thc frag., four 9/10thc frags., two 10/11thc frags., and five 12/13 thc frags.); 3 by F. Grassi (Grassi 2010, pp. 84-85, Types 1-2 Rocchette Pannocchieschi, 9-10thc and 10thc, Type 3 Montemassi, 8thc); 1 by C. Citter (Citter 2007, p. 150, dated to before 11thc – water pot); and 34 by E. Vaccaro (Vaccaro 2011, plate CVII, Type 2, EMed Small amphora, from Casa Andreoni – dated by thermoluminescence to 850±65).



tav. 1 – Undecorated material culture from the site of Vetricella (Scarlino-GR).



tav. 2 – Small-amphoras found at the excavation of Vetricella.

duce a clean, neat edge when broken. At the macroscopic level, one notes medium-sized to small inclusions, the most numerous being quartz, both white and transparent, micas, iron oxides and feldspars. The surfaces vary from beige in the more levigated fabrics to dark brown in coarser fabrics, and occasionally the internal, central part is grey[15].

In the case of the better preserved examples, which can be described with certainty as two-handled, there is an extremely small number of fragments, from the Grosseto area, in and around the town (Citter 2007; Vaccaro 2011). However, the close analogy of the rim, and the way the handle is attached in the new additions, suggests that we are looking at the same vessel form, designed not only as tableware but also for transportation, although restricted to a limited radius of diffusion.

In order to determine the area of provenance of this specific ware, chemical and petrographic analyses were conducted on a sample of 11 examples from the aforementioned sites of Vetricella, Rocca degli Alberti, Rocchette Pannocchieschi, Donoratico, and others in southern Maremma, such as Capalbiaccio, Colle Massari, San Martino in Piano, and Casa Andreoni, as well as on a clay sample from the clay-workings situated near Monterotondo Marittimo.

From this analysis a good match emerged between the fabrics of the 'small amphoras', with special reference to the samples from the sites of Vetricella, Rocca degli Alberti and Rocchette Pannocchieschi, and the local clays at Monterotondo. In this specific instance, this would reinforce the suggestion that the clay-workings were also exploited during the Early Medieval period, as well as in the Roman and Late Antique periods, as the survey highlighted.

Accordingly, this very analogy enables one to link the finds studied to a common area, at the sub-regional level. However, only further analysis can define this with greater precision.

2.2 Concluding considerations

The characteristics, especially technological, described in the case of the 'small amphoras' are also found, as shown more clearly in the paragraph below devoted to archaeometrical analyses, in the rest of associated commonly used pottery. This leads one to regard as still valid the notion of the existence of local *workshops*, active during Early Medieval times, although they have not yet been identified and located, which served to meet the demand for pottery vessels from local towns and hamlets (Grassi 2010).

The distribution of the 'small amphoras', albeit with a relatively limited diffusion, as argued in this article, would take on a different meaning compared to the rest of the panorama of ceramics, suggesting that the various findspots are all located within the same trading circuit. It is in this context that these vessels may have served to transport and spread specific products, or else be objects of trade themselves. At the same time, however, since this study is still in progress, it is not possible to rule out the possibility that their primary function may have been as storage containers.

L.R.

[15] For further discussion of the archaeometric findings, and all the analyses referred to in this article, see the paragraph by Fornacelli below.

3. 'SMALL AMPHORAS': PRELIMINARY ARCHAEOMETRIC INVESTIGATIONS

An archaeometric study was conducted on 11 pottery fragments samples from several archaeological sites situated in south-western Tuscany in the Colline Metallifere area, and along the Tyrrhenian coast: Donoratico, Rocca degli Alberti, Rocchette Pannocchieschi, Vetricella, Casa Andreoni, San Martino al Piano, Colle Massari and Capalbiaccio. The aim is to establish the characteristics of these fragments of small amphoras, from the point of view of petrography, in order to begin to determine the area where they were made, and the area where they were circulated.

The petrographic, mineralogical and chemical investigations on the fabrics are aimed at determining the process whereby the vessels were produced, with a special interest in the nature of the raw materials used via the identification of geochemical markers which might provide more detailed information as to their provenance, the possible addition of tempers, and firing conditions and temperatures.

Petrographic investigations have provided information regarding the microstructure of the ceramic bodies, such as the size, orientation and abundance of pores and inclusions. Characteristics of the fabric were also studied, with special attention to the nature and distribution of inclusions. Moreover, chemical analysis of the ceramic bodies helped to acquire more information on the composition of the samples, and the geochemical interpretation of the results (in particular as regards trace elements and rare earths) represented a useful approach to the resolution of a number of archaeological issues (provenance, reuse, etc.).

An in-depth knowledge of the geological context of southern Tuscany is fundamental for a better comprehension of the findings made by archaeometric investigations of the *small amphoras*. Southern Tuscany is characterized by several stacked units superimposed between the Late Cretaceous and the Middle Miocene. An extended magmatic activity during the Late Miocene triggered an intense hydrothermal circulation, leading to the formation of several mineral deposits (Innocenti *et al.* 1992; Costagliola *et al.* 2010), while a number of post-nappe basins were filled by clastic sediments (Costagliola *et al.* 2008).

The Neogene-Quaternary succession, in particular, reflects a complex morphological and depositional evolution of the area (Costantini *et al.* 2002; Benvenuti *et al.* 2009; Costagliola *et al.* 2010), and comprises sediments which have not undergone horizontal displacements, but only dislocations involving a predominantly vertical component. The Neoautochthonous complex consists in belts which radiate out from the mineral district of the Colline Metallifere as far as the Tyrrhenian coast (Martini, Sagri, Colella 2001). Closely linked to the geological formations belonging to the Neoautochthonous complex are Neogene-Quaternary clays, which were deposited during the extension regime (Bossio *et al.* 1998) at the foundation of the genesis and evolution of the Tyrrhenian Sea (Gliozzo, Iacoviello, Foresi 2014).

The chemical, mineralogical and physical properties of these sediments (which have been subjected to a low lithostatic pressure, and moderate tectonic pressures) generated

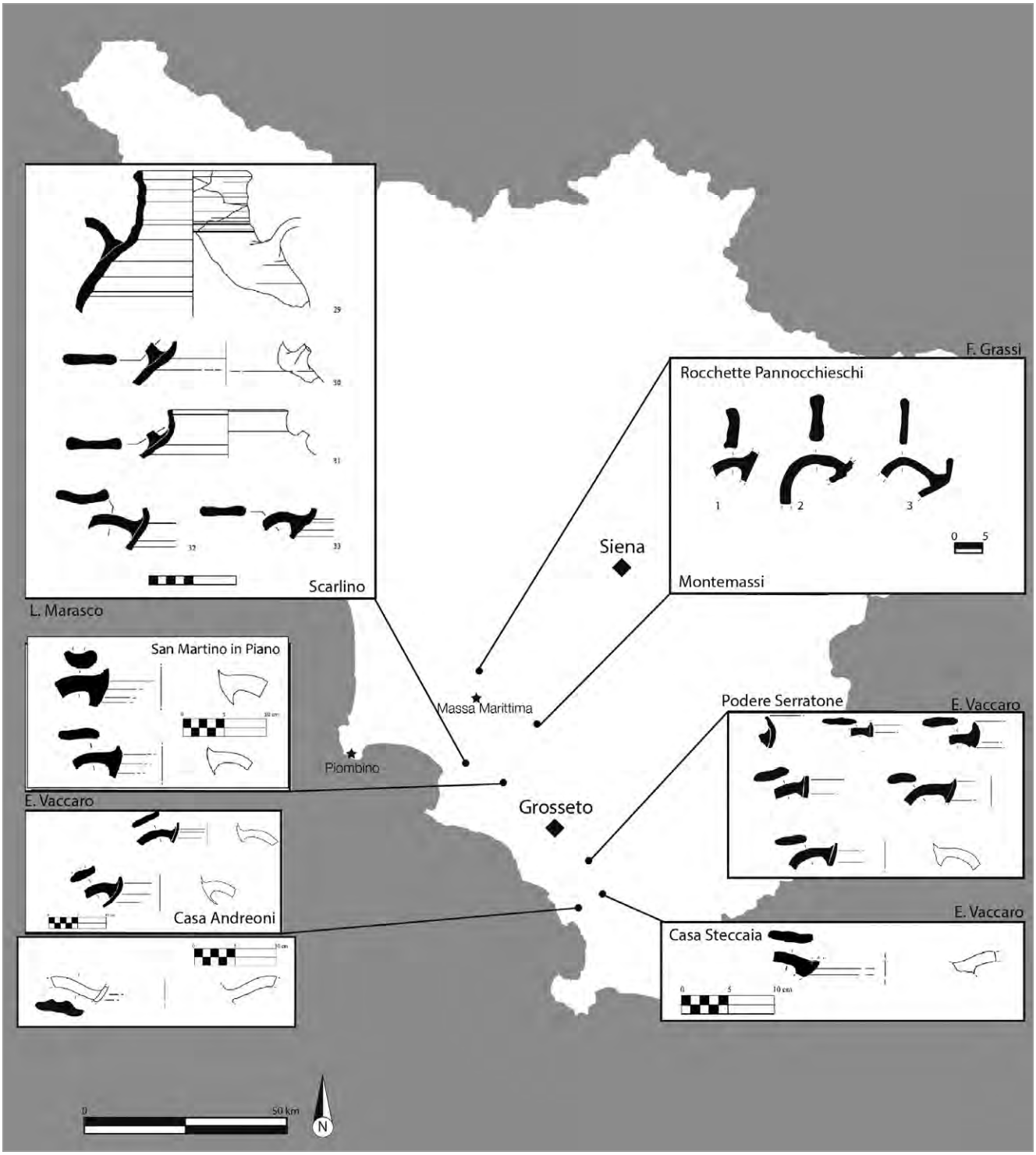
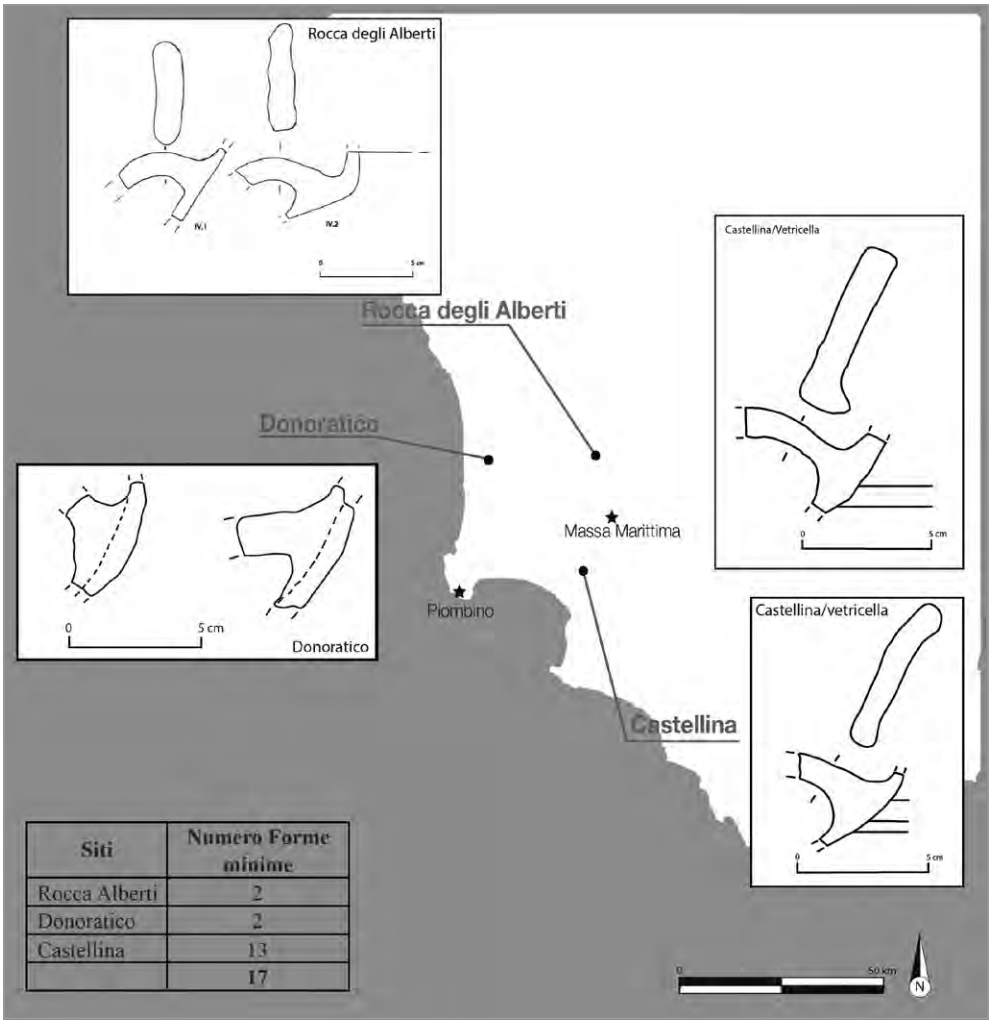


fig. 2 – Finds of small-amphoras from published sites.

clays highly suited to the production of ceramics (Trevisan 1952; Gliozzo, Iacovello, Foresi 2014). Most of the clay outcrops documented in southern Tuscany are located in the vicinity of one or more archaeological sites where pottery production has been documented during the Early Medieval period; further investigation is thus under way to outline the connections between production centres and nearby deposits of exploitable clay.

The main clay outcrops in southern Tuscany are shown in (*fig.* 4). Most of the deposits consist in *blue* or similar clays, although deposits with differing mineralogical and chemical characteristics are present. Further studies are in progress to characterize clays from different deposits, with the aim of drawing up a catalogue of the resources of southern Tuscany, for the use of archaeologists and academics intending to define the production and trade of ceramics in this area.

Blue Clays are very widespread in southern Tuscany, and have been exploited on a large scale for production purposes. These sediments were deposited in marine basins between the Early Pliocene and the Early Pleistocene, and are marked



Siti	Numero Forme minime
Rocca Alberti	2
Donoratico	2
Castellina	13
	17

fig. 3 – Finds of small-amphoras from unpublished sites.

by a fairly uniform mineralogical and chemical composition. The *Blue Clays* can be described as carbonate sediments (carbonates between 15-25% in weight, mainly comprising calcite and rare dolomite) with large amounts of quartz (25-35% in mass), feldspars (6-10% in mass) and phyllosilicates (40-50% in mass). Clay minerals are abundant and mainly represented by illite, with small quantities of chlorite and kaolinite (Dondi *et al.* 1999). Fossil bivalves and gastropods are frequent (Cita *et al.* 2007).

The coastal area of the river Cornia is constituted by alluvional and lagoon marsh sediments (Olocene), marked by gravel, sand, silt and clay, in varying proportions (Barazzuoli *et al.* 1999). In this zone, deposits of silty clays have been documented featuring abundant fossils, for example in the zones of Ornellaia (Castagneto Carducci, Livorno), and in a zone next to the archaeological site of Donoratico (see section 294160 in www502.regione.toscana.it/geoscopio/cartoteca.html).

Higher up the valley, in the alluvional zone of the river Cornia, deposits rich in alunites and kaolinites are a feature of the Frassine plain (near Massa Marittima) where traces have been found of ancient mining (Lazzarotto 1967). The Frassine mineral formations consist in veins within the "Calcare Cavernoso" formation, closely connected to the activity of hydrothermal fluids transporting and depositing the products of alteration of the underlying "Verrucano" schists in the strongly brecciated limestones (Leoni, Sartori 1988). Discontinuous neoautochthonous outcrops of blue clays are also present in the higher zones of the eastern side of the Frassine basin (near Monterotondo Marittimo and the Rocca degli Alberti site).

Finally, clays associated with quartz-rich sands near Paganico (Valle dell'Ombrone) are marked by sediments derived from the erosion of Verrucano rocks. As in the case of Frassine, mineral formations of alunite-kaolinite are derived from hydrothermal alteration and from the leaching of Verrucano rocks, and are, here, characterized by extensive decay of the micas, and a partial mobilization of silica (Sartori, Tamponi 1991). In some cases, moderate hydrothermal activity has produced clays with a low iron content owing to the alteration of the Verrucano sands (Heckroodt, Bühmann 1987). The average mineral composition of these clays is thus marked by greater quantities of quartz (30-50% in weight) and low calcite content (2-15% in weight) and feldspars (<5% in weight). The clay minerals are marked by abundant illite, together with kaolinite (linked to the breakdown of micas) and chlorite (Sartori, Tamponi 1991).

The archaeometric investigation of the samples was carried out by means of a petrographic, mineralogical and structural study of the ceramic bodies conducted by means of optical

fig. 4 – Map of Medieval Tuscany (modified by Pinto 2002; Martini *et al.* 2010). Main clay outcrops.

microscopy, while chemical analyses via ICP-MS (*Inductively coupled plasma mass spectrometry*) and ICP-OES (*Inductively coupled plasma atomic emission spectroscopy*) were carried out on very small quantities (<5 mg) of powdered samples.

Petrographic investigations were carried out with a polarized light microscope (Whitbread 1989), and structural characteristics were assessed using special comparative tables (Marital *et al.* 2005; Cuomo di Caprio 2007).

Chemical analyses made it possible to define the concentration of the major elements, minor elements, and trace elements using a Perkin-Elmer-Sciex spectrometer and a Pelkin Elmer Optima 2000DV spectrometer, respectively for ICP-MS and ICP-OES. For the calibration, geological standards were used (AGV-1 and SDC-1). The analytical error is less than 1% for the main elements, and most of the minor and trace elements (except for V, Sr e Rb, error <5%).

The main, minor and trace elements (MgO, SiO2, K2O, CaO, Al2O3, TiO2, Fe2O3, Na2O, Ba, Cr, Zn, Cu, Co, Mn, Ni and Sr) and rare earths (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Ho, Er, Yb, Lu) were used with the aim of identifying any differences in the raw materials used, and for studies of provenance (Kilikoglou, Maniatis, Grimanis 1988; Maritan *et al.* 2005; De Francesco, Crisci, Bocci 2008). In particular, in order to obtain information as to technological and compositional variability within the analysed sample repertoire, data relating to chemical tests was treated statistically by means of principal component analysis (PCA), carried out using a statistics plug-in, OriginPro 9.1.

Num. Campione	Sito	Datazione
1	Capalbiaccio	Seconda metà X d.C
2	Capalbiaccio	Seconda metà X d.C
3	Colle Massari	Fine VIII-inizio X d.C.
4	Colle Massari	Fine VIII-inizio X d.C.
6	San Martino al Piano	IX-inizio X d.C.
7	Rocchette Pannocchieschi	VIII-metà IX d.C
8	Rocchette Pannocchieschi	VIII-metà IX d.C
9	Donoratico	IX d.C.
12	Vetricella	XI d.C
18	Rocca degli Alberti	IX-X d.C
20	Casa Andreoni	VIII-IX d.C
AR	Argilla (Monterotondo M.)	

tab. 1 – Analysed samples of "small-amphoras" and clay.

The normalization of the rare earth content for each sample to the content of chondrites (Henderson 2013) and the Upper Crust (Mclennan 2001; Taylor, Mclennan 2009) was also used to obtain preliminary information on the provenance of the raw materials.

Due to the large number of samples collected at many different sites, the archaeometric investigation was carried out on selected samples (*tab.* 1). After preliminary observation

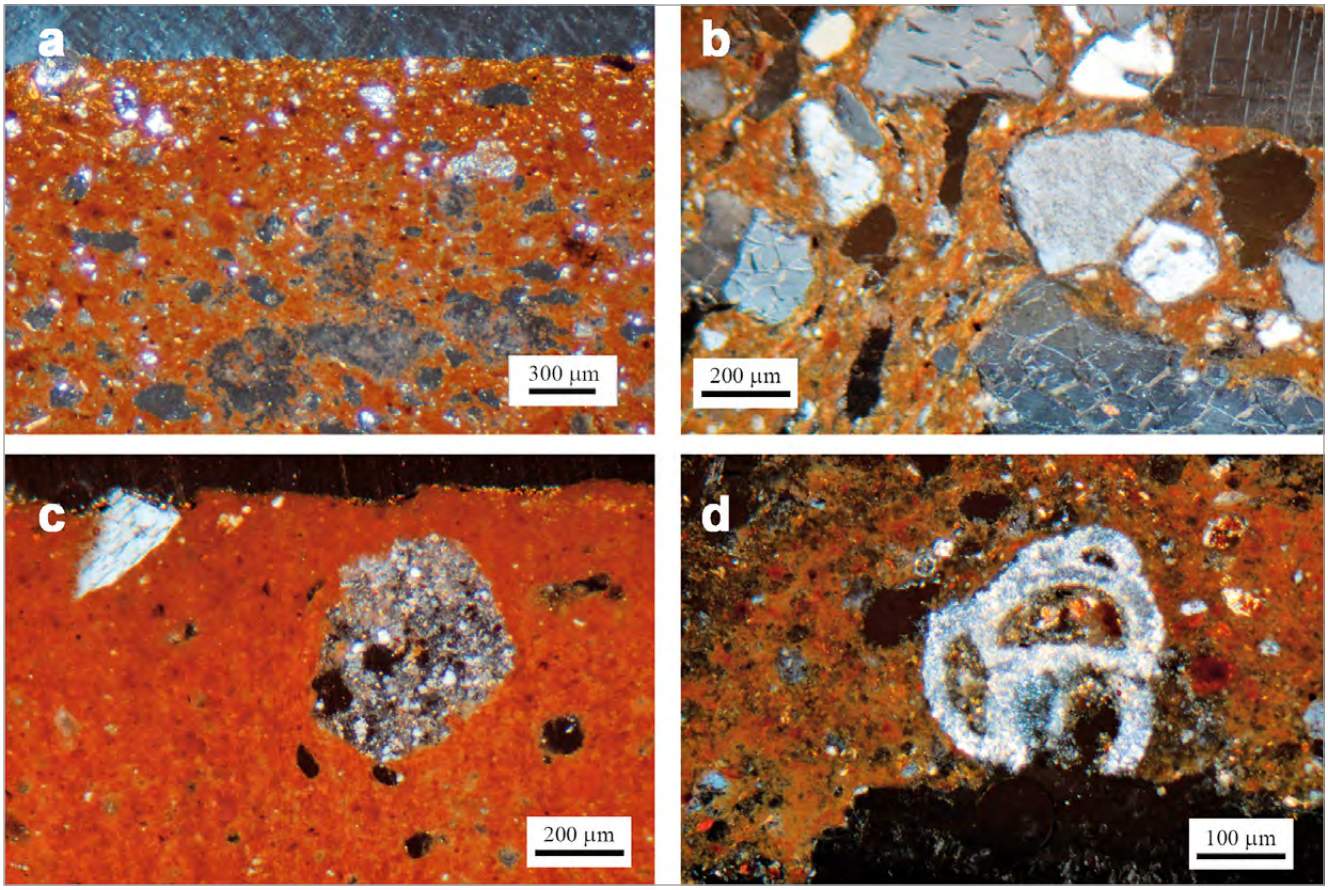


fig. 5 – Microphotographs made with a polarizing optical microscope. Magnification 2.5x (a) and 5x (b, c and d), crossed nicols, of samples 2 and 12. (c) Chert observed in sample 8. (d) Bivalve observed in sample 8.

using stereo microscopy, most of the samples were found to have a reddish, fine-grained fabric typical of iron-rich matrices fired in oxidizing conditions. In particular, some samples (6, 12, 15 and 18) have a coarser fabric with large inclusions.

The samples from the Rocchette Pannocchieschi site (7 and 8) differ slightly owing to the characteristics of their fabric, which is greener in colour and with large inclusions.

From the petrographic examination of the samples, it was possible to distinguish the three groups in more detail, on the basis of the structure of their body, and the nature of the inclusions.

The main group comprises fragments marked by a dense underlying fabric ranging in colour from dark brown to red (*fig.* 5a) and inclusions very similar in nature and abundance (<20% of the volume within the mass). Most of the samples in this group are well-sorted, and have very fine grain size (30-80 µm) with inclusions ranging from sub-angular to sub-rounded shapes. The most abundant mineralogical species are monocrystalline quartz and feldspars, together with opaque inclusions and micas.

All the samples belonging to this group are marked by low porosity consisting in mainly non-oriented pores, and infrequent elongated medium-sized pores between 50 and 200 µm. Samples 9 and 19 show greater porosity marked by large elongated pores aligned parallel to the surface (from 300 to 800 µm).

Some samples in the same group (5, 12, 15 and 18) are poorly sorted, with coarser grain size (*fig.* 5b) All these samples have displayed two main series with sizes of between 30-80 µm and 300-600 µm, represented mainly by quartz (both monocrystalline and polycrystalline), feldspars and smaller quantities of micas.

Finally, few samples (7 and 8) features a more greenish matrix, and the inclusions are less well-sorted. Clasts, being angular to sub-angular, have an average degree of sorting, and are mainly represented by mono- and polycrystalline quartz, feldspars and opaque inclusions, together with abundant micas in sample 7 (*fig.* 5c) and fragments of rock (chert) in sample 8.

As regards the repertoire as a whole, the alignment of the clasts and pores, which in some examples is horizontal to the surface, rules out the possibility that the samples were made on the fast wheel. Fossils of bivalves and gastropods were observed in samples 5 and 7 (*fig.* 5d).

The results obtained by ICP-MS and – OES are shown in *tab.* 2. The chemical composition of the samples is reported in terms of % weight for the oxides of all the main elements and some minor elements (MgO, SiO_2, K_2O, CaO, Al_2O_3, TiO_2, Fe_2O_3, Na_2O and P_2O_5), while the remaining minor elements (Ba, Cr, Zn, Cu, Co, Mn, Ni and Sr), and trace elements (V, Rb, Y, Zr and Pb) and rare earths (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Ho, Er, Yb, Lu) are shown in ppm.

Major and minor elements mainly reflect the chemical composition of the raw materials used to produce the pottery (Dominguez, Zuluaga, Ortega 2001), and were studied in detail using biplots and statistical analyses.

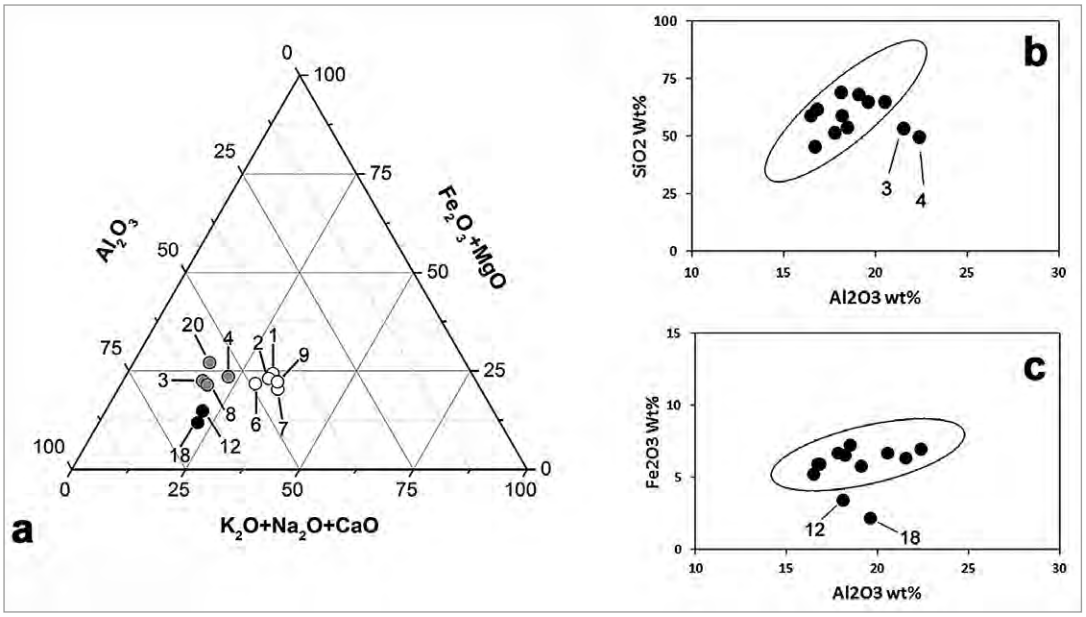


fig. 6 – (a) Ternary plot (Al_2O_3 – Fe_2O_3+MgO – K_2O+Na_2O+CaO) showing non-calcareous pottery (black and grey circles) and calcareous pottery (white circles) (b and c) Diagram showing correlation between sand and clay fraction characterizing fabrics analysed using ICP-MS.

Site	Capalbiaccio		Colle Massari		San Martino	Rocchette Pannocchieschi		Donoratico	La Castellina	Rocca Alberti	Casa Andreoni
Sample	1	2	3	4	6	7	8	9	12	18	20
MgO%	3,1	2,8	1,8	2,9	2,6	2,4	1,2	2,4	0,9	1,6	2,4
SiO_2%	54,1	53,2	55,0	49,8	60,6	58,2	65,4	60,4	68,8	65,3	59,4
K_2O%	3,4	3,4	3,3	1,8	3,7	3,2	3,4	3,3	4,6	4,7	2,9
CaO%	9,9	8,4	2,7	7,5	7,6	8,7	1,5	8,7	0,8	1,2	2,5
Al_2O_3%	19,5	18,9	22,6	23,5	19,5	16,5	19,2	16,1	18,4	19,7	18,9
TiO_2%	0,8	0,8	0,9	0,9	0,9	0,6	0,3	0,6	0,8	0,8	0,9
Fe_2O_3%	7,6	6,9	6,2	6,9	6,6	5,1	5,7	5,4	3,3	2,1	7,0
Na_2O%	0,8	1,2	0,6	0,7	1,2	0,9	1,3	1,2	1,0	0,8	1,2
P_2O_5%	0,1	0,0	0,0	0,1	0,0	0,0	0,1	0,1	0,1	1,4	0,0
LOI	0,8	3,0	4,9	5,8	0,8	3,0	2,0	2,8	1,4	3,7	3,2
Sr (ppm)	362	427	147	219	256	364	98	386	124	172	164
Zr (ppm)	131	139	166	174	146	137	139	147	240	219	188
Ba (pm)	274	470	413	544	692	497	286	390	647	582	494
Pb (pm)	18	26	29	35	29	31	34	22	48	59	26
Cr (ppm)	128	97	121	152	136	176	75	209	83	87	140
Zn (pm)	114	143	124	85	106	151	87	100	54	104	109
Cu (pm)	48	44	45	34	65	13	31	33	11	29	30
Co (ppm)	19	17	27	19	22	15	5	17	5	4	18
Mn (pm)	841	772	644	1138	1301	625	917	1367	178	191	594
Ni (ppm)	114	52	77	99	94	84	39	145	30	34	82
V (ppm)	140	136	93	103	118	108	55	101	86	89	112
Rb (pm)	138	151	137	59	166	169	210	136	261	270	102
Y (ppm)	26	24	29	32	25	22	46	22	24	24	27
La (ppm)	42	43	49	45	39	35	41	34	49	43	44
Ce (ppm)	76	77	91	80	74	62	84	62	90	97	83
Pr (ppm)	8	9	11	9	8	7	10	7	10	11	9
Nd (pm)	34	37	41	38	34	28	39	28	41	42	37
Sm (pm)	6	7	8	7	6	5	8	5	7	8	7
Eu (pm)	1	1	1	2	1	1	1	1	1	1	1
Gd (pm)	6	6	7	7	6	5	9	5	7	7	7
Tb (pm)	1	1	1	1	1	1	1	1	1	1	1
Dy (pm)	5	5	6	6	5	4	8	4	5	5	5
Ho (pm)	1	1	1	1	1	1	2	1	1	1	1
Er (ppm)	3	3	3	3	3	2	5	2	3	3	3
Tm 8(pm)	0	0	0	0	0	0	1	0	0	0	0
Yb (pm)	3	3	3	3	3	2	4	2	3	3	3
Lu (pm)	0	0	0	0	0	0	1	0	0	0	0
$(La/Lu)_N$	11,0	12,4	10,8	9,5	10,2	10,1	6,9	9,6	12,7	11,5	10,7
$(La/Sm)_N$	4,3	4,1	4,0	3,9	3,9	4,2	3,1	4,0	4,3	3,6	4,0
ΣREE	185,9	192,6	223,3	205,2	182,1	154,9	213,5	153,9	217,7	221,3	202,5

tab. 2 – Chemical composition of fabrics obtained using ICP-Ms and ICP-OES.

The scarcity of the secondary phase deposited within the pores (observed only in sample 7), together with low concentrations of P_2O_5 (<0.1%), allowed excluding an extensive contamination from the soil during burial (Lemoine, Picon 1982; Maritan *et al.* 2005).

Preliminary analysis of the major and minor elements suggests the use of iron-rich clays (3% <Fe_2O_3 <7%, see *tab*. 2), with a different carbonate content (*fig.* 6a), where samples 1, 2, 4, 6, 7 and 9 showed higher amounts of calcium (Ca> 6% weight).

The correlations of the main elements have provided important information on the composition of the silica and clay components of the samples, obtained respectively from the SiO_2/Al_2O_3 and Fe_2O_3/Al_2O_3 plots. While the correlation between silicas and alumina (*fig.* 6b) is not good enough to provide indications about the exploitation of sources with similar mineralogical features the differences observed for the samples from Colle Massari (3 and 4) from the main groupare not negligible. The low SiO_2/Al_2O_3 (≤3) ratio observed for the samples from Capalbiaccio, Colle Massari and San Martino, moreover, suggests the predominance of clay minerals over the silica fraction, and is also an index of fine grain size (Trinidad *et al.* 2009). On the other hand, the deliberate addition of quartz in samples from the other sites was also indicated by the higher SiO_2/Al_2O_3 values (3.3-3.8), as also suggested by the low seriation and the angular shape of the inclusions observed for the samples from these sites. The use of poorly purified clays was, however, was not excluded.

The information obtained from the Fe_2O_3/Al_2O_3 ratio regarding the composition of the clay fraction (*fig.* 6c) has shown a good correlation between most of the samples, except for those from the sites of Vetricella (12) and Rocca degli Alberti (18), where lower concentrations of Fe_2O_3 were found.

Finally, the strong correlation between TiO_2 and Al_2O_3 has suggested that the titanium content was mainly correlated with the presence of abundant quantities of muscovite in almost all the samples.

From statistical analysis (Principal Components Statistics Analysis, PCA) of the major elements, and some of the minor and trace elements (SiO_2, K_2O, CaO, Al_2O_3, TiO_2, Fe_2O_3, Na_2O, Rb, Ba, Cr and Ni) 4 eigenvalues were identified, representing 93.48% of the total variance.

Principal component 1 (PC1) represented the 44.4% of the total variance and was related to abundant Ca-enriched clay fractions, while principal component 2 (PC2, 18.9%) indicated the more abundant mineral inclusion species (quartz, feldspar, or micas). On the other hand, principal component 3 (PC3 16.0%) was associated with iron oxides, while principal components 4 (9.9%) with the nature of feldspar inclusions (concerning the Na or K endmembers).

The PC2/PC1 graph (which represents 63.3% of the total variance, *fig.* 7a) enables us to distinguish 4 groups characterized by samples with a differing ratio of the clayey fraction over temper, and by the predominance of micaceous or quartz/feldspar inclusions. The data set has confirmed that the samples are mainly represented by fragments with a predominant clay fraction, marked by abundant micas, while few samples (5, 8, 12 and 18) display a more abundant percentage of temper, consisting of inclusions of quartz and/or feldspar.

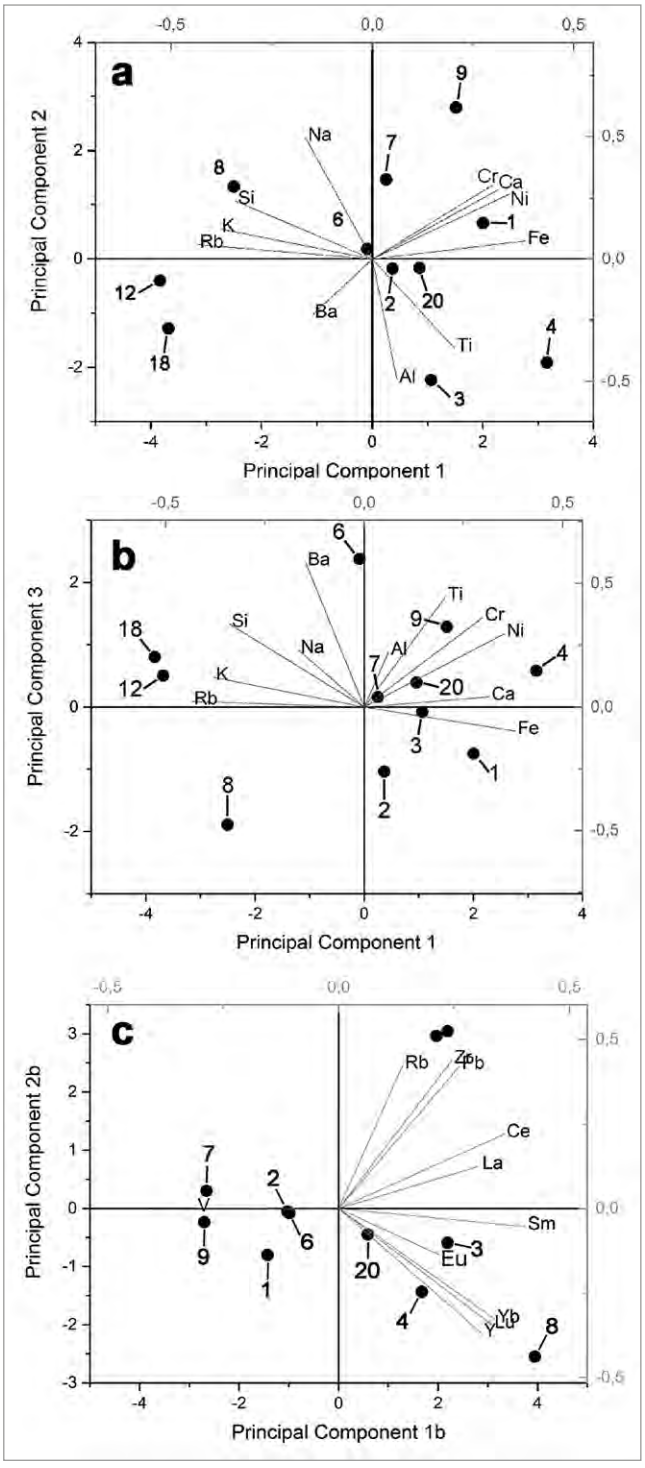


fig. 7 – Multivariate statistical analysis. Principal Component Analysis (PCA) carried out on major, minor and trace elements selected and obtained via ICP-MS and ICP-OES. Diagram showing values of main components PC1 and PC2 (a), PC1 and PC3 (b), PC1b and PC2b (c).

On the other hand, the PC3/PC1 graph (*fig.* 7b) allows us to correlate most of the iron content to abundant iron oxides in most of the samples, except 6 and 8 where the Fe was probably related to phyllosilicates, while samples 12 and 18 were did not show any correlation Finally, if we consider trace elements and rare earths, PCA analysis provides useful information as to the nature of the clay fraction. Three main components were considered, representing 93.3% of the total

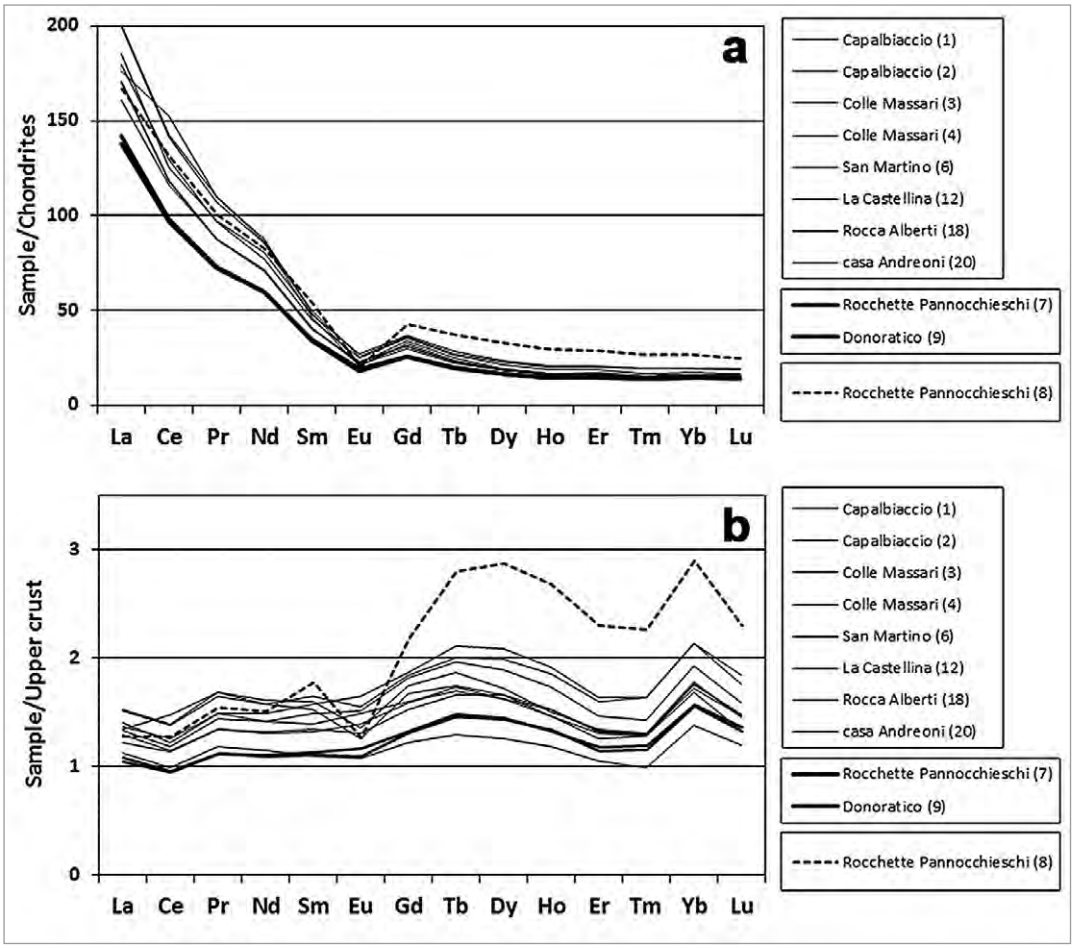


fig. 8 – Distribution of rare earths (REE) in pottery samples. Values normalized to chondrites (a) and to the average upper crust (b) chemical compositions.

variance. The main component 1 (PC1b, 53.5%) correlates positively with rare earths, or REE, and in particular with heavier ones (also called HREE), suggesting a non-negligible weathering of the clays used to make the pottery. Equally, the main component 2 (PC2b, 23.1%) represents clays which have undergone a certain degree of weathering (represented by Rb enrichment), probably correlated to the dismantling of kaolinite (as also suggested by the correlation with Pb). By contrast, main component 3 (PC3b, 16.7%) is found to be associated with light rare earths (also known as LREE, such as La), and with vanadium (a trace element strongly correlated to iron oxides and clay minerals), suggesting a lower weathering. However, the presence of monazite (with the generic (Ce, La) PO4 formula), documented in the sediments of southern Tuscany (Fortina, Memmi Turbanti, Grassi 2008), must be taken into account when we consider this data set.

Accordingly, from an investigation into the correlation between PC1b and PC2b (*fig.* 7c), three distinct groups were identified. The main group strongly correlates with vanadium (V), suggesting that it is populated by pottery derived from clays subjected to low e low weathering. No correlation is present with Ce and La, suggesting that these elements are strongly linked to the presence of monazite. Four samples (3, 4, 8 and 20) showed a positive correlation with heavy rare earths (HREE), suggesting the use of clays subjected to a high degree of alteration, while samples 12 and 18 were found to have been produced from raw materials with different characteristics.

A more detailed study of the rare earths (REE) was then carried out, to obtain further information regarding the provenance of the raw materials.

The rare earth elements are a group of 17 elements, including lanthanides (Z = 57-71), together with Sc (not found in the present study) and Y, used on a large scale for provenance studies. However, consideration must be given to several factors which influence the concentration REEs in a pottery sample. While it is possible to distinguish between different materials according to normalized distribution patterns, there may be significant variations in the REE content within the same type of clay, depending on the weathering degree of the parent rock. The great variety of processes which influence the chemical and mineralogical composition of clays during the complex production process (purification, addition of temper, firing), together with the chemical interactions with the surrounding environment (conservation, use and burial), could, furthermore, play a significant role in the concentration and distribution of REEs (Kilikoglou, Maniatis, Grimanis 1988). REEs distribution patterns normalized to chondrites and to the upper crust (Taylor, Mclennan 2009; Henderson 2013) are shown in *fig.* 8a and b, respectively. All the samples, except number 8, show a similar pattern, suggesting the exploitation of similar sources. The limited variations in the normalized (La/Lu)N

ratios (9.5-12.5) observed for most of the samples, suggested the raw materials to be derived from similar sources. On the other hand, an enrichment in HREE observed for sample 8 (La/Lusample8=6.8) could be related to the use of a clays subjected to a more extended weathering. The relatively minor content in REEs for samples with large mineral inclusions was related to the use of less purified clays or to the intentional addition of a consistent fraction of large quartz/feldspar inclusions which causes a dilution of REEs content (Prudencio, Figueiredo, Cabral 1989).

In conclusion, the preliminary archaeometric investigation has provided useful information as to the main characteristics of the fragments studied. However, the limited number of samples examined has not made it possible identifying chemical and petrographic markers which make it possible to distinguish differing supply sources for the raw materials (such as clay).

Further analyses are thus currently in progress to obtain an in-depth characterization of a larger number of samples from differing sites, together with the sampling and characterization of clays from a high number of deposits (around 14) scattered throughout southern Tuscany, to provide new parameters to be used in provenance studies.

Thus far, the samples analysed have shown very similar characteristics, and the results suggest the exploitation of similar sources for the production of the majority of the fragments. Exceptions are samples 8 (Rocchette Pannocchieschi), 12 (Vetricella) and 18 (Rocca degli Alberti), whose characteristics do not accord with the rest of the samples. Further studies are necessary, however, to confirm a differing provenance of the raw materials.

4. PRODUCTION AND CIRCULATION OF SPARSE GLAZED POTTERY[16]

4.1 The context

In the panorama of local-scale pottery (Grassi 2010), organized in a larger system in which artisanal centres situated here and there at the sub-regional scale, we propose here that "sparse glazed" ware was a possible specific ware produced at the site of Donoratico (Bianchi 2004). Donoratico castle stands in the municipality of Castagneto Carducci (Livorno province), and is situated in a intermediate zone between the hinterland and the coast (*fig.* 9), in an area of great historical and environmental interest marked by an extremely significant geographical and historical continuity[17]. The site of Donoratico is believed to be part of the holdings of the monastery of S. Pietro in Palazzuolo, standing on the slopes of the hill where, later on, the castle of Monteverdi is mentioned as existing (Bianchi 2015a, pp. 11-15).

The site of Donoratico castle was investigated archaeologically from 2000 until 2009, and has yielded an exceptional site continuity from the Hellenistic period until the later Medieval period, of which there are still very visible monumental remains today, such as the two towers standing side by side (Bianchi 2015a, pp. 301-335; Bianchi 2015b, pp. 9-26). In this article we will refer to a single construction phase for the castle, identified in the south-east portion of the site, and dated to between the 9th and 11thc, to contextualize an important find, the subject of this article, relating to the finding of "sparse glaze".

However, here we will consider another significant aspect of the site: the truly exceptional quantity of "sparse glazed" pottery found during the previous archaeological investigations.

4.2 Single-fired glazed ware: the current state of research, and research problems

"Sparse glazed" ware is an example of single-fired glazed pottery datable to the Early Medieval period (Cuomo di Caprio 2007, pp. 397-400); early medieval glazed pottery found in Italy falls into two groups. These are easily distinguishable not so much on the basis of technological differences as on the basis of their form and decoration. The first group, the so-called "Forum Ware", is characterized by a lead-based glaze which covers all of the pottery vessel. This is green or yellow-brown in colour, with applied decoration (Whitehouse 1981, pp. 583-587; Mazzuccato 1972)[18]. The second group, "Sparse Glazed" pottery, is characterized by the absence of applied decorations, and by a thinner glaze, which does not cover all of the pot. Like the previous ware, this glaze is also green or yellow-brown (Molinari 2003, pp. 519-528; Ead. 2014, pp. 95-109)[19].

Studies of early medieval single-fired glazed pottery[20] have concentrated, ever since the beginning, on both typological aspects and technological aspects (Blake 1981, pp. 20-52). Indeed, on the occasion of the first systematic study project, which ended with a conference held in Siena in 1990, many archaeometric analyses were conducted, which were later published in the form of the conference proceedings, and this is still the most up-to-date study available (Paroli 1992). There has also been specific research (Sannazaro 1994, pp. 229-261), and other, regional studies, such as for Lazio[21] and Tuscany: in the context of the research carried out in Tuscany since the end of the 1970s, directed by Riccardo Francovich, of particular importance were the excavations which provided secure stratigraphic contexts in which to be able to analyse the presence of early medieval glazed pottery (De Marinis 1978, pp. 504-512; Grassi 2010, pp. 9-10; pp. 91-104). There was a further focus on this on the occasion of an AIECM2 international conference in Salonicco (Paroli *et al.* 2003, pp. 477-490), to which we must add a summary on Sicily

[16] The data in this article were processed during the first six months of this writer's doctoral research, entitled: *La ceramica a "vetrina sparsa" nella Toscana altomedievale: produzione, cronologia e distribuzione*.

[17] See Bianchi 2015b, with bibliography; Benvenuti *et al.* 2014, *Studying the Colline Metallifere mining area in Tuscany,* pp. 261-287.

[18] "Forum Ware" was produced in Rome between the 8th and 11thc. We would also draw attention to the numerous past contributions by D.B. Whitehouse and O. Mazzuccato on this subject, with bibliographies.

[19] "Sparse Glazed" ware became widspread in northern central Italy from the 11th to the 13thc.

[20] An overview, with particular reference to northern Italy, has already been produced by Hugo Blake, following an academic seminar entitled *La ceramica invetriata tardoromana e altomedievale*, Museo Civico Archeologico "Giovio", 1985.

[21] For the latest updates on the numerous studies in Lazio, see the recent volume edited by Molinari, Santangeli Valenzani, Spera 2014.

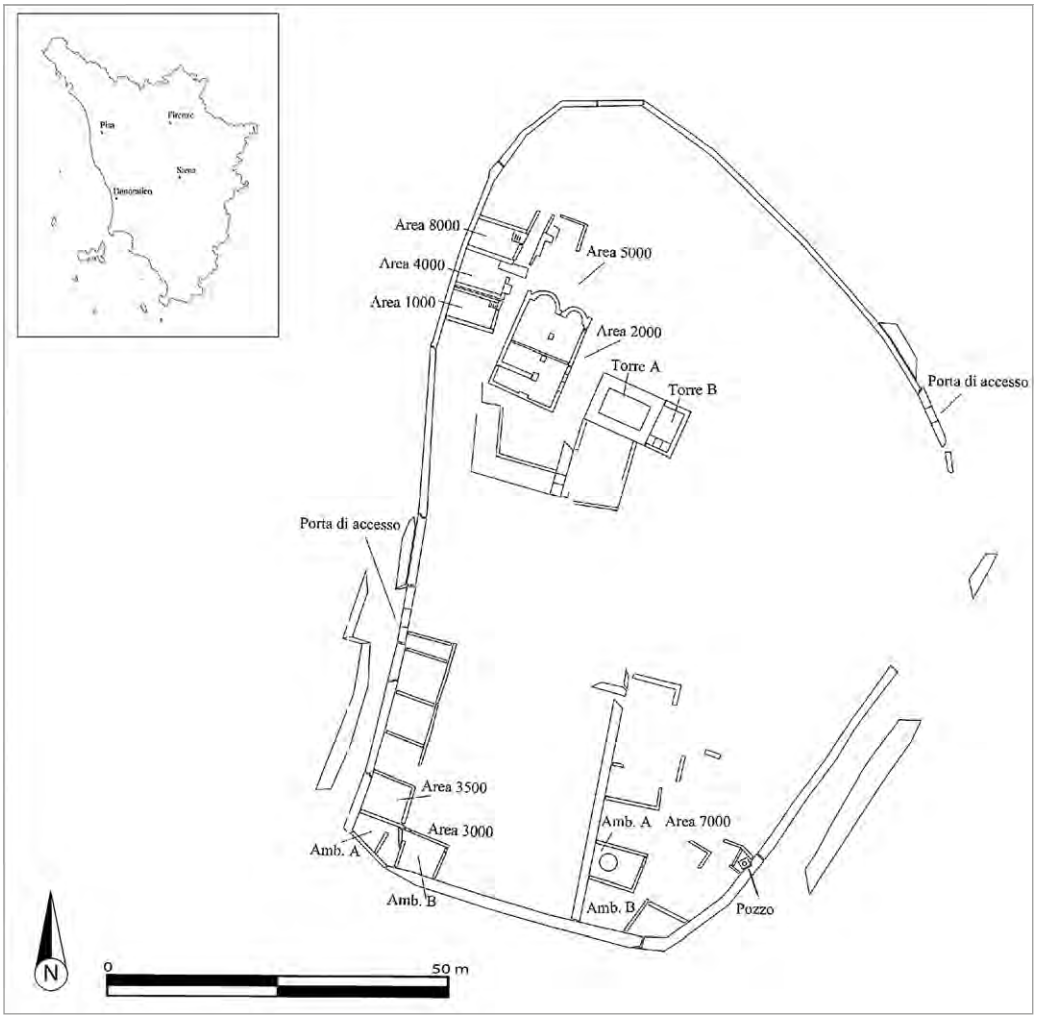


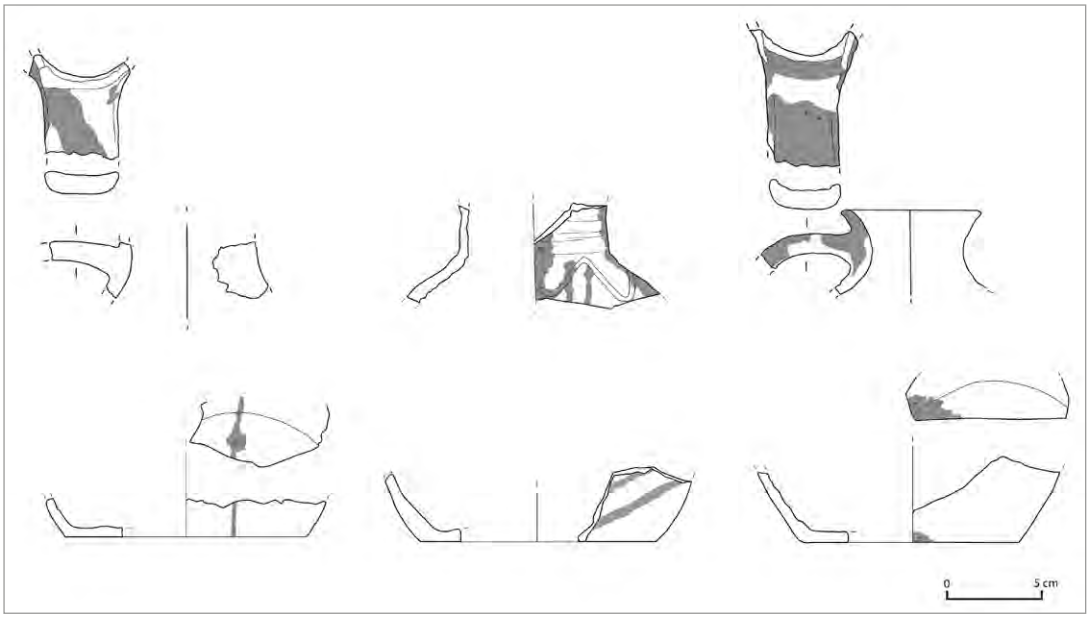
fig. 9 – Location of castle of Donoratico and site plan.

(Cacciaguerra 2009, pp. 285-300) and a recent text which once again sums up the state of play (Gelichi 2016, pp. 297-317). Contributions to this subject have highlighted two problems in particular for studies on "sparse glazed" ware: the very small number of finds, and the fact that, owing to the very nature of the non-homogeneous glaze, this pottery, when found in fragmentary form, could be mistaken for simple levigated pottery, and thus it would not be easy to identify. Thus, to date, we do not have a safe chronology for the diffusion of "sparse glazed" ware, nor a study on how it was produced and its technical characteristics.

4.3 "Sparse glazed" pottery at Donoratico

The exceptional find of "sparse glazed" pottery at the site of Donoratico amounts to around 3,000 fragments, attributable to several hundred vessels[22]. Most of the finds come from stratigraphy relating to the construction and occupation phases corresponding to a moment when the site was being profoundly redefined (Bianchi *et al.* 2012), and these give a detailed chronological reference grid, between the end of the 9th and the 10thc (*ibid.*, pp. 45-48). As regards morphology, only medium-sized and large closed vessels were found. These are trefoil jugs or jugs with a round mouth, with just one handle, with various kinds of profile, and ovoid body and a flat base. The handles are attached either halfway up the neck of the vessel or directly on the rim, and thus at the same height as the rim. In terms of surface treatment, it is clear that the lower part of the belly of the vessel, and the base, was smoothed with a stick (*tav.* 3). In terms of decoration, there is a characteristic association between the places where the glaze was poured on and the large wavy motifs, predominantly in a single band, on the shoulder of the vessels. The waves appear clearly incised directly on the unfired pottery (biscuit ware), before the glaze is poured onto the outer surface of the pot. These pourings of glaze always seem irregular, and in many cases drips and splashes are present both inside the vessels and on the base of the outer surface. Also, two main ways of spreading the glaze have been found: vertical, and horizontal (*fig.* 10). The first way involves turning the pot upside down and dipping the mouth in the glaze; then, afterwards, it is placed on its base, allowing the glaze to drip down, naturally. With the second technique, the direction of the drips follows the lines from

[22] Documentation of the ceramic material is still in progress, and thus liable to change. The method used for calculating the quantity of pottery is based on a calculation of the number of fragments (Orton *et al.* 1993) and on the minimum number of vessels (MnV) (Orton 1975, pp. 30-35), aware of the respective limits, primarily the complexity of its application in contexts with thousands of fragments, and also the subjective basis for their ordering into groups (Ceci, Santangeli Valenzani 2016, pp. 35-57).



tav. 3 – Sparse-glaze pottery forms from the site of Donoratico.

fig. 10 – Decorations associated with sparse-glaze forms from Donoratico.

the potter's wheel, and appear oblique to them; this would indicate a procedure during which the glaze was poured onto the pot while keeping it in a horizontal position; later it was rolled, creating mainly horizontal drips compared to the axis of the pot itself. As regards the characteristics of the glazes, these are mainly transparent or slightly milky, thin glazes, with a range of colours varying from yellowish hues to green and brown. The surfaces exhibit characteristic imperfections, such as cracks and bubbles, due to the collapse of the glaze within the ceramic body. Finally, an important association was found between vessels with sparse glaze and levigated, unglazed products which are completely similar in terms of form and incised decoration found within the site.

4.4 Archaeometric analyses: preliminary findings

The archaeometric findings presented here are still only partial and preliminary, insofar as the archaeometric analyses are still under way, and for this reason will not be presented in as much detail as in the previous paragraphs.

As well as being documented, finds were sampled and subjected to specific archaeometric analyses both of the ceramic bodies and of the glazes[23]. The results of the analyses still in progress partially confirm the previous tests in 2008 on 27 samples of glazed pottery from 6 sites, including Donoratico itself: in that instance, the samples were both sparse glazed and glazed kitchenware (Fortina, Memmi Turbanti, Grassi 2008, pp. 30-47). Recent mineralogical and petrographic analyses[24] conducted on the ceramic bodies, are currently verifying the abundance of quartz, plagioclase, K-feldspars and micas, in accord with a high

[23] Petrographic and chemical analyses are currently under way at Siena University (Dipartimento di Scienze Fisiche, della Terra e dell'Ambiente). These will make it possible to identify fabric groups to be compared with groups from other sites in the Colline Metallifere, and in the general context in Tuscany, thereby enabling us to proceed in recognizing wares by no longer looking at individual sites, but at micro-areas.

[24] The analyses, in part still under way, were conducted by Dott.ssa Cristina Fornacelli and by this author, at the Dipartimento di Scienze della Terra dell'Università di Siena, as part of the doctoral project (see note 1).

Comuni	Siti	Stato	Vetrina Sparsa	Colature Rosse	Bande Rosse	Dipinte di rosso
Castagneto Carducci	Castello di Donoratico	Inedito	3081	-	108	-
Campiglia Marittima	Rocca di Campiglia	Edito	9 forme / 96 frammenti	-	7 forme118 / 107 frammenti	-
	Rocca San Silvestro	Edito	3	-	-	-
Suvereto	Rocca di Suvereto	Edito	1	-	-	-
Piombino	Carlappiano	Inedito	3	-	-	-
	Populonia	Edito	19 con VP	-	-	509 fr. / 109 forme
Monteverdi Marittimo	Monastero	Inedito	10	7	-	-
Radicondoli	Ricognizione (intero comune)	Edito	-	-	-	-
Chiusdino	Castello di Miranduolo	Edito	-	-	-	-
Monterotondo Marittimo	Rocca Degli Alberti	Inedito	1	1	-	-
	Castello di Cugnano	Inedito	-	-	-	-
Montieri	Edificio Fonderie	Inedito	-	-	-	-
	Canonica di San Niccolò	Inedito	-	-	-	-
Roccastrada	Castello di Montemassi	Edito	-	-	-	-
Massa Marittima	Castello Rocchette Pannocchieschi	Edito	7	5	-	-
Gavorrano	Castel di Pietra	Edito	1	-	-	-
Scarlino	Castello di Scarlino	Edito	4	-	-	-
	Vetricella	Inedito	11	19	-	-
Follonica	Podere Aione	Edito	-	-	-	-

tab. 3 – Summary quantifications of slip-decorated pottery wares.

incidence of silicon, aluminium, iron, potassium and sodium typical of these minerals, while all the fabrics proved to be characterized by low concentrations of calcium. Taken together, this information, along with the presence of monazite, typical of the area in question, accords with the findings made in the past in the previous, aforementioned studies. However, what clashes with the results of the previous investigations is the abundance of iron, associated with the presence of abundant micas and Fe oxides, and in some samples the presence of filler in the fabric, probably added deliberately. Despite this, the Campiglia mining district confirms its status as a reference area for the supply of raw materials (Fortina, Memmi Turbanti, Grassi 2008, p. 43). The preliminary observations on the glazes analysed by optical microscopy (OM) involved some of their aspects (hardness, thickness, colour, distribution), the type of application, and the state of conservation. The following step involved the application of the scanning electron microscope (SEM) to get a more detailed picture of their chemical, mineralogical and textural features, together with a higher resolution compared to optical microscopy. Naturally, these glazes are rich in lead but, thanks to the increased amount of information obtained following the microscopic investigations, it was possible to reveal the complex structure of the glazes present on some samples which showed indistinguishable characteristics to the naked eye. The new analyses currently make it possible to confirm that the technology of production involved a single firing, evident in the typical collapses of the glaze in the cavities of the ceramic body itself, and in the considerable size of the interface between the ceramic body and the glaze, features found in all the samples analysed. Moving on to the glaze, what was already known concerning the glazes (Fortina, Memmi Turbanti, Grassi 2008, pp. 45-46) was confirmed and further explained during the recent analyses, which defined the variable thickness of the glazes, the great underlying variability in composition, although continuing to be rich in lead in every instance, the rapid mixture of the components, and the presence of iron oxides which determine the sometimes amber-coloured hues.

4.5 Concluding hypotheses

To sum up, as stated above, previous finds of "sparse glaze" in Tuscany are based on the study of a tiny number of fragments. Finds made in urban contexts and at rural sites (Grassi 2010) do not number more than a few dozen complete vessels. We have summed up the available data regarding attestations of some classes of pottery from 19 sites investigated archaeologically, and situated in 14 municipalities in the provinces of Pisa, Livorno, Siena and Grosseto (*tab.* 3)[25]. From these we have come to a conclusion regarding the presence of "sparse glaze" also at other sites in the local area, namely that, with an eye to the statistics, this presence was truly very limited, and geographically restricted to the coastal area.

If one bears in mind the absolutely disproportionate number of vessels with "sparse glaze" found at the site of Donoratico, and the presence of possible kiln waste, one can suggest that the site may have been a production centre of this pottery ware[26]. Donoratico would thus, for the first time, be positioned specifically within the polycentric system

[25] The data from 11 sites (Rocca di Campiglia; Rocca San Silvestro; Rocca di Suvereto; Populonia; Radicondoli municipality (field-walking); Castello di Miranduolo; Castello di Montemassi; Rocchette Pannocchieschi; Castel di Pietra; Castello di Scarlino; Podere Aione) were taken from previous publications, and reported numerically as originally presented by the authors, hence the disparity between the numbers of fragments or minimum forms. The data from the 8 unpublished sites (Castello di Donoratico; Carlappiano; Monastero di San Pietro in Palazzuolo; Rocca degli Alberti; Castello di Cugnano; Edificio delle Fonderie; Canonica di San Niccolò; Vetricella) are still being studied, and they are presented here by kind permission of the Site Director, Professoressa Bianchi.

[26] Regarding this hypothesis, no actual kiln has as yet been identified here.

of production typical of "sparse glaze"[27], proving also to be an important marker of the circulation of specific skills. The continuation of research work will enable this hypothesis to be explored further and checked.

5. SOME CONSIDERATIONS ON RED-SLIP WARES

The pottery wares circulating in Tuscany between Late Antiquity and the Medieval period include pottery decorated with a red or dark brown slip. Of these, we must distinguish a number of wares characterized by differing technological peculiarities, and especially by a differing chronology. For the purposes of a general discussion, in this geographical area, of diffusion and circulation at the sub-regional level, the wares to be considered are those decorated with dripped red slip, but not those datable mainly to between the end of the 4th and the 7thc which still include forms from the Late Antique tradition; instead, we should look at the ones after the 8thc, which involve medieval morphological types, such as jugs, storage pots and bowls (Cantini 2005, p. 179).

Thus observations similar to those for "sparse glaze", in Tuscany, could be made also for drip-painted pots, also called "red band" ware, attested in the fully medieval forms of jugs, cooking pots and small pots, although in small numbers at the sites examined. Decorations feature drips and spirals painted in association with waves incised on the ceramic bodies, and lattice-motif stamps impressed on the handles, as of the 10thc. These wares date from the 8th to the 11thc, and have a fairly widespread diffusion, encompassing both towns and villages (Cantini 2009, p. 67).

Regarding centres of production, some analyses conducted in the past on the fabrics of ceramic material from the site of Campiglia (Grassi 2003, pp. 301-303; Fortina, Memmi Turbanti 2003, pp. 337-340) have enabled the identification of areas of probable provenance, which include the Colline Metallifere for the fabric of a coarseware cooking pot with red bands, while for band-decorated levigated types the anayses only enabled the definition of a regional area, compatible with both parts of coastal Tuscany and clays from the Arno. Thus, bearing in mind the small percentages in which this ware is attested, and the presence of forms with heterogeneous fabrics, distinct production centres could be suggested, as a preliminary hypothesis: in the Valdarno, where the only certain centre that made early medieval drip-painted pottery, with kiln waste, was found at the site of San Genesio (San Miniato, Pisa), and thus in a rural context, close to important road arteries and areas which supplied the raw materials (Cantini 2009, p. 71; Cantini forthcoming); and at some sites in southern Tuscany where we can posit that, as of the 10th-11thc, these wares start to spread, and perhaps to be produced, alongside "sparse glaze" ware, inspired by models which already circulated in the Arno valley. In order to continue to explore this line of research, further specific archaeometric analyses are envisioned in the future on this class of pottery, too.

A.B.

[27] This factor was highlighted by Lidia Paroli right from the earliest phases, with clear signs of a reinforcement in the 10thc, in Paroli 1990, p. 46.

6. GENERAL CONCLUSIONS

In conclusion, the picture outlined thus far, albeit in a preliminary form, can be summed up as follows:

1. For pottery circulation between the 8th and 10thc, widespread production is revealed, at the local level, consisting in common kitchenware and storage vessels, as already shown in the past. This pottery, from local workshops, certainly used various clay sources, of the same type, scattered here and there both in the coastal area and in the immediate hinterland. New additions to the formal and technological repertoire consist of the new finds of the aforementioned 'small amphoras', and, to an even greater degree, a greater definition in their distribution, which can currently be circumscribed to the Colline Metallifere district and to the area of Grosseto.
Indeed, to date, at the regional level, no other examples are known with the same formal characteristics, a factor which inclines us to interpret this form as peculiar to this specific territory.
2. As regards other possible locally-made wares, and in particular sparse glaze pottery, on the basis of the exceptional number of fragments found at the site of Donoratico, we may suggest that the site may have been a production centre for this ware.
3. Regarding red-slip ware, attested to in our geographical area in smaller numbers, and solely along the coastal zone, we are not yet able to determine whether this is a local or a sub-regional production, since the only known contemporary production centre is in the Valdarno.

Accordingly, the future research agenda envisages quantitative analysis of the 'small amphoras'. This is desirable in order to define, in an even more specific way, the area of presence and distribution. In addition, there should be further archaeometric analyses of the fabrics, both of undecorated wares and glazed or slipped wares, in oder to determine their provenance.

The primary objectives, particularly in the case of sparse glaze and red-slipped wares, also include the need to conduct comparative research with materials from other parts of Tuscany. In addition, the continuation of research will make it possible to obtain some more solid, fixed chronologies for the specific wares mentioned above. Thus, with a view to this, material culture can help to outline the productive system characteristic of this territory during the Early Medieval period, in reference to possibly differing types of customers.

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Abstract

The article examines pottery circulating in the area of the Colline Metallifere (Grossetano district), and in the associated coastal zone, to identify the presence of possible centres of local pottery production during the Early Medieval period.

Setting out from an overview of the production of plain, undecorated wares, sparse glazed pottery, and red-band pottery in southern Tuscany, it presents the most significant findings made in recent excavation campaigns at sites within the nEU-Med project.

We also add here the preliminary results from archaeometric analyses conducted on a selection of pottery samples from the aforementioned territory.

Finally, we put forward a number of considerations regarding the differing attestation of locally-made and widely-circulated undecorated pottery, including the "small amphoras", and sparse glazed ware, also perhaps locally-made, but limited to just a few sites in the coastal area.

Paolo Tomei

THE POWER OF THE GIFT. EARLY MEDIEVAL LUCCA AND ITS COURT

1. INTRODUCTION AND QUESTIONS

As of the Lombard period, the city of Lucca played host to one of the most important courts in the Italian peninsula. It was the main seat of a political and territorial body which enjoyed considerable autonomy compared to the rest of the Italic realm, and it achieved a regional dimension: the duchy of Lucca, which later became the March of *Tuscia*. In the territory of Tuscany, which was often perceived differently from the rest of *Langobardia*, also owing to its geographical position – surrounded and protected by the Apennine ridge – there was exceptional continuity of public institutions (Wickham 1996; Ronzani 1998). Since the treaty of Verdun, and up until the clash between Henry IV and Gregory VII, the marquis was active and universally acknowledged in the region as a political authority. He structured the social fabric of the aristocracy, and governed political competition according to 'traditional' rules, liaising directly with the imperial power. In other words, at this time in *Tuscia*, justice was administered via the *placitum* in a 'doubly public' way: on the occasion of major assemblies held under the loggias, in leafy courtyards or inside the heated assembly-rooms of suburban palaces, especially Lucca's one, and also in fiscal estates. Indeed, these assemblies were chaired, in the name of the sovereign, the vicar of Christ, by his emissaries and representatives, who had *publica potestas*.

The power and the fortune of the marquises was founded on their ability to redistribute material and symbolic resources to the various different sectors of society, attracted into the orbit of the *palatium* (Tomei 2017). *Palatium* is a word with a complex semantic stratigraphy, indicating several things at once: the public institution; its visual image: the building that housed the authority, where its power was made manifest and exercised; by extension, the other fiscal residencies (*curtes*, *salae*) scattered in rural areas, also meeting-places for the administration of justice and the issuing of sovereign dispositions, and the people who made up the court and who held functions (*officia*) on behalf of the *publicum* (Brühl 1968, 1972, 1975). It is not easy to trace the ways in which the marquises, the most prominent landowners in the region, ensured the survival and smooth working of their institutional apparatus by redistributing land and positions (*honores*). Surviving written sources only marginally touch on these aspects, despite the fact that they are crucial for an understanding of the political and socio-economic structures of Early Medieval *Tuscia* (Collavini forthcoming).

It is also thanks to the decisive contribution of archaeological data that our knowledge has begun to increase in recent years regarding the composition, appearance, and forms of administration of fiscal estates. This new phase of consideration given to Tuscan fiscal estates is focusing particularly on the southernmost part of the region, which, despite its distance from Lucca, was closely and continuously controlled by the authorities established in the city of Lucca since Lombard times (Bianchi forthcoming). Indeed, in the Maremma there were fiscal estate complexes which were so extensive as to take the appearance of *exclaves* of Lucca: public areas of land marked by the presence of wide-ranging areas which were uncultivated, but productive (coastal tombolos and lagoons, wooded hills) with distinctive toponyms. In the Cornia and Pecora valleys alone, we find: Bagno del re, Gualdo del re, Acqua del re (*Teupascio*), Mulini del re (*Mulinareggi*), *Monteregio*. Accordingly, one could justifiably add to the label commonly given to Early Medieval Maremma, dubbing it a "land without cities", another, different label, a "land of the king" (Collavini 1998; Farinelli 2007; Bianchi 2015).

However, in this article I will set out to cite new elements for reflection on the physiognomy and functioning of what was the nerve centre of the fortunate public institutions of Tuscany: the *palatium* residence located in the western suburban area of the city of Lucca. To do this, I will make use of a wide range of sources: written and archaeological, sources from Lucca or coming from spatially distant contexts. Focusing on the *palatium* in the narrowest meaning of the term allows us to grasp its wider implications, indirectly, thanks to the same evidence sample. Therefore I shall try to address the iconography and the nature of the marquisal power, to reconstruct an exemplary image of court life, and the social and cultural mechanisms that regulated it, and to identify the common connections between men and places which existed within the public sphere, noting objects, techniques and models which acted within this network: from Lucca to the Maremma, and vice versa[1].

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[1] For a recent multidisciplinary survey of the subject, cf. *Le corti nell'alto medioevo* 2015.

2. *PALATIA* AS A CONCENTRATE OF THE HISTORY OF POWER

The majestic suburban palace was, as stated above, the symbolic site of public power in Lucca and in *Tuscia*. It was the political setting where the redistribution circuit governed by the marquises took place, and where *potestas* was publicly displayed: a command authority and a privileged socio-economic status. More generally, there is a clear connection between the sequence of palatial structures and the major breaks which can be seen in Lucca's political history (*fig.* 1). A fertile period of historiographical studies which flourished following the encounter between the school of Cinzio Violante and the works of Gerd Tellenbach and Carlrichard Brühl, between the end of the 1960s and the early 1980s, studied two aspects in parallel: the topographical and iconographical dimension of power (Belli Barsali 1973; Tirelli 1980), and the major political and institutional turning points (Keller 1973; Nobili 1981) in Lucca and in the March. The following historical parabola can, broadly, be derived from this.

The great suburban residence (called *curtis ducalis* or the *mansio* of Adalbert in the sources) is documented in the mid-9thc, in the same years as when the Adalberti managed to convert the title of count into an inherited title in Lucca. The fortune of their mansion closely follows the history of the power of the marquises, which, in the days of Adalbert II and his wife Bertha, began to take on princely features[2]. Indeed, the Marquis concentrated in his hands all the public prerogatives. The break-up of the Adalbertine principate in *Tuscia* brought this territory more firmly back within the frame of the kingdom and also entailed the appropriation by the Crown of the suburban *curtis* of the marquises, first with Hugh of Provence (*curtis domni Hugoni regis*) and later under Otto I (*palatium domini imperatoris*)[3]. In this phase, the ancient royal *curtis* within the city walls could be said to have been supplanted. It had lost all residential function, but still maintained its role as the city's main hub for commerce and artisans: it was the location of the mint, which Hugh had got up and running again, after a break of just over a century (Rovelli 2010), as well as of specialized manufacturing sites, markets and money-changers' stalls. We will return to this later on.

The *palatium*, a term adopted by the suburban mansion since Otto's reign, continued to be the residence of the marquises, the local representatives of imperial power. Around 1080 it was dismantled, when Countess Matilda was ousted and cast out from Lucca. This marked the end in *Tuscia*, an exceptionally long time after other parts of the kingdom, of a system of power which was still public and 'traditional'. The end of the age of the March coincided with the destruction of the palace which Henry IV, on the occasion of the diploma to the people of Lucca which marked the start of the new political era, promised not to rebuild either within the city walls or in suburban areas – as indeed happened (Ronzani 2012). By November 17 1086, the residence of Bishop Peter, whose appointment was an imperial one, to whom Henry IV had granted the *regalia*, located near the Cathedral of San Martino near the south-eastern corner of the city walls, had already risen to the status of a *palatium* (*palatium domni Petri episcopi*)[4]. The last time Countess Matilda went to Lucca, in June 1099, she camped outside and dispensed justice in the field known as the field of the marquis, where the public palace had stood, and never entered the city[5]. Therefore, throughout the 12thc, the only palace which remained in Lucca was the episcopal palace. Only with Henry VI's death made its appearance a palace of the Commune (*palatium Sancti Michaelis*), mentioned for the first time on November 13 1197. This was the seat of the highest bodies, the consuls and/or podestà, of an institution which was still highly experimental[6]. The new public building occupied a space full of meaning: it stood within the city's ancient Roman forum, not far from the church of S. Michele.

3. SOURCES FOR THE HISTORY OF THE MARQUIS' *PALATIUM*

3.1 Documentary sources: the *laubiae* as temple of a justice in light and shade

Following this brief review of the places of power which, one after the other, mark the different phases of Lucca's history, I now focus on the early medieval palace where the marquises lived in the city's 'golden phase', when Lucca was one of the most important political centres in the Italian kingdom. This period is illuminated by several kinds of sources. I will start with the parchments kept in the archives of Lucca, primarily the Archbishop's archive. This is, famously, an exceptional documentary resource, for its size and continuity, and for some time now it has attracted the interest of medieval scholars, not just from Italy itself (Pagano, Piatti 2010). Of the thousands of documents relating to the chronological period in question, the only ones that refer to the palace are the accounts of the *placitum* assemblies (*notitiae iudicati* and *brevia*): judicial acts that clearly show the lasting fortune of public institutions in Lucca and in *Tuscia*. This documentary sample comprises a small number of reports. This is no surprise: almost all the documents conserved are transactions involving the bishopric, not directly linked to the activity of the *palatium*. The number of sovereign diplomas issued to Tuscan recipients is very limited, with the exclusion of those for churches of the bishopric, and imperial abbeys: public concessions were generally mediated by the marquises, and were of an oral and precarious nature (Bougard 2013a; Collavini, Tomei 2017).

In the archives of Lucca and Pisa there are only slightly more than 10 *notitiae* and *brevia* referring to judicial sessions that took place in the ducal *curtis*, and later the imperial palace, between June 25 847 and July 1077. These sources constitute the first and last references to the public residential

[2] ASDL, AAL, *D*, * G 22 (ed. *Chartae Latinae Antiquiores*, v. 79, n. 21), † P 60 (ed. Manaresi 1955-1960, n. 127).

[3] ASDL, AAL, *D*, * H 71 (ed. Manaresi 1955-1960, nos. 141, 152).

[4] ASDL, ACL, *D*, E 29 (ed. Guidi, Parenti 1910-1939, n. 492).

[5] ASDL, AAL, *D*, * M 74; ASL, *D*, *S. Ponziano*, 1099 (ed. Goez, Goez 1998, nos. 51-52).

[6] ASL, *D*, *S. Giovanni*, 1197 novembre 13.

fig. 1 – Seats of power in Lucca during Early and High Middle Ages.

complex[7]. The *placitum* reports begin with a description of the scene where justice was publicly enacted: the place, the judicial bodies, and participants at the meeting. Historians have observed the *Gerichtsort* with great attention (Keller 1969; Heil 2016), because the choice of the forum, often determined by the identity of the presiding authorities and/or the parties themselves, could also reflect the relations of power in the *civitas*, constituting a good indication of political changes. In that respect, the members of the audience provide an excellent insight, allowing us to see eminent sectors of society in Lucca, and more widely in Tuscany, in action (Castagnetti 2017). However, these reports were not designed to offer a global description of the palace, and are only of relative use in reconstructing the form and structure of the residence of public representation. They give a sequence of partial snapshots which it is hard to reassemble in a coherent picture. The palace appears to have had a large room on the ground floor (*sala terrestile*), enlarged by a portico. It also had a large heated room (*caminata*), and a two storey loggias (*laubia longanea*) housing the chapel of S. Stefano *in Palatio*. The relationship, or possible correspondence, between these buildings is not clear. Finally, near S. Stefano there was the actual palatine chapel, S. Benedetto *in Palatio*, now known as the church of the Crocifisso dei Bianchi, opposite via della Rotonda, because of its peculiar curved shape.

Although the documentary traces are too fragmentary to put forward a proposed overall reconstruction which is anything other than impressionistic, the architectural spaces illuminated by the judicial documents as the public setting for meetings and the places where power was exercised, can be further interpreted thanks to the general model proposed by François Bougard. Early medieval public *palatia* in the Italic kingdom were usually composed of a two-storeyed hall with an apse, preceded by towers and embellished by one or more porticoes (*laubiae*). An eminent archetype is the *palatium* of Theoderic in Ravenna, as represented in the mosaic of S. Apollinare Nuovo. Its design was copied, in simplified form, by Charlemagne for Aachen (Bougard 1996). The aforementioned architectural features could be combined in various ways, giving rise to a common, distinctive language for this type of buildings. One characteristic feature was the tower, a manifestation visible from a distance, which had a defensive and a propaganda function. There were three solutions. As in Ravenna, the towers could give the facade a monumental appearance, and be placed symmetrically in association with the covered gallery endowed with a tympanum. Otherwise, they could be connected to the main hall, ensuring access to the floor above. Finally, they could stand

[7] ASDL, AAL, *D*, * G 22, † N 62, * H 99, * K 35 (ed. *Chartae Latinae Antiquiores*, v. 79, n. 21; v. 80, n. 26; v. 81, n. 20; v. 85, n. 21), * H 71, * O 24, † O 34, † O 72 (ed. Manaresi 1955-1960, nos. 141, 340, 376, 395, 406), ACB, *D*, Z 227 (ed. Volpini 1975, n. 39); ASDP, AAP, *D*, 171-172 (ed. Ghignoli 2006, nos. 174-175), ACP, *D*, 8 (ed. Volpini 1975, n. 10). For a useful review of the *placitum* reports for Tuscan recipients, see Bougard 2013b. Cf. also the *placitum* for the bishopric of Reggio (ed. Manaresi 1955-1960, n. 152).

fig. 2 – The illustration to Psalm 51 (*Quid gloriaris in malitia*) in the Utrecht Psalter.

alone, often near a chapel, housing on the first floor the room reserved for the political authority (Noyé 2012). Even more distinctive is the portico/loggia (*laubia*) delimited by rows of columns or wooden uprights. In light of its systematic use as a meeting-place in the *placitum* reports, this can justifiably be seen as a sort of 'temple of *iustitia*', where power was publicly made manifest, and was administered, at least since the Carolingian period (Bougard 1995, pp. 209-218). This space was open on at least one side, so as to ensure visibility of, and public knowledge of, collective events which could take place inside, or in the space immediately in front of it, and thus at all times of year. At times it played host to assemblies also in its most minimal and stylized version: the pergola of an orchard.

Laubiae begin to be attested as of the mid-9thc, during the reign of Lothair I, in *placitum* reports. Mentions increase significantly in number in the 10thc, and in the 11thc they are also mentioned as a place for the rogation of private charters. They are found in all the structures situated in the public sphere, that embodied the *palatium* itself, and where the highest authorities, having coercive *potestas*, resided. Some examples are the holy palace in Pavia, the palace at St Peter's in Rome, the ducal and comital *curtes*, and later also those of the bishop and those belonging to the great imperial abbeys, both in towns and in rural areas. One example is Bellano, a *curtis* of S. Ambrogio in Milan, on the bank of the lake of Lecco (July 905). A *laubia* could be associated with a large hall, or, in the case of the Archbishop of Piacenza's residence (Sep 30, 990), with a tower (Miller 2000, pp. 62-64). In general, it was two-storeyed, and acted as a link between several rooms, crossing a courtyard or garden with trees (*brolium*). Usually, palaces had more than one. Therefore further specification was made in the sources. Thus, mention is made of a *laubia maiore*, a *laubia rotunda*, or one of elongated shape like a gallery, as the *laubia longanea* of Lucca[8]. It is not known how common these structures were in the kingdom of Italy in the period prior to their appearance in the *placitum* reports in the days of Lothair I. The picture is heavily affected by the structure of the sources. To stay within the context of Lucca, as mentioned previously, there are no references to the ducal *curtis* earlier than the mid-9thc, when judicial records become more numerous and more detailed in indicating the sites where the assemblies took place. Also unknown is the date of construction of its loggias. The *longanea* is first mentioned in the time of King Hugh of Provence (March 25, 941)[9]. It is no coincidence that, given the fact that the preserved documents mainly spoke about the bishop's activity, the *laubia* located in the *brolium* near the walls of the mother church of S. Martino appears first (May 19, 902)[10].

Just a brief mention of the possible role of the *laubia* in the iconography of early medieval power, an issue which deserves further, specific analysis. Aware of the difficulty in identifying specific architectural features in illuminated manuscripts, and in artistic scenes in general, features which can be identified as loggias are to be found in many depictions in the Carolingian and Ottonian periods. These contribute to the construction of the typical image of the early medieval sovereign: seated on a throne, with the attributes of his authority, or in the act of passing judgment, surrounded by his aristocratic retinue, armed. Sometimes he is shown mirroring the image of Christ the Judge, seated and surrounded by his advisers. One emblematic example, packed with meaning, is the illustration which accompanies Psalm 51 (of David), which recalls the bad advice that Doeg the Edomite gave to King Saul, in the Utrecht Psalter (*Cod. Rhenotraiectinae I, 32*, fol. 30r). It was produced in Reims at the time of Archbishop Ebo or his successor Hincmar, in an environment familiar with the court and its hidden dangers: both were involved in court infighting which perturbed the final years of reign

[8] See the following sample of documents: Manaresi 1955-1960, nos. 67 (Milan), 99, 107 (Piacenza), 111 (Rome), 117 (Bellano, Lecco), 122 (Pavia), 125 (Verona), 141 (Lucca), 181, 212 (Piacenza). In addition to the loggia, the first-floor *solarium* can also be considered a feature of the topography of power in the Carolingian age, cf. Bianchi 2012; Hodges 2016.

[9] ASDL, AAL, *D*, * H 71 (ed. Manaresi 1955-1960, n. 141).

[10] ASDL, AAL, *D*, † N 54, * H 40 (ed. Manaresi 1955-1960, n. 116).

of Louis the Pious (Jaski 2016). Seated outside an elongated architectural structure with columns and a gable, and surrounded by his advisers, the King listens to the accusations that led to the killing of the priest Achimelech and his family, charged with having provided shelter for David. Both the advisers and the accuser are dressed and armed in accordance with the classic military garb of the early medieval aristocracy, with a brooch that would pin the cloak at the shoulder, and holding a spear. David, who would replace Saul as the new King, holds a razor, a metaphor for Doeg's sharp tongue, and addresses the celestial court, depicted as a mirror image of the earthly court (*fig.* 2).

Justice did not always reign in the loggia, despite the ideological setting and the moralizing rhetoric promoted by the great intellectuals of the Carolingian era, which set out to present the sovereign as Christ's deputy on earth, responsible for the *correctio* and the safety of his people. In a society with an increasingly hierarchical structure, and increasingly polarized between *pauperes* and *potentes*, the people who resided in the palace and assisted the authorities in assembly decisions often only considered their own interests, or those of their friends and clients, rather than the common good (Devroey 2006; De Jong 2009; Wickham 2009). If the Emperor wanted to remain on the throne and not follow the fate of Saul, but instead the fate of David, he had to listen to the right advisers (the Archbishop of Reims himself could be an example), acting in accordance with the teachings of the Holy Scripture. For that matter, the darker side of the *laubia*, as remembered in the English word lobby, casts a long shadow still today.

3.2 Archaeological sources: some preliminary facts

I shall now move on to the other material sources from Lucca – non-written sources – relating to the suburban public court. There is little available evidence. The scant archaeological information regarding the marquis' palace in Lucca reflects the state of research in Italy on the archaeology of the seats of power. As Ghislaine Noyé recently remarked, Italy still seems to be slightly behind in this field, compared to France and Germany, where for at least two decades now large-scale research projects have been started on palatial residences, both in urban and rural contexts (Renoux 2001; Ehlers 2002; Noyé 2012). This appears evident from the list of those attending the recently published Istanbul conference, dedicated to the issue of palaces using a comparative approach, and considering a long time period (Featherstone *et al.* 2015). The situation in Italy is marked, particularly, by primary attention given to urban contexts: in the last 15 years, this branch of studies has seen the contribution, in particular, of Andrea Augenti and Enrico Cirelli, dedicated to the *palatia* of Rome and Ravenna (Augenti 1996; Cirelli 2008).

In recent years, in Lucca, emergency excavations and preventive interventions carried out by Giulio Ciampoltrini and Elisabetta Abela in the south-western area of the city, between the early medieval walls and the modern-day outer wall, have brought some information to light. The areas explored are situated at the corner between Piazzale Verdi and Via San Paolino, opposite the Crocifisso dei Bianchi church, inside the former Manifattura Tabacchi, and in the area of the cloister of the monastery of S. Domenico. Here burials emerged which are possibly associated with a large cemetery area which developed between the 6th and 7thc, and early medieval structures, built using naturally-rounded stones and roughly-hewn blocks of stone, which can possibly be referred to the palace (Ciampoltrini 2011, pp. 54-55, fig. 52; Abela *et al.* 2015, pp. 77-78). Romano Silva had already noted that a capital bracket reused at the end of the 1500s in a building close to the church of Crocifisso dei Bianchi may have come from the *laubiae* of the marquis' residence. On the basis of its iconography and execution, this capital seems to date to the 8th-9thc (Seidel, Silva 2007, fig. 208). In the hope of being able in the future to have results from a more extensive excavation, these remains, still fragmentary and episodic, nevertheless confirm the importance of the complex, suggesting it may have been used in the Gothic and Lombard times as a ducal residence, and highlight its archaeological potential. For that matter, the dismantling of the palace structures around the year 1080 could be useful for dating purposes, 'freezing' the deposit.

3.3 *Antapodosis*: a boundless treasure

Accordingly, to increase our knowledge, it is necessary to look outside Lucca itself, seeking other evidence. There is a famous description of the Lucca's court in one of the 'masterpieces' of 10thc medieval Latin literature: the *Antapodosis* by Liutprand, Bishop of Cremona. The Bishop gives an exemplary picture of the palace, when narrating Louis III's passage through Lucca (*Antapodosis*: II, 38-39). The episode can be dated to around the year 900, when the sovereign, invited to the Kingdom of Italy by the Marquis of *Tuscia* Adalbert II and by his wife Bertha, of Carolingian descent, was travelling to Rome to receive the imperial crown. Liutprand's account, written about half a century after the event took place, emphasizes the Marquis' honour (*dignitas*) and wealth, and the magnificent splendour of his residence (*domus*) in Lucca, crowded with richly armed aristocrats (*milites elegantes*). According to Liutprand, so great was the power of Adalbert II that he alone, among all the princes, was dubbed *Dives* (*Antapodosis*: I, 40). The court's proverbial opulence would later prompt the envy of the future emperor, condensed in the words «… this man (Adalbert) should be called King, not Marquis; there is nothing in which he is inferior to me, excepting his title alone» (*Antapodosis*: II, 39). Notoriously, walls have ears in any palace. These words, although spoken softly, apparently reached the ears of the cunning Bertha, leading to a breach of the alliance (*fidelitas*) between Adalbert and Louis. Thus, the Bishop uses two commonplaces to explain the break-up of the political axis that supported the sovereign, and his subsequent fall.

In order to fully understand this account, it is useful to refer to the study of political and social lexicography by Germana Gandino regarding the whole of Liutprand's work. Adalbert quintessentially embodies the concepts of *potens* and *dives.* In Liutprand, the former term always has the status of an attribute, and is never a noun. It is an adjective describing a quality that secular officials had when holding public office, and is used for people of the recent past, such as the Marquis; among contemporary figures, it only suited

Emperor Otto I, Liutprand's patron. Adalbert's *praepotentia* was manifested visually in the extraordinary splendour of his residence, in the presence of a large armed retinue which was expensively maintained (in line with Gandino, I believe that this is the right nuance for the expression *milites elegantes*), in the observance of an excessive lifestyle, which was more than suited to his actual public position. Power could be measured externally by noting clothing, armour and precious ornaments, instruments of social distinction and also of personal identification, which were the means of ostentatious display and gifts in the palace[11]. In their elegant residences, the great aristocrats who were players in the public sphere, in line with the court *habitus*, gave hospitality and handed out gifts to *amici* and *milites*. Indeed, in what is an important problem, wealth had to be possessed with generosity, and socialized (Gandino 1995, pp. 81-89). To return to Liutprand's narration, Louis' envy and concern was aroused not so much by the quality of the things that he saw in Lucca, which were fitting for a *princeps* of the kingdom, but their quantity, regarded as excessive.

This is the only mention of Lucca in the *Antapodosis*. The city and its palace appear in this passage in the form of metonymy. After taking power in Pavia and visiting the whole of Italy (in other words the northern part of the kingdom), Louis decides that he also wants to see *Tuscia*. Travelling to Adalbert's suburban residence means visiting the region (*Antapodosis*: II, 38). In this work, *Tuscia* is often called a *provincia*: in other words it is a district perceived as 'other' than the kingdom, with its own peculiar physiognomy (Gandino 1995, pp. 252-253). As the seat of the comital office of the first members of Adalbert's dynasty, heirs of the Lombard ducal tradition, Lucca is the heart of this political and territorial body. Lucca's centrality also emerges from the episode analysed above: for Liutprand, the palace of Lucca is *Tuscia*. However, this bold statement somehow conflicts with the traditional interpretation given to another passage in the same work (*Antapodosis*: III, 16). The narration of the advent in Italy of another Provençal prince, Hugh, during the year 926, runs as follows: Hugh, count of Arles, swiftly crosses the Tyrrhenian with divine help, which causes favourable winds to blow. He disembarks at Alfea, «hoc est Pisam, quae est Tusciae prouinciae caput». This identity is immediately underlined by Liutprand with a direct quote from Virgil: «Alpheae ab origine Pisae» (*Aeneid*: X, 179).

Almost without exception, historiography has translated the term *caput* as main city, often in such a way as to underscore the emerging role of the city of Pisa in the 10thc, thanks to its maritime status. This is in line with the triumphalist, eulogizing tone of 12thc Pisan narrative sources, and in order to underline the beginnings of its antagonistic dynamic with regard to Lucca, the former 'capital' of the March which, in the Tuscan medieval grand narrative, would later be joined and eventually overtaken by Pisa and Florence (Salvatori 2002, p. 25; Savigni 2005, p. 689). According to Andrea Puglia, the expression was designed, for example, to ennoble the city, an important Mediterranean harbour, because it was the location preferred by the future sovereign for his arrival, and for meeting the magnates of the realm. This allegedly took place in opposition to Lucca, more closely controlled by Marquis Guy (Puglia 2002, pp. 684-685). However, there is no reason to doubt either the Marquis' full control over Pisa, the main Tuscan port, or, in that juncture, the Marquis' full support for Hugh, his half-brother (Chiesa 2015, p. 472).

Liutprand is not contradicting himself here. The inconsistency in the two passages of the *Antapodosis* is, in my opinion, only apparent. Indeed, the difficulties are resolved if, on the one hand, one notes the account of Hugh's arrival by sea in light of the literary model that explicitly inspired it, and, on the other hand, if we reflect on the many possible meanings of the versatile word *caput*. In a side note to a study on a different issue, Reginald Grégoire justified the expression by reference to Pisa's antiquity, and the reference to Virgil (Grégoire 1990, p. 2). Although Liutprand uses the term a short time earlier for Pavia, in the sense of the main city in the kingdom (*Antapodosis*: III, 8), here it most likely stands for starting point, the point of origin in the geographical sense (the sea is the privileged means of accessing the region), and, even more so, in the genealogical sense. This is the meaning given to it in the lines of the *Aeneid* dedicated to the god of the river Tiber (*Aeneid*: VIII, 65), and, above all, in those dedicated to Mantua, Virgil's birthplace founded by Ocnus, of Etruscan-Theban blood (*Aeneid*: X, 203). This same passage is found next to the lines regarding Alfea, in a list of the glorious cities which were the origins of Aeneas' allies in the final fight against Turnus. Liutprand's tale dwells on the mythical genesis of Pisa, and on its epic age, of Virgilian memory[12]. It does not aim to point up any supposed political supremacy in *Tuscia*, but rather to mark the illustrious past of the place from which Hugh (at whose court the writer himself had served in his youth) began his Italian adventure (Giovini 1997, pp. 108-118).

3.4 *Ruodlieb*: the daydream of every court knight

We get an unprecedented insight into court life in Lucca and its exemplary status in the 'European' panorama, if we turn our gaze even further away, beyond the Alps. The *Ruodlieb* is a poem composed in the full 11thc in Leonine hexameters, taking its name from the hero in the story that is narrated. This fragmentary work was rediscovered at the beginning of the 1800s on parchment, used as part of the bindings of codices at the imperial abbey of Tegernsee, specifically the *Cod. Lat. Monacensis 1946*. The latter also contains interesting riddles and epigrams. The text was probably produced in the same Bavarian monastery, refounded by Otto II and firmly inserted in the *palatium* orbit. Regarded as the first novel in verse in medieval Europe, it has often been seen as the precursor of courtly-chivalric narrative. However, there are grounds for believing that the *Ruodlieb* does not describe the dawn of a new age, but rather the decline of the Early Medieval, 'public' period. In the words of Chris Wickham: the extinction of "the inheritance of Rome" (Wickham 2009).

[11] *Antapodosis*: I, 23, II, 62, IV, 12. Cf. *Walthariu*s: 308-311, 555-558, 1269-1272.

[12] Regarding the legendary origins of the city of Pisa and its ancient legacy cf. Campopiano 2005; Meo 2014.

I will set out from certain observations already made, in 2003, by its editor, Roberto Gamberini. Although in his subtitle the scholar describes Ruodlieb as the "first courtly hero", he notes in the introduction to the volume that the poem is an isolated phenomenon: there is no continuity, but a clear breaking point with the following tradition (Gamberini 2003). Following Dennis Kratz, amongst others, it is perhaps more useful to seek parallels with epic poems from the previous two centuries, especially the *Waltharius*, the context of production of which was recently the subject of an in-depth study by Anne-Marie Turcan-Verkerk, and the *Gesta Ottonis imperatoris* by Roswitha, the canoness at the imperial abbey of Gandersheim (Kratz 1977, 1987; Turcan-Verkerk 2016). Moreover, there are substantial thematic differences compared to the courtly-chivalric romance (Gamberini 2003). With a typical expedient from heroic poetry, the skilled mixture of idealism and realism, the author wants to place the legendary feats of the protagonist against a realistic backdrop, in order to give to the tale the force of an *exemplum*. The world described by the *Ruodlieb* is fairly different from that described by the romances of the chivalric cycle. The eponymous protagonist does not primarily devote himself to war, but is depicted rather as an operator of peace on behalf of the King with whom he collaborates, whose values he shares, and whose models he reproduces. Ruodlieb and his King, explicitly called the vicar of Christ (*Ruodlieb*: IV, 154), follow the same ethics, marked by hospitality, generosity and clemency, honour and loyalty, with the aim of bringing harmony and peace. In accordance with the s*peculum principis* offered by the good Christian King, the knight can thus accomplish his destiny and crown an existential trajectory, all inscribed within the public setting, becoming King himself in turn. The poem presents a harmonious image of society. At the top there is the King; the Church stands alongside him, and constitutes almost an 'apparatus of the state'; the groups marked with social distinction, including the lesser rural élite, reproduce on a small scale a royal court. Within the narration, great attention is given not so much to battle scenes, but rather to solemn ceremonial events: arrivals and departures, awakenings and dressings, banquets and assemblies. Much space is also reserved for forms of gift-giving, as an instrument of social and political connection based on the principle of reciprocity, in the three different phases of Mauss' circuit: giving, receiving, and reciprocating. More generally, life is measured out in public moments: assemblies and convivial events. In these passages, embellished by detailed descriptions of objects given and displayed, the author shows direct knowledge of court rituals.

In the last two decades of the last century, Karl Leyser and Timothy Reuter made great use of the poem, regarding it as a crucial source for understanding society and its representational models in the 10th and 11thc (Leyser 1982; Reuter 1991, pp. 221-229). More recently, other medieval scholars, all writing in German, have made use of the *Ruodlieb* (Weinfurter 1991, p. 85; Althoff 1997a, p. 144; Id. 1997b, p. 293; Id. 2003, p. 106; Wolfram 2000). What emerges is a consistent picture that can be summarized as follows. Produced within the palace circle by an individual who had a good knowledge of the *Spielregeln* of the imperial court, the text would offer an insight into the aristocratic lifestyle and mentality in the days of the Ottonians and the first two members of the Salian dynasty, showing on the one hand the ideological context that ensured that imperial power had consensus and legitimacy, and, on the other hand, the concerns and daydreams of the *milites*. The source can be used retrospectively, rather than projecting it forward towards the Central Middle Ages. There are no few similarities between episodes narrated in the *Ruodlieb* and famous events in Ottonian political history, handed down in other accounts. Central features are the ideal of peace and the urging for moderation in the exercising of *potestas*, principles very dear to Henry III's entourage. Beneath the rhetorical court veneer, there is a palpable effort on the part of the sovereign to bring harmony to a society which was increasingly violent and unruly, marked by the insolence of the great, who fought amongst themselves for power. Just a few brief mentions of the main features of the aristocratic profile that have emerged from studies on the *Ruodlieb*: the poem attaches great importance to habitus, rather than to ancestry. One can be a member of the *nobiles* by birth, but more importantly this status is to be shown every day: through honourable conduct, service at court, magnificence and munificence. As for family institutions, scholars have underlined the fragility of mechanisms for hereditary transmission, these being the object of political negotiation, and the primary role of women in their role as wives and mothers.

The use of this source, as stated above, has been largely confined, as well as to philological studies and histories of middle Latin literature, to German scholarship or studies of the German kingdom. The court at which Ruodlieb found his fortune, located in a fabulous utopian Africa (*Ruodlieb*: XIII, 42, 47; XVI, 5), the medieval "land of gold" par excellence (Insoll 2003), constitutes, however, an idealized type which *Tuscia*, with its peculiar characteristics, can be identified with more closely than other places. At the time when the *Ruodlieb* was composed, the March, ruled by the Canossa-Lorena family, stood out as a region where there was indeed an authority which still governed effectively according to 'traditional' and public forms. Indeed, it was positioned within the same, broader political and institutional context as Tegernsee Abbey: the empire. The rift between Countess Beatrice, the mother of Matilda, and Henry III, which was never really healed, took place in the 1050s (Ronzani 2012). It was not just a case of vague similes. The general model presented in the poem of a political and social institution based around a splendid court which functioned perfectly has, in two passages, specific points of contact with Lucca and the March of *Tuscia*. In one instance, the reference is explicit.

The protagonist, Ruodlieb, is a knight (*miles*), who is *nobilis* by birth and by habit. He places himself at the service of other, more powerful notables (*domini*) in order to obtain *beneficia* and *honores* (power and prestige). Initially, he gives help in warring feuds, and in hunting, and gives advice in political affairs. Not having received from his patrons what he would have been worthy of, and since he had attracted many enemies owing to his service, he is forced to leave his home (*domus*), giving it up to his mother's care, in the hope of finding someone powerful elsewhere to serve, and someone

more generous. Once in a foreign land, he becomes a travelling companion and friend to the royal huntsman. Thanks to this companion, he is able to introduce himself at the court of the King of the Africans. The King accepts his gifts, and welcomes him into his entourage, which he remunerates boundlessly (*Ruodlieb*: I). I note, incidentally, that his relationship with the huntsman and the King are based on reciprocity, symbolized by handshakes, exchanging kisses and/or gifts, and not coloured by purely feudal-vassal overtones. Rather, the author draws on the lexicon of friendship, of *societas*, and patronage.

Thus, Ruodlieb finds at court the 'Eldorado' of every *miles elegans*: he manages to gain the favour of the King, who is generous and just, distinguishing himself and serving him faithfully first as a fisherman and huntsman, and later as a commander and ambassador (*Ruodlieb*: II-IV). After ten years of honourable service, he decides to return home, at the request of his former *domini* and his mother. When the time comes to bid farewell, the King of the Africans dispenses advice and gives the knight precious gifts – in accordance with the etymological meaning of the Italian and Spanish term "regalo" – which are minutely described (*Ruodlieb*: V, 308-391). This list, one of the passages in which the author shows off his experience of courtly circles, has allowed scholars to circumscribe the date of the poem. Hidden within silver recipients, Ruodlieb receives Byzantine coins, identifiable as those struck by Emperor Romanos III (1028-1034), whose daughter was betrothed to Henry III, brooches and jewels of specific appearance. Both these items – in the case of the brooches we can say there is a close analogy, rather than an exact correspondence – have been found in the Mainz Treasure of Empress Gisela (1027-1043), mother of Henry III (Gamberini 2003). Thanks to archaeological and documentary sources, these objects can be traced in the same decades in Lucca and *Tuscia*.

In the Colline Metallifere Grossetane, excavation of the church of S. Nicolò in Montieri, probably built on fiscal land in the first 40 years of the 11thc, yielded an extraordinary object, recently studied by John Mitchell. This is a large and sumptuous, disc-shaped, gold brooch. It has filigree decoration and is adorned by a garnet, amethysts, and opaque glass beads. It was placed in a cavity cut by the stratum where the building's foundations were later created. The building itself has a highly original six-apse design. The Montieri brooch is an object of valuable workmanship, commissioned by persons of high social status, and it has numerous parallels in iconographic sources. Brooches of this sort are associated with the highest spheres of power, both secular and ecclesiastical, in Germany and Italy in the late Ottonian and Salian period. They are found in many representations of both men and women. In the case of men, the brooches pinned the cloak at the right shoulder, while in the case of female figures the brooch was used below the chin, to cover the chest. However, there are few surviving examples comparable to the Montieri brooch in terms of size and quality. The first parallel is the great brooch from the Mainz treasure, a piece of jewellery made for the imperial court in the first few decades of the 11thc (Bianchi *et al.* 2014).

From this date onwards, and for around a century and a half, brooches and other gold and silver objects (containers and goblets, seal moulds, jewellery), weapons and items of clothing, appear in large numbers also in private documents, mainly in the areas of Lucca and Pisa. In many cases they represented a compulsory counter-gift (*launegild*). In Lombard law, an object of value, used to strengthen the legal force of donation acts, since every transaction had to feature some aspect of reciprocity. Chris Wickham has recently returned to this. In the very first years of the 11thc, quite suddenly these objects (*species*) enjoy excellent visibility in documents, since they are used as a means of remuneration (*meritum*) also for sale transactions, as well as for charters of gift, promise, refutation and investiture. This aspect was studied some decades ago by David Herlihy and Gabriella Garzella, with differing results, and deserves to be taken further, in view of the vast spread of the phenomenon (Herlihy 1957, 1973; Garzella 1979; Wickham 2010). In Lucca, for example, nearly 90% of sales during the 11thc saw the use of *species* instead of money – the first mention is on March 8, 1002[13]. Here I will only make a few preliminary observations, in light of the parallel with the *Ruodlieb*, and the archaeological findings from the church of S. Nicolò.

The use of gold and silver artifacts in transactions, to seal socio-political and economic relations, harks back to court procedures which are modelled in the poem. These are clear correspondences between the objects donated to the knight by the King of the Africans and those which appear in Lucca as forms of remuneration in charters: particularly brooches (*nuscae*) and gold bezants. Bezants are documented, moreover, as a *meritum* in a judicial act by Countess Matilda, drafted at the *curtis* of Pappiana on June 21, 1077[14]. In the course of the 11thc, these objects were circulated widely in *Tuscia*, but they were especially concentrated at the palace: at the marquisal *curtes*, both urban and rural, they were redistributed and displayed. The Montieri brooch itself conveys blatant ostentation of status and power in a public context. Its interment constituted an important moment in the ritual of the building of the church, built on fiscal soil, probably in what was a joint operation involving the marquis and the Bishop of Volterra, Gunfrid, who was close to the imperial court (Collavini, Paganelli, Tomei forthcoming). The brooch may have sealed, as *launegild*, the act of endowment, legitimizing a relationship which touched upon the otherworldly sphere. Although details of the ritual of the delivery and deposition of the jewel escape us, it is clear that we are looking at an *Inszenierung* which betrays surviving older customs. In the case of the church of S. Nicolò, the offering of a valuable object, of great social and economic value, and the surrender of it, constitutes the link point between two consecutive ways of publicly expressing eminence in relation to the afterlife: burial with grave goods being replaced during the first part of the 8thc in the Lombard kingdom, by the

[13] In the timespan ranging from 1000 to 1096, out of 269 sales no fewer than 241 have a *meritum* (the figure is above 89%). If we narrow our view to the last three quarters of the century, the percentage rises to above 92% (225 out of 244 charters). This figure is rounded down: the figures to not take into account two sales of uncertain date, although they can probably be dated to the 11thc.

[14] ASDL, AAL, *D*, † C 15 (ed. Goez, Goez 1998, n. 22). Regarding the use of golden *nuscae*, see for example ASDL, ACL, *D*, E 42, E 52 (ed. Guidi, Parenti 1910-1939, nos. 80, 97); ASL, *D*, *S. Ponziano*, 1012 dicembre 21 (ed. Degli Azzi Vitelleschi 1903-1911, n. 35).

foundation and endowment, *pro anima*, of ecclesiastical and monastic institutions (Innes 2000; Bougard, La Rocca, Le Jan 2005; Collavini 2007).

We now return to the story narrated by the poem. Laden with gifts, Ruodlieb sets off on his journey, bidding farewell to his friend the huntsman. After the death of a new red-haired fellow traveller, who rode with him, systematically contravening all the King's advice, Ruodlieb by chance meets his nephew, with whom he continues his journey (*Ruodlieb*: VI-IX). The two knights are then given hospitality in the residence of a *domina*, where they display refined clothing (*Ruodlieb*: X, 113-122). This is one of the frequent descriptions of clothing, instruments, and accessories in the work, added to give a touch of realism to the epic tale. Ruodlieb's legs, one reads, are bound in bandages from Lucca («ligaminibus de Lukka»), and he wears small silk shoes («calceolos sericatos») laced with silken strings («corrigiis … sericosis»).

The poem thus makes explicit mention of an article that was so famous and widespread among knights of the empire to be, in the full 11thc, a 'typical product' of Lucca, well suited to a *miles elegans* who has served at the perfect court of the King of the Africans. Indeed, silk-weaving skills were maintained in Lucca, exceptionally, for the post-Roman West. Lucca's production, unable to compete with silk from the East, focused on bands twisted around the legs (*guindangassia*), a characteristic item of aristocratic clothing in the West. It therefore filled a 'gap in the market' (Tomei forthcoming). In this case, too, the comparison with other documentary sources is fruitful. Silk bands from Lucca are known from accounts thanks to which it has been possible to circumscribe their context of production and circulation. These *guindangassia* are mentioned in early 8thc Rome papyruses copied by Cardinal Deusdedit in his *Collectio Canonum* (last quarter of 11thc), and in 9thc charters from Lucca, as accessories for garments made from silk interwoven with mohair, always with reference to the monastery of S. Pietro *in Cortina*, also called *Bellerifonsi*[15]. Together with S. Maria *in Palatio*, this was one of the ecclesiastical buildings that surrounded, like a crown, the royal *curtis* within the city walls. Replaced at the turn of the 10thc as the public residence by the suburban palace, as mentioned earlier, it remained the artisanal, productive and commercial centre of Early Medieval Lucca. The mint stood here, and we find the toponym *Fisila* (from *pisele*, or textile factory), and craftsmen are mentioned who were specialized in the production of weapons. There were also places where it was possible to buy or exchange objects as well as getting coins (*stationes*, *mercata et banchae*)[16]. Places where precious clothing was produced, often made even more precious by gold and silver thread, and where ornate metal objects were made, also richly decorated, were often associated with places of public power where aristocratic demand was concentrated. These were luxury goods in many cases conveyed through gift mechanisms, used as a means of remuneration at various levels of society, according to practices which were well established at court[17].

The *Ruodlieb,* in conclusion, mirrors, by means of an exemplary *speculum*, some of the dynamics of the workings of the palace at Lucca, and transmits, just like the *Antapodosis*, its proverbial wealth. The poem clearly reveals the redistribution circuit of movable goods, thanks to which it was possible to publicly display a social status of distinction. These were just some of the resources which it was possible to have access to by gravitating in the public orbit. Luxury articles produced and/or donated at imperial courts, both urban and rural, under the loggias which played host to banquets and justice assemblies, often sealed estate transactions whereby relations of a political nature were entered into[18]. The main source of wealth was land, which the marquis, the main representative of the *publicum* in the region, had in very large amounts. The most important system of circulation of resources must, accordingly, have involved the extensive fiscal estates, having castles, towers and other structures of coordination and transformation; in *Tuscia*, however, these were granted in the form of favours (*beneficia*), which, in themselves, were precarious and could be revoked. These left only fleeting traces in documents (Collavini forthcoming). Other things which were circulated existed on the back of these assets, and intersected with them. For that matter, gold, silver and silk could arrive in Lucca also thanks to the series of vast fiscal *curtes* located along the Maremma coast, that included lagoons with landing points. Furthermore, there is a good likelihood that these also served the purposes of the extraction, processing, and supply of local raw materials belonging to the public sphere: first and foremost salt and iron (Bianchi forthcoming). It was in the same decades as when the poem was written that the public world in *Tuscia* began to decline. Accordingly, the connective tissue which, for centuries, had held together the various components of the *palatium* started to come apart. This was the network on which objects such as the Montieri brooch, and characters like Ruodlieb, had moved: elegant knights in silken raiment who, by serving the public authorities, nurtured the ambition of raising their social status.

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[15] ASDL, AAL, *D*, †† O 1, †† F 21 (ed. *Chartae Latinae Antiquiores*, v. 79, n. 5; v. 82, n. 40), †† N 65 (ed. Tomei 2012, p. 601); Wolf von Glanvell 1905, pp. 353-354.

[16] ASDL, AAL, *D*, * F 16, †† S 24 (ed. *Chartae Latinae Antiquiores*, v. 86, nos. 8-9), †† N 65 (ed. Tomei 2012, p. 590); Wolf von Glanvell 1905, pp. 353-354; Martin 2015, v. 3, n. 449.

[17] For an interesting parallel see the workshops of the great abbey of S. Vincenzo al Volturno, definitely situated in the public sphere, which produced objects of prestige for its aristocratic clientele, cf. Hodges 2012, pp. 437-453.

[18] For an evocative image of a banquet at the king's court, featuring sumptuous furnishings, see *Waltharius*: 287-323. The scene takes place in a hall decorated with tapestries and in the nearby porticoes. In the story, this is where the political betrayal takes place by the hero of his sovereign. The literary model is, once again, Virgil, cf. *Aeneid*: I, 637-642, 697-708.

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Abstract

The aim of this article is to try to build an historical framework by which to contextualise the new data offered by the nEU-Med project. The areas investigated during the Early Middle Ages were characterized by a close integration into the public sphere, coordinated in Tuscany by the dukes/marquises of Lucca. The public institutions had a very long and exceptional fortune in Tuscany. The political, economic and social life still in the late eleventh century was structured by the court and by the circuits of redistribution of the material and symbolic resources moved by the marquis. Thus, my intent is to shed some light on the features of the nerve centre of Tuscan public institutions, the palace in the western suburb of Lucca, on the mechanisms that regulate the functioning of court life, and on the wide network that connected men, things, places and models gravitating in the Tuscan public orbit. To do this, I will use sources of difference nature and origin: archaeological evidences, parchments and two renowned literary works produced outside Lucca, namely *Antapodosis* and *Ruodlieb*.

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METALS AND COINAGE IN MEDIEVAL TUSCANY: THE COLLINE METALLIFERE

1. INTRODUCTION

The aim of this article is to illustrate a number of questions underpinning one of the main pillars of our project, namely the sector involving metallurgical analyses applied to coins. As is well known, in the last few decades the development of physical and chemical analyses has produced notable results[1], in some cases challenging many accepted views over facts which could be regarded as given, and even self-evident[2]. Indeed, our present case could be one of these.

It is worth noting that, thanks to the nEU-Med project, it has been possible, also in the case of Medieval Italy, to get a programme of analyses under way that is sufficiently detailed to start to formulate hypotheses as to the provenance of metals used for coinage or which could potentially be used for coinage. These different expressions have been used to refer to a problem which is always present when these issues are addressed, namely the recycling of metal reserves accumulated over time in different forms. In this connection, and especially for Medieval Tuscany, the work of David Herlihy and Cinzio Violante was pioneering (Herlihy 1957; Violante 1986).

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[1] We would like to especially thank dott. Mario Iozzo and dott. Fiorenzo Catalli who made available some examples from the National Archaeological Museum in Florence, and our colleagues Stefano Campana, Federico Cantini and Marco Valenti who directed the investigations which provided many of the specimens contained in our sample. Our gratitude also goes to dott.ssa Cristina Felici for assistance during the analyses of the coins held at the Museum of San Giovanni d'Asso (Pava) and dott.ssa Beatrice Fatighenti for the analyses conducted at the Museum of San Genesio (S. Miniato di Pisa). Ever since the publication of the volume *Methods of Chemical and Metallurgical Investigation of Ancient Coinage* (Hall, Metcalf 1972) and the series on *Metallurgy in Numismatics* (Metcalf, Oddy 1980; Oddy 1988; Archibald, Cowell 1993; Oddy, Cowell 1998), attention to these subjects has continued to increase, in line with refinements in investigative methods, cf. Ponting 2012 and the bibliographical overviews by Cowell 1986; Gilmore 1986; Oddy 1986a; Oddy 1986b; Stos-Gale 1986; Helly 1991; Barrandon, Guerra 1997; Cowell 2003; Blet-Lemarquand, Ponting 2009; Blet-Lemarquand, Nieto-Pelletier 2015.

[2] On the role of silver from Melle in supplying the mints of Aquitaine, cf. Barrandon, Dumas 1990: the Melle silver seems to have only supplied some mints in Aquitaine and, moreover, it does not seem to reach the mints of other Frankish regions.

This part of the project is also aimed at resuming a discussion launched years ago in the framework of international research conducted with numerous friends and colleagues, some of whom have been as good as to be present at our seminar, which focussed upon the identification of silver sources in Carolingian Europe (Sarah *et al.* 2008). It is our hope, and in pursuance of that experience, to answer some of the remaining unresolved questions regarding Italian mints (Rovelli 2004, 2009a; Bianchi, Rovelli 2017).

Thus, in the future, we hope to look again at the Carolingian era and to extend the research to the whole period covered by the project (7th-12thc). However, at present, we will focus attention on the initial results relating to a sample of *denari* datable to the 10th-11thc, minted at Pavia and Lucca. In particular, the analyses have focused on some examples issued under Hugh and Lothair II (2 examples), Otto (I-III), the so-called *ottolini* (12 examples), Hugh, Marquis of Tuscany (1 example), and Conrad II of Franconia (5 examples).

Various different reasons justify this initial choice. First, it allowed us to have a relatively large number of specimens thanks to local archaeological finds and a small batch of *ottolini* from museum collections. In our sample – and unlike, as we shall see, the picture suggested by archaeological finds (Saccocci 2001-2002) – the Lucca mint is the most represented. Accordingly, our sample seemed useful for starting to identify the initial phases of the influx of silver from the Colline Metallifere to local mints. Furthermore, the concomitant presence of Pavian denari offered an opportunity to check whether the different royal mints used different sources of supply.

Moreover, recent studies have proposed a new, convincing chronology of the *ottolini* which, unlike the subsequent series issued in the name of Henry, are thus easily datable (Saccocci 2001-2002; *MEC*, 12, pp. 38-42). It will be interesting, as the research continues, to be able to observe the evolution of their intrinsic content, and possibly help to specify the phases of the issues in the name of Henry by the Lucca mint. Indeed, up until today, tentative classifications of these issues, which have an immobilized type with the monogramme of Henry, have mainly been based on a stylistic analysis and a study of the different expressions used in notarial documents to describe the *denari* requested in payments: *lucenses veteres, boni de argentum, rugi, de rigo* … (Matzke 1993).

Finally, and this is the fact which convinced us that it was advisable to focus our attention on Ottonian coin issues, and

on those immediately before and after, one has to remember that a sort of monetary reform, geared towards standardizing the coin issues of the royal mints, has been attributed to the Ottonian dynasty (most probably Otto I)[3]. The salient features of this monetary reform, which is part of a general administrative reorganisation of the kingdom, are known thanks to the so-called *Honorantie civitatis Papie* and, in particular, to the *Instituta regalia et ministeria camere regum Longobardorum*. Although the surviving text is datable to the 11th c, it is thought that the first draft of the *Honorantie* dates to the start of the Ottonian era (Brühl, Violante 1983, pp. 80-84; Travaini 1989, pp. 223-232; Matzke 1993, pp. 138-143; *MEC*, 12, pp. 30-31).

The provisions which interest us describe the tasks of the nine *magistri* of the Pavia mint, and of the four in Milan, which had to make sure that the *denari* coined at the two imperial mints had the same intrinsic content, equal to 10/12 (*de pondere et argento de duodecim in decem*), in other words around 833/1000. This figure, which seems to be confirmed by destructive analyses carried out in the 19th c (Cipolla 1975, p. 18), but not by tests carried out on some *ottolini* in the Le Puy (Lafaurie 1952) and Fécamp (Dumas 1991, pp. 604-607) hoards, will be the point of departure for the elementary analyses which we intend to conduct. Neither the Lucca mint nor the Verona mint – the latter, moreover, being part of the Duchy of Bavaria, and thus in the *Regnum teutonicum* (Matzke 1993, p. 138) – are mentioned in the *Honorantie*, but the instructions addressed to the *magistri* of Pavia and Milan seem to have been received by both, since both, after all, were royal mints. On the basis of some tests (in turn destructive, and conducted in the 19th c), the *denari* struck by these two mints also seem to have a fineness that is consistent with the text of the *Honorantie* (around 833/1000) (Travaini 1989, p. 228 and note 12). By contrast, the intrinsic value of the *denari* in the name of Otto III struck in Venice (Saccocci 2009, pp. 141-142 and notes 21-23, SEM/EDS analyses) seems considerably lower. In all cases, these examples are yet to be included in a larger sample.

Meanwhile, a fact that seems beyond question is the large increase in the volume of coin issues which took place in the Ottonian period. Indeed, the *ottolini* represent a marked change compared to the previous Carolingian issues, and constitute the first coin series of the *Regnum italicum* which enjoyed a highly inter-regional circulation (Rovelli 2010; Saccocci 2013). The problem of metal supply is thus of central importance.

In this connection, Michael Matzke has recently drawn attention to an aspect which is only seemingly obvious, namely that a regular and abundant monetary production cannot exist without an equally regular and intense mining activity, despite the possible contribution of recycled metal (Matzke 2011a, p. 271). This follows the theme of the magisterial book by Peter Spufford which first analysed, on a European scale, the multiple ramifications of that long and winding Ariadne's thread which linked the developments of the medieval economy to the parallel successes of mining activity (Spufford 1988, pp. 74-105). Hence the interest in quantifying mining capacity, in following the path of silver from the moment of its extraction, and, as mentioned, in assessing the role and size of the pre-existing metal stock, namely that heterogeneous assemblage, composed of old or foreign coins, as well as silver objects – often fragmentary – which late medieval sources call *bolzone, bolsone* or *bolsonalia* (Finetti 1987, pp. 14-16 and note 2; Baldasarri 2010, p. 69).

A corollary to these issues are the problems raised by the need to assess the role of local powers in controlling the production and trade in metals, and, above all, the ability of the public administration to manage mineral resources, and thus, ultimately, to supply the mints[4]. It is needless to dwell on the economic interest which derived from the control of silver production, and on its political significance, considering the repercussions which control of this resource had on one of the most significant prerogatives of the public authority: namely the production of coins (Matzke 2011b).

Let us reflect, then, above all on the problems rooted in the numismatic data by the gaps or by the sharp increases visible in museum collections and archaeological finds. Several studies have recently analysed the activity of mints and coin circulation in the period in question. So it is sufficient to go back over the facts which are useful for illustrating the assumptions and the initial results of the research under way (Degasperi 2003; Rovelli 2010; Saccocci 2013).

Numerous factors make Tuscany not only a privileged point for viewing the development of mining, but also a paradigmatic example of the rate of development of Italian medieval coinage. Indeed, Lucca had a leading role amongst the mints of Lombard Italy (*MEC*, 1, pp. 55-73; Pardi 2003; Arslan 2011), equal, if not greater, to that of Pavia, the capital of the kingdom (Rovelli 2015, p. 489). It was also one of the few mints that remained active in the Carolingian period, although, it would seem, only intermittently (Travaini 1989, p. 226; Matzke 1993, p. 138; Rovelli 2011). As regards Tuscany, Pisa and Pistoia, which were opened in the Lombard era, closed down. Pisa would only reopen around the mid-12th c (Baldassarri 2011, pp. 1027-1036), while Pistoia disappeared forever (Villoresi 2011). The presence of a Lombard mint in Chiusi was not totally ruled out by Philip Grierson (*MEC,* 1, tav. 7), but later there was no further discussion of this hypohesis (Day, Travaini 2011).

Moreover, coin production at Lucca, which, along with Rome, remained the only mint in central Italy, is attested to, as stated previously, thanks to a few examples. The *Corpus Nummorum Italicorum* only reports a few *denari* of Charlemagne[5] and a *denaro* of Louis the Pious (*CNI*, XI, p. 60, n. 1, tav. IV, 19). After Louis the Pious, Lucca coins seem to break off for around a century (the attribution of a

[3] Herlihy 1957, pp. 6-7 considers the measures adopted (probably) by Otto I as "one of the most important monetary reforms of medieval history»; cf. also Cipolla 1975, p. 18; Matzke 1993, p. 138; *MEC*, 12, pp. 30-31.

[4] Salvioli 1901 is still a mine of useful information and interesting suggestions. Regarding Tuscany, cf. Francovich, Wickham 1994; Francovich, Farinelli 1994; Wickham 1996. See also the article by S. Collavini and G. Bianchi in this volume.

[5] *CNI*, XI, pp. 9-18; no. 8 is regarded as a *denaro*, but the legend *flavia luca* suggests that it is a *tremissis* with a very low level of fineness. *MEC*, 1, p. 208 notes the Anglo-Saxon influence on Lucca coin types, and stresses the rarity of the issues of Charlemagne from the Lucca and Pisa mints.

denaro to the years of Lothair I is uncertain[6]). They resume with Hugh of Provence, associated with his son Lothair II (931-947) but, on the basis of the data currently available, their volume still seems to be very limited. Only one specimen is mentioned in the *Corpus nummorum italicorum* (*CNI*, XI, p. 61, n. 1, tav. IV, 21), and the two examples present in our sample, found in the excavations at Vetricella, are from the Pavia mint. It was only over the course of the second half of the 10thc that the activity of the mint becomes more regular, although the volume of its issues continues to be low (Matzke 1993, pp. 138-143).

To date, archaeological excavations have not brought substantial changes to the panorama which we have outlined thus far, especially on the basis of examples held in museum collections. In 2013, the coins of the *Regnum Italiae* found in Tuscany numbered around 200, from 29 sites. Of these 200 pieces, around 160 belong to 5 hoards, while single finds number around 40. Only 5 examples can be dated to the Carolingian period, some of which come from burials. Almost all the finds are composed of 10thc *denari*, mostly in the name of Otto. As Andrea Saccocci has emphasized, the arrival of the Franks and the introduction of the silver *denaro*, which replaced the gold *tremissis*, do not seem to have had any impact on coin circulation, which, as I have also argued, began to increase only in the Ottonian period (Saccocci 2013, p. 30; Rovelli 2010).

In this panorama, founded on archaeological research involving, albeit in different ways (extensive excavations or surveys), a sample composed of no fewer than 240 medieval sites (Valenti 2008a, p. 194), the 16 *denari* datable to between the period of Berengar I (king 888-915, emperor 915-924) and Conrad II (1024-1039) found at Vetricella represent a considerable exception, which will help to better understand the history and function of our site.

If we exclude Vetricella, the scant number of archaeological discoveries of silver *denari* echo the evidence of the written sources in many regions of central Italy, where documents dating to between the 10th and 11thc highlight the recurrence of prices assessed in *res valentes*.

It is worthwhile to remember, as a partial explanation of this phenomenon, that between the Ottonian period and the second half of the 12thc, Lucca was the only mint active in central Italy. Indeed, Rome was closed for reasons which remain unknown and was only reopened around the year 1180 (Rovelli 2009b).

What were the causes of this weak coin production? We need to bear in mind that the *ottolini* found in Tuscany (as elsewhere too, both in Italy and north of the Alps) are mainly issued by the palatine mint at Pavia. Lucca, despite the fact it was in turn a royal mint, appears to have had a secondary role, and we can say the same, in this phase, as regards Milan.

The following two phenomena have been considered so far:

1) the failure to improve minting activity during the transition from the Lombard gold system to the Carolingian silver one;

2) the limited volume of Lucchese issues during the Ottonian period, and partially during the 11thc, inevitably raises several questions. Thus we have asked ourselves, firstly, what the role may have been of the local silver-bearing seams in ensuring coin production, however limited, and when these mining activities began. We also had to consider, as well as the possible use of hoarded silver, the possible contribution of new metal from non-local mines.

As we have already recalled, Peter Spufford has outlined a wide range of these problems, highlighting, for the period in question, the role of the mines in the region of Goslar in Saxony. It is thanks to this metal that more than 80 mints were opened in 'Germany' in the Ottonian period, while only 2 were active under Conrad I of Franconia (Spufford 1988, p. 76). Regarding Italy and the possible use of silver from Saxony, Spufford's estimates are prudent precisely because, unlike Germany, it is not clear where the silver struck by Italy's mints came from: «It is not clear whence Italy drew its silver at this time, and there are contradictory indications about what was happening there» (p. 97).

In trying to answer these problems, our initial analyses were also modulated to identify any traces of Saxon silver in the Italian *ottolini*.

The analyses carried out, although involving a limited sample, give fairly interesting answers and also, at least at present, fairly clear ones, especially as regards the *ottolini*. As will shortly be argued, isotopic tests indicate, for all 12 examples examined, an unquestionable compatibility with the silver from the Harz deposits in Saxony, as regards both *denari* from Lucca (seven examples), and *denari* from Pavia. In just one instance, a Lucchese *denaro* of Otto I and Otto II, can we see a possible contribution of Tuscan silver alongside silver from Saxony. A similar picture can be found among the five *denari* in the name of Conrad II from the Lucca mint, all compatible with the Harz mines, but with one example in which one also notes the possible use of Tuscan silver.

A.R.

2. THE ARCHAEOLOGICAL-NUMISMATIC SAMPLE AND ARCHAEOMETRIC ANALYSES

2.1 The archaeological-numismatic sample

In the context of the nEU-Med project, and with a view to future archaeometric analyses, we proceeded first and foremost to reorganize and complete the census of all numismatic material from sites especially in the Colline Metallifere investigated archaeologically in recent decades, as well as other sites. The sites where the sampled coins came from include the following: the castles of Scarlino (Francovich 1985), Rocca San Silvestro (Francovich 1991; Cicali 2005, pp. 81-119) Donoratico (Bianchi 2004), Montemassi (Bruttini, Dallai 2006) and Rocchette Pannocchieschi (Grassi 2013; Cicali 2013, pp. 134-139); the villages of Poggibonsi (Valenti 1996; Cicali 1996, pp. 314-326; Valenti 2007; Cicali 2007, pp. 254-256), Miranduolo (Valenti 2008b; Cicali 2008, pp. 403-414) and San Genesio (Cantini 2008, 2010); the monastery of S. Pietro a Monteverdi (Francovich, Bianchi 2006); the pieve of Pava (Campana, Felici, Marasco 2008); the Canonica

[6] *CNI*, XI, pp. 60-61, n. 1, tav. IV, 20; for the attribution of this example to Marquis Rainier or Ranieri (1024-1027), who had rebelled against Conrad II, cf. Matzke 1993, pp. 142-143. Support for the traditional attribution to Duke Manfred, and the years of Lothair I, is found in Vanni 2011, p. 787.

di S. Niccolò (Bianchi, Bruttini, Grassi 2012); and finally the site of Vetricella (Marasco 2013) (*fig.* 1). In the future, the sample will be further enlarged by analyses of other coins. The research will be completed by a survey, as exhaustive as possible, of published coin finds from modern-day Tuscany. To conclude the research, the findings will be schematized and made available on a GIS platform.

C.C.

2.2 pXRF analyses

The survey of numismatic material has made it possible to select 154 pieces on which an initial non-destructive compositional analysis was conducted, using the technique of portable x-ray fluorescence (pXRF).

The instrument used for the analyses, which is available at the Biotechnology, Chemistry and Pharmacy department at Siena University, is a portable (pXRF) Olympus Delta Premium Innov-X spectrometer, equipped with an X-ray tube of 40kV, 4 W and 200 μA, Rh anode, a large area SDD detector, an accelerometer, and a barometer to allow corrections for atmospheric pressure. The instrument is also fitted with an internal camera, allowing the correct positioning of the area of investigation.

The pXRF non-destructive compositional analysis (Navas, Asuero, Jimenez 2016, pp. 207-221) served mainly, in this initial phase, to check the amount of lead present in the coins, so as to select the most suitable materials for subsequent isotopic Pb analyses, as well as to have a qualitative chemical analysis of the alloy, and to create a semi-quantitative compositional database of all the coins sampled, especially of those conserved and held in museums (the museums of Pava, San Genesio, Rocca S. Silvestro, and the Archaeological Museum of Florence) which would not have been available for further, more detailed analyses (for example using the LA-ICP-MS method), requiring the finds to be moved. Publication and discussion of the findings provided by the pXRF analyses is awaiting completion of the research on the whole sample.

V.V., A.D.

2.3 Isotopic analyses of lead

It is well known that lead isotopes are the most widely-used archaeometric method for tracing the provenance of metals used for the production of artefacts. The method works not only for lead artefacts but also for other objects or alloys, as long as they contain sufficient amounts of lead to conduct the analysis. The method is based on the principle that the lead present in the minerals (such as lead-bearing galena, which was mined in order to produce silver) comprises four isotopes (Pb^{206}; Pb^{207}; Pb^{208}; Pb^{204}). The relative abundance of these, in other words the "isotopic composition", represents a sort of "digital finger-print" of the Pb contained in the ore, and this finger-print is characteristic of the deposit from which the mineral is extracted. There are considerable variations in the isotopic composition of lead between the various deposits found throughout the world. Furthermore, lead is not susceptible to isotopic fractionation (in other words it does not alter its isotopic composition) during the metallurgical process (Gale, Stos-Gale 2000). Accordingly, ore containing lead, and waste products (slag and other by-products), the finished metal and finished objects all have the same isotopic composition. For this reason, in theory, it is possible to trace the original deposit where the ore came from, on the basis of the isotopic composition of the Pb in the artifact.

The main advantages of the method lie in the small amounts of lead needed to carry out the analyses (with modern spectrometers, amounts of Pb in the order of 100-1000 ng of lead are sufficient), and thus in the possibility of taking micro-samples. Moreover, an extensive database on the isotopic composition of most of the metal deposits that were mined in ancient times has been published. This is obviously being continually updated as research proceeds (Cattin *et al.* 2009). The main limits include the inevitable overlapping of the fields of isotopic composition. Since the isotopic composition of a given deposit depends on its geological history and evolution, its isotopic composition may in some cases be distinctive, but it is very likely that more than one deposit, located in different parts of the world, will have a similar isotopic composition, and that their compositional fields overlap in a more or less significant way (Brill, Shields 1972; Gale, Stos-Gale 2000). This means that, rather than give a single answer to the provenance of a given metal, Pb isotopes can suggest possible provenance fields, on the basis of isotopic compatibility, or in some cases exclude others with a certain reliability.

Another limitation lies in the fact that Pb isotopes only give information about the lead contained in the alloy (silver or silver-copper in the case of our samples), and thus they may be affected by the phenomena of mixing, recycling (Gale, Stos-Gale 2000; Stos-Gale 2001), or even the addition of lead of different provenance. In this connection, it is worth mentioning that silver has a great affinity for lead, and that lead plays a vital role in silver extraction processes: lead acts as a collector of silver, and is easy to separate from slag, because it is denser and heavier (Bachmann 1993)[7] The problem of the possible mixing of metals containing lead of various provenances could, for example, be schematized for some of the "investigated coins" in the diagrams in *fig.* 2. In the event of a silver coin being produced setting out from two Ag ingots which have approximately the same Pb content, of differing provenance, or by adding and recycling Ag objects of different provenance with a similar Pb content (*fig.* 2a), the final coin will have an isotopic composition lying somewhere between those of the two ingots (or original objects), and lying closer to the ingot which was used in the higher proportion. If a coin is produced from mixed metals (*fig.* 2b), since the levels of Pb in copper are generally far lower than Pb levels in silver, although the coin contains only a little silver (eg 20 wt%), its Pb isotopic composition will be very similar to that of the silver used to make the coin.

On the basis of what has been stated so far, it seems clear that, although the isotopic composition of a silver object may be clearly distinguishable in isotopic terms, the provenance of the silver itself cannot be unambiguously identified

[7] For a detailed description of silver extraction processes in ancient times, see Merkel 2016.

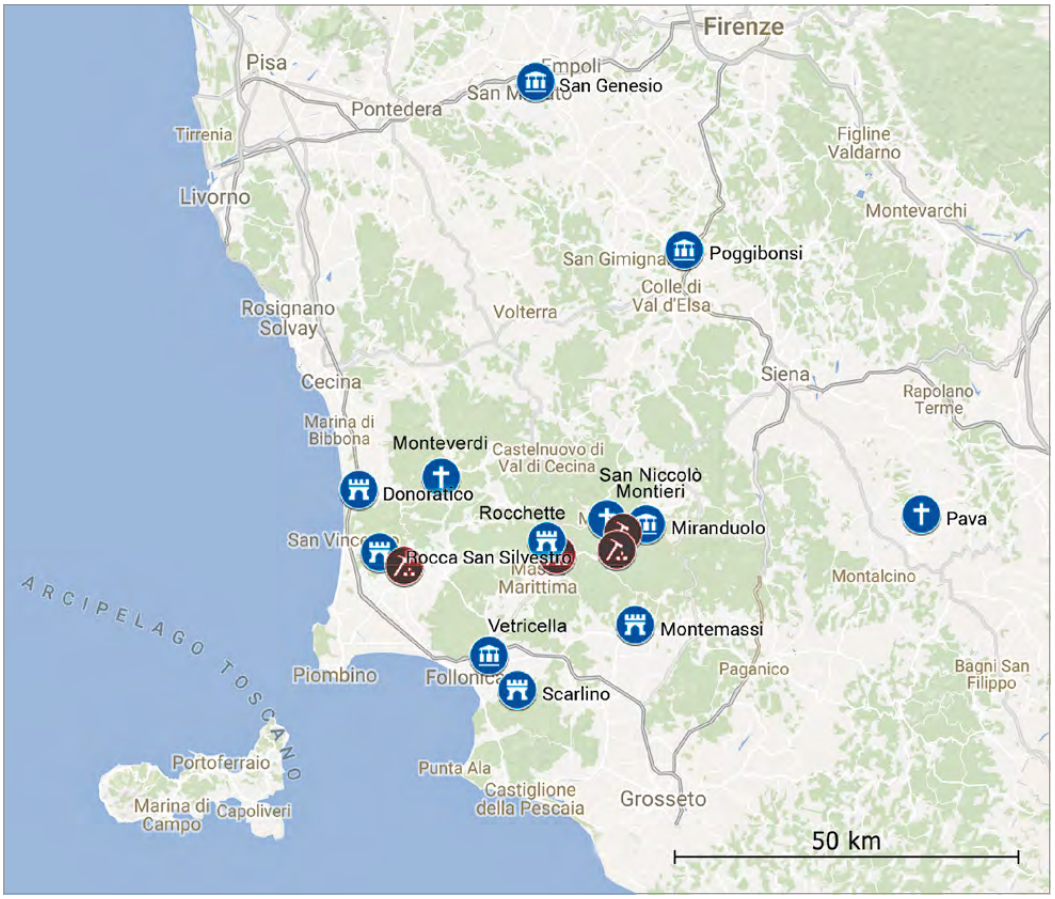

fig. 1 – Location of sites (blue) where the coins described in this chapter were found. Main silver bearing mines of Southern Tuscany (Colline Metallifere) are also reported (red).

without there being the support of other types of evidence; in particular, the support of historical and archaeological evidence is vital for backing up, or otherwise, suggestions for provenance put forward on the basis of isotopes (Baron, Tămaş, Le Carlier 2014).

2.3.1 *Analytical method*

On the basis of the results provided by portable XRF, coins were selected that had sufficient lead to carry out isotopic analyses. Micro-samples were taken from the investigated coins (using a sterile scalpel), from the edge of the coin. Thus the two sides of the coin were not touched. The sample is usually around 0.5 mg (ie 0.0005 g), without altering the weight of the coin. The samples were analysed for lead isotopes at the laboratory of the Institut für Geologie, at the University of Bern, using an MC-ICP-MS Nu Instruments™. The samples were analysed by Prof. I.M. Villa. Numerous measurements of the NIST SRM 981 international standard were carried out during analysis, to estimate the degree of analytical precision, which was found to be as reported in the literature (Galer, Abouchami 1998).

2.3.2 *Results and discussion*

The isotopic data for the coins were compared with findings from the metal-rich district of southern Tuscany, and from the Apuane Alps, and with several lead-rich and silver-rich districts in Europe which may have been mined in the Medieval period (Melle in Aquitaine, the Rhenish Massif and Harz in Germany, and the Erzgebirge in Germany-Czech Republic). As shown in *fig.* 3, while the isotopic composition of the ore-fields in southern Tuscany (shown in red.) is clearly distinguishable, many of the other deposits in central Europe, having a similar age of formation and geological history, have fields of isotopic composition (coloured polygons in *fig.* 3) which are largely overlapping. Accordingly, it is only possible to provide a number of hypotheses regarding isotopic compatibility between the coins analysed by us with some of these ore-fields. Thus, the hypotheses put forward here are to be regarded as preliminary suggestions, given that the database is continually being updated, and that also to be assessed, as investigations continue, are other areas which may have supplied metal (especially silver) in the period of interest to us, such as the Massif Central in France, for example, or the Upper Rhine Valley in Germany. We will briefly mention what are the historical periods for which there is evidence for the exploitation of European mines which have so far been included in our database, and which are shown in the diagrams.

The Melle mines in Aquitaine have historically been considered as the most important silver mines in the Merovingian and Carolingian period; their exploitation perhaps began as early as the 5thc, under the Roman Empire, and increased significantly between the 7th and 9thc, as is borne witness to on a broad scale by the remains of mining activity, and by the geographical diffusion of coins issued in Melle (Téreygeol 2007, 2013; Coupland 2011). The mines saw a marked decline at the end of the 10thc (Téreygeol 2013).

The zone of the Rhenish Massif, in western Germany, is home to numerous mines of lead, zinc, copper and silver, with traces of mining in the Roman era, but there is scant evidence

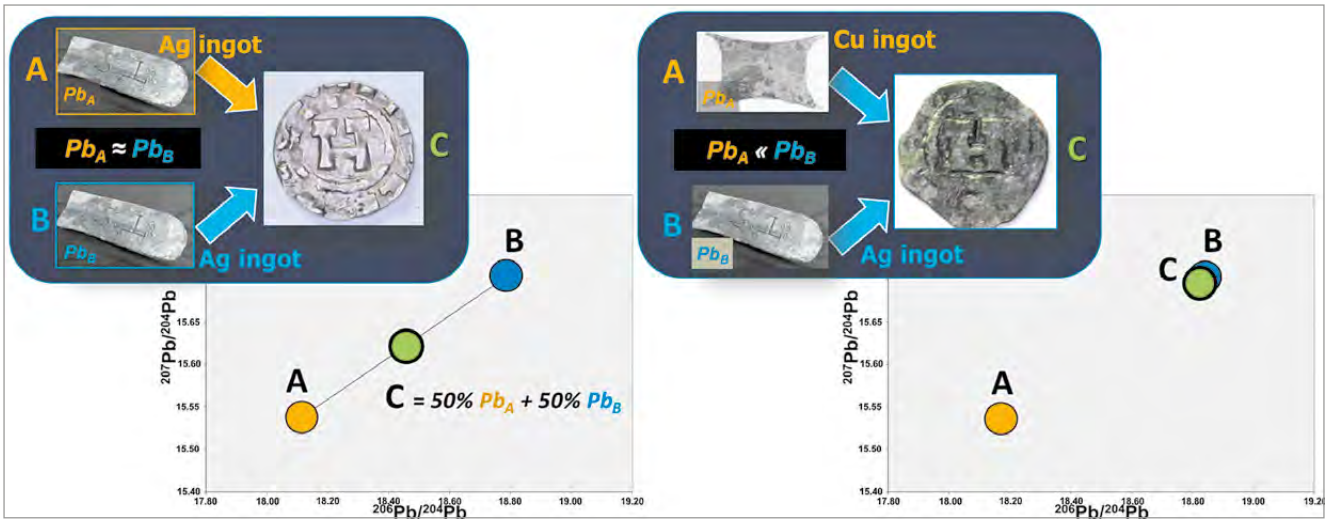

fig. 2 – Mixing example of two metals with different lead isotope signatures represented in the diagram $^{207}Pb/^{204}Pb$ versus $^{206}Pb/^{204}Pb$. a) mixing of two silver ingots having the same lead content; the coin produced with equal quantities of silver from the two ingots (having lead isotopic composition A and B respectively) displays a lead isotope signature (C) intermediate of the two ingots and located in the diagram along the mixing line joining the composition of the two ingots. b) mixing of a silver ingot lead rich with a copper ingot lead poor; the produced coin made of a mixture of copper and silver, even if could contain low silver, it will bear a lead isotopic composition (C) similar to silver ingot since it is extremely lead rich.

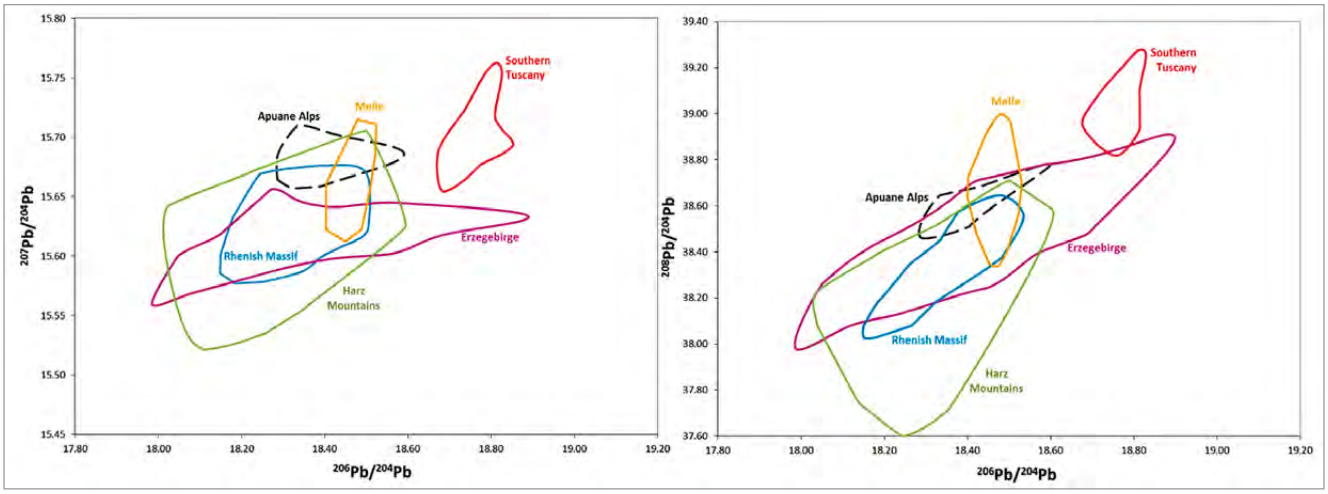

fig. 3 – Diagrams of lead isotope composition which schematically represent (polygons of different colours) compositional fields of European main silver and copper mines exploited in Medieval times for silver extraction. a) diagram $^{207}Pb/^{204}Pb$ versus $^{206}Pb/^{204}Pb$; b) diagram $^{208}Pb/^{204}Pb$ versus $^{206}Pb/^{204}Pb$. Each coloured polygon includes lead isotope compositional data of minerals from mines published in literature.

of possible mining in the Early Medieval period. The historical sources mention silver mining only as of the 12th-13thc for the mines at Mechernich (near Aachen), Lüderich (east of Cologne), Altenberg (Siegerland) and Bad Ems/Holzappel (Bartels, Klappauf 2012). Similarly, in the area of Ramsbeck, although the historical sources mention the mine only as of the 14thc, some traces of mining activity can probably be dated to the 10th-11thc (Strassburger 2006, Id. 2007).

There are signs of the exploitation of the mines at Harz (Saxony) perhaps already in the 3rdc AD (Klappauf 1989), but copper, lead and silver were certainly mined as of the 9thc (Klappauf *et al.* 1990). The first historical mention is in the "History of the Saxons" by Widukind of Corvey, who states that, in 968, "silver lodes" were opened up in Saxony. Later on, in the 11thc, Thietmar of Merseburg writes that the Saxony silver mines were opened up in the reign of Otto I (936-973 AD) (Steuer 2004), which was certainly a reference to the Harz mountains. Despite the fact that silver mining in the Harz area was historically associated with the Rammelsberg mine, this is mainly a copper mine, while the Upper Harz deposits, characterized by abundant silver-bearing galena (Asmus 2012), were probably more important for silver mining in the Early Medieval period (Klappauf *et al.* 2008; Klappauf 2011), as also testified to by the 9th-10thc archaeological record (Alper 2003).

The Erzgebirge area, on the border between modern-day Germany and the Czech Republic, is also famous for silver deposits, but the archaeological traces of mining seem to indicate that large-scale silver extraction only began in the second half of the 12thc (Kenzler 2009, 2012), while evidence linked to silver metallurgy can mainly be related to the 13th-14thc (Eckstein *et al.* 1994).

Throughout the Colline Metallifere area, in southern Tuscany and in particular in the Campiglia Marittima area,

fig. 4 – Location of the most important silver mining districts exploited in Medieval times.

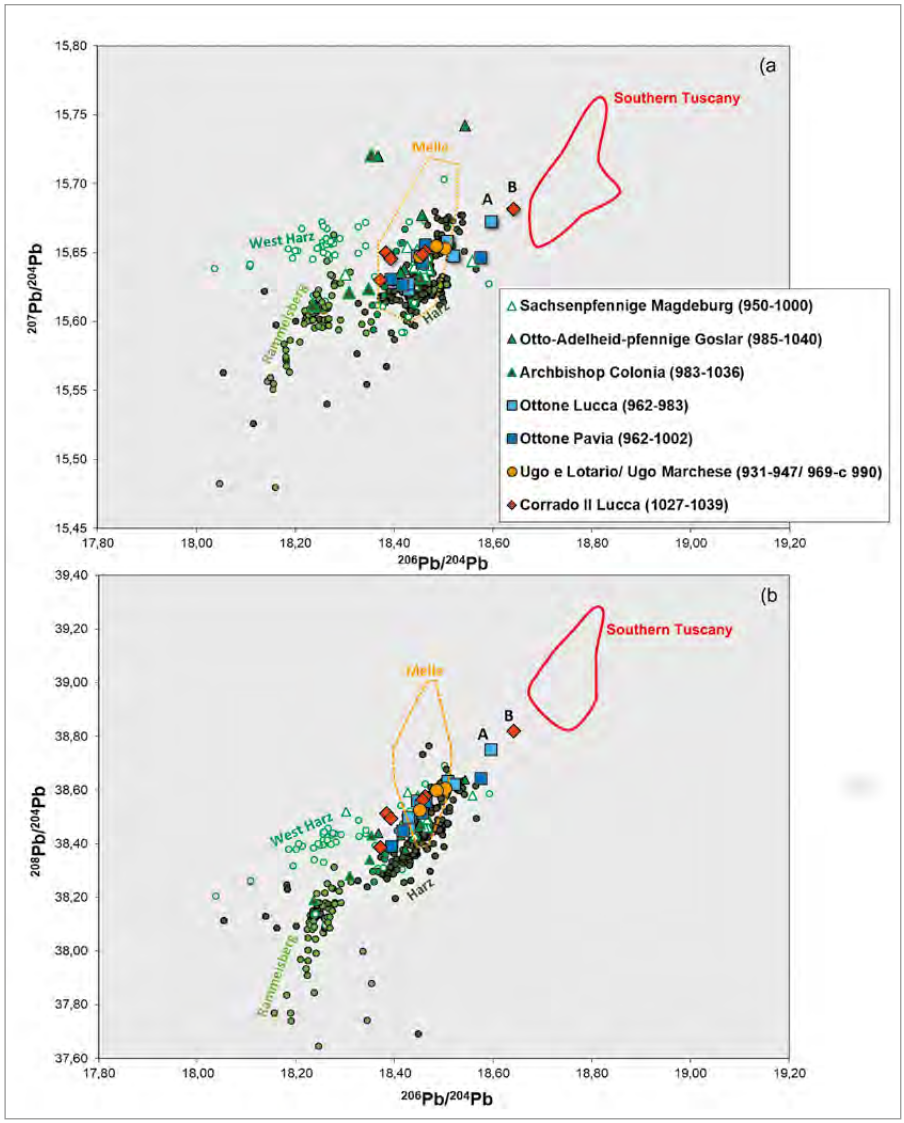

fig. 5 – Lead isotope composition of analysed coins dated between 931-1039. The diagram shows the lead isotope fields of Southern Tuscany (red), Melle (yellow), Harz Mountains mines (white and green circles) and lead isotope composition of coeval coins minted in Germany (triangles). a) diagram $^{207}Pb/^{204}Pb$ versus $^{206}Pb/^{204}Pb$. b) diagram $^{208}Pb/^{204}Pb$ versus $^{206}Pb/^{204}Pb$ (literature data of Sothern Tuscany are from: Lattanzi *et al.* 1997; Stos-Gale *et al.* 1995; Chiarantini *et al.* 2018. Melle from: Tereygeol, Hoelzl, Horn 2005; Harz from: Lévêque, Haack 1993; Lehmann 2011; Pfennige from Magdeburgo-Goslar: Merkel 2016).

where the first traces of copper mining date to 3400-3100 BC (Artioli *et al*. 2016), remains of mine-workings both from the Etruscan and the Roman periods can be found. As regards the Medieval period, although most of the castles situated in close spatial association with occurrences of ore deposits (consisting in iron, copper ores and silver-bearing lead ores) in the area first appear between the 8th and 10thc (Rocca San Silvestro, Rocchette, Cugnano), traces of mining and metallurgical activity in these initial phases of the sites are very slight, whilst the bulk of extraction activity is concentrated between the 12th and 14thc, as borne witness to by the large mounds of slag which are features of the sites of Cugnano, Rocchette and all the territory around the castle of Montieri (Benvenuti *et al*. 2014).

Meanwhile, as regards the Apuane Alps mining district in northern Tuscany, some traces of mine-workings can perhaps also be related to the Etrusco-Roman era, but in the Medieval period only mine-exploitation is attested to between the 11th and 14thc (Mascaro, Benvenuti, Guideri 1991).

The largest group of coins analysed so far consists of *denari* in the name of Otto (I-III), coined in Pavia and Lucca, and datable to the period between 962 and 1002 AD. As can clearly be seen in *fig.* 5, none of these is isotopically compatible with the compositional field of the mines of southern Tuscany (in red.). Except for sample "A" in *fig.* 5, most of the coins, regardless of the mint which they came from, are located in a portion of the diagram (*fig.* 3) where there is the biggest concentration of central European ore fields, such as Melle, Harz, the Rhenish Massif, and Erzgebirge, and accordingly the samples are isotopically compatible, in part or wholly, with all these mines areas.

In particular, however, the *denari* in the name of Otto display strong isotopic compatibility with two contemporary coin series (the Sachsenpfennige, 950-1000, and the Otto-Adelheid-pfennig, 985-1040) coined in Saxony by Otto I-III probably in Magdeburg and Goslar (white and green triangles in *fig.* 5) on the slopes of the Harz massif, and recently published (Merkel 2016). Most of the latter have a chemical and isotopic composition that is compatible with the mines of northern Harz, where there is contemporary archaeological evidence of silver production; it is thus likely that these *denari* were produced with new metal mined from the Harz mountains (Merkel 2016). It is reasonable to suppose that samples struck in Italian mints in the same period, and by the same sovereigns, were made from metal of Saxon provenance, or from north of the Alps.

A similar provenance can also be suggested for the Pavia *denari* in the name of Hugh and Lothair II (931-947), and Hugh the Great, Marquis of Tuscany (969-990 circa) struck in Lucca, which have an isotopic finger-print that is compatible with central European ore-deposits such as Melle and Saxony.

The five denari in the name of Conrad II (1026-1039), all from the Lucca mint, except for sample "B" in *fig.* 5, also do not display any isotopic correlation with the Tuscan ore deposits, and they are sited close to the Saxony deposits.

From all of the above, no lead isotope identification in the coins analysed is to be found that is unmistakeably compatible with the silver bearing ores of in southern Tuscany. It is nevertheless possible that these mines were exploited (perhaps for copper- and lead-workings) but, going by our preliminary data, it would seem that any silver mined from these deposits was not used for coinage. Exceptions to this are the two coins called A and B, in *fig.* 5, which do not formally fall either in the field of southern Tuscany or in the fields of central European deposits. These are two different silver coins (in the name of Otto and Conrad II) all struck by the Lucca mint, whose isotopic composition falls midway between the field of southern Tuscany and the field of the central European deposits, and which could be compatible with a mixed use of silver from both types of deposit. This finding, to be confirmed with an increase in coin samples, could suggest a sporadic use of silver from the Colline Metallifere in the course of the 10th-11thc.

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3. CONCLUSIONS

The results obtained so far seem, therefore, to be rather surprising, and propose valuable and innovative data which will help to specify details, not only as regards chronology, of the economic development of the region and of the local aristocracies.

Moreover, these results, if confirmed by further investigations, may offer a plausible answer to the questions posed by the body of numismatic data. Indeed, in the light of these, the dominance and widespread circulation of the Pavian *denaro* (our sample, where *denari* from Lucca are prevalent, is, as stated earlier, the result of arbitrary choices) could have been the fruit of a specific royal policy that had an interest in boosting the role of Pavia as the capital of the kingdom also by strengthening the palatine mint. It was to this mint, which had nine *magistri monetarii* (there were only four in Milan, according to the *Honorantie*), that the largest amount of metal resources was sent, resources which the emperors procured wherever it was easiest, and most economical, so to do.

Information relating to the Lucca mint appears, in turn, consistent with this royal plan. Indeed, in the Ottonian period, Lucca also seems predominantly to have been supplied with silver from the Saxony mines. However, the small number of coins it produced suggests that the king's attention was directed primarily on the palatine mint in Pavia. Thus, although unexpected, these findings could explain the slow rate of expansion of the Lucca coin issues. Indeed, at least up until the reign of Conrad II, the Lucca mint seems to rely on silver of transalpine provenance, with local silver being added only sporadically. In our sample, such local silver has only been found in one *denaro* among the five that go to make up the nucleus of examples issued under Conrad II.

On the basis of our sample, the use of Tuscan silver in Lucca coin issues datable to between the mid-10thc and the first half of the 11thc still seems fairly faint. It is useful to underline that these findings are still largely provisional, but, as stated in the beginning, they ask serious questions of a model which was once thought to have the status of an established fact.

A.R.

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Abstract

The aim of this collective study is to illustrate the historiographical premises and the initial results of one of the fundamental sectors of our project, namely studies based on metallurgical analyses applied to coins. The analyses were conducted on a sample of 47 denari from the Pavia and Lucca mints, datable to between the first half of the 10thc and the start of the following one. Isotopic analyses revealed the crucial role of mines in Saxony in supplying the mints of the *Regnum italicum*.

Giovanna Bianchi, Simone M. Collavini***

PUBLIC ESTATES AND ECONOMIC STRATEGIES IN EARLY MEDIEVAL TUSCANY: TOWARDS A NEW INTERPRETATION

In this article, our intention is to summarise the salient findings which emerge from the previous articles, to widen our gaze to include contexts outside the project sample area. However, in doing so, we will bear in mind two aspects which are characteristic of the history of this area:

a) the presence of important public estates, often preceded by important senatorial and imperial properties (see note 4 in the article by Briano *et al* above).
b) the end of the 9th and the 10thc as the chronological period in which some of the most important changes in the anthropic and natural landscape seem to be concentrated (see Pieruccini *et al.*; Marasco *et al* above).

These findings allow us to embark upon a series of preliminary reflections on how the presence and administration of public property may have influenced the economic dynamics of territories connected to them. At the same time, the reference to the aforementioned timespan leads us to concentrate our attention on a specific historical context, which could have enabled conditions to come about which were at the foundation of changes which affected Vetricella and its territory.

In the first paragraph the issues will be addressed by setting out from an analysis of documentary sources. Thereafter archaeological findings will be explained, or revised, in light of a new interpretative perspective, stimulated by the information which is emerging thanks to the nEU-Med project.

Bearing in mind the series of questions and hypotheses formulated in the first article in this volume (Hodges *above*), in the final paragraph we will try to summarize a series of considerations, with the intention of providing the basis of discussion and reflection for future research strategy.

G.B., S.M.C.

1. AN OVERALL VIEW STARTING FROM WRITTEN SOURCES

1.1. A couple of years ago I first began, in collaboration with some young scholars, a research study on the "material foundations" of public power in Tuscia between the 9th and 11thc. The investigation, which set out from questions relating to the regional political system, offered interesting insights in other fields, too: from the history of the production of documents to economic history. It is on this latter aspect that we will focus on this occasion, seeking an interaction between the initial results from this work and the data produced so far by the nEU-Med project.

One of the first outcomes of the research is the preparation of a database, "Fiscus", to contain a census of public properties known in the region between the 8th and 13thc, updating the last systematic research on this subject, i.e. the one by Fedor Schneider published in 1914 (Collavini forthcoming; Schneider 1914). Pending its completion, in order to try form an idea of the scale of this patrimony, we can begin from the double dower dated December 937 with which King Hugh concentrated in the hands of his wife, and the wife of his son Lothair (Berta and Adelaide, respectively), many public properties, some of them in Tuscany. Despite the fact that this only offers a partial picture of the public patrimony in the region, the dower has some evident advantages: first, it offers an overall picture, and quantifies approximately the size of the *curtes* recorded. Moreover, it was produced in the first half of the 10thc itself, when major material transformations were under way at some of the sites investigated. Finally, and this aspect is no less fundamental, the dower mentions two *curtes* connected to the valleys, and specifically to the sites at the centre of the nEU-Med project: *Cornino* and *Valli*.

The Tuscan properties mentioned in the dower (excluding properties in the Lunigiana area, which was outside the March at the time) consist in 10 or so *curtes,* and three large royal monasteries; in the case of each estate complex, the total number of *mansi* which made it up is indicated. These are generic estimates, to be handled with caution, but the figures are nevertheless impressive: the *curtes* in Tuscany had 880 *mansi*, while the three monasteries, where the rest of the public properties had been concentrated (S. Salvatore of Sesto, S. Salvatore al Monte Amiata, and S. Antimo in the Val di Starcia), possessed 3,500 *mansi* in all[1].

The best way to form a more concrete idea of the size of this enormous complex of property is to compare it with the only ecclesiastical property in Tuscany known in detail for this phase, the property of the bishopric of Lucca, described in

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[1] Schiaparelli 1924, nos. 46, 47 (937); cf. Vignodelli 2012, esp. pp. 258, 271-275. The number of *mansi* included in the dower could be surprising, but a comparison with the "ideal size" of the major Carolingian communities of canons, in line with the Council of Aachen of 816 (between 3,000 and 8,000 *mansi* for the largest ones; between 1,000 and 2,000 for medium-sized ones; and between 200 and 300 for the smaller ones, see *Concilium Aquisgranense*, cxxii, p. 401 lines 7-20), suggests that the figure is likely, and that its size was not too big compared to the greater churches of the hearth of the Frankish world.

the inventories of Peter II at the end of the 9th c. It comprised around 500 *mansi*, and thus it was more or less one ninth the size of the royal property in the dowers, and one quarter the size of the S. Salvatore of Sesto monastery property alone (2,000 *mansi*)[2].

Thus, we are talking about an immense source of wealth, and a very large mass of men and economic production, controlled by the king or by the marquis. To limit ourselves to one example, let us consider the wealth of the monastery of S. Salvatore of Sesto, in the Lucchese countryside: its 2,000 mansi must have corresponded to around 10,000 people, much more than the inabitants of the city of Lucca at the time. In economic terms, the patrimony attested by the dower was, primarily, a collection of *mansi* which guaranteed a very large agrarian income, making the one who held it the biggest economic player in the region, even in quantitative terms alone. However, as well as farming agricultural products, it must also, given the quantities involved, have conserved them, transformed them, and circulated them (although not necessarily commercially). Finally, as we shall see, although the dower is silent on this point, archaeological research is showing that the royal *curtes* (and, of course, the monasteries too, and even more so) were also centres of far from insignificant artisanal production. In short, trying to understand the economic activity of the public estates in its various components means having to deal with a fundamental player in the regional economy of the day, which thus far has been neglected by historical research.

1.2. Staying with the texts which we set out from, let us observe now the spatial structure of the dower (see maps in Vignodelli 2012, pp. 258, 273, 280). There are several reasons for this structure, none of which is exclusive. Indeed, it shows what the political fulcrum of public power was in Tuscany in 937, namely the area in which the king and the marquis had most land to distribute in order to ensure political support. It also reveals a series of thoroughfares along which a political power, which was indeed itinerant, moved. Finally – and this is the central point of my argument – it suggests a number of economic strategies put in place by the royal power. In order to understand them, we will focus first on the main nucleus of public properties in Tuscany (the northern one), which was the largest and most complex, examining its spatial distribution and quantitative size. One can identify three main groups of *curtes*. The first is situated in the Valdarno, in the system of lakes north of the river (Lago di Sesto/Bientina) and the area of Pistoia[3]. These *curtes* (to which must be added those of Lucca, Pisa, and Florence, which were still in the hands of the marquis, including S. Genesio, the *caput curtis* of which is currently being excavated by Federico Cantini) were first and foremost large agricultural businesses, involved in farming (cereals, vines, and olive trees). However, they did not restrict themselves to producing foodstuffs, but also transformed agricultural products and were active in their circulation. Setting out from this basis, obviously, artisanal activities could also develop. They are occasionally suggested by the written sources (such as weaving at Bientina), and also sometimes attested by archaeology investigations (S. Genesio)[4].

1.3. Meanwhile, the remaining *curtes* in the dower are concentrated in two much more restricted ambits which were, apparently, more marginal both politically and in the royal itineraries: the area facing Monte Pisano (where the patrimony of S. Salvatore of Sesto was situated, and perhaps also the property of the *curtis* of Bientina); and the Maremman coast in the territory of Populonia, and in particular the two valleys investigated by the nEU-Med project, the Cornia valley (*curtis* of *Cornino*) and the Pecora valley (*curtis* of *Valli*). These zones are certainly less rich as for agriculture, being characterized by flat regions interrupted by unproductive hills, and/or extensive wetlands consisting of lakes or lagoons which were the result of stagnation of the waters. Moreover, in the case of the Maremman *curtes*, the distance from the heart of the March must have made it economically irrational to transport, over long distances, products similar to those grown in the Valdarno, to bring them to the marquis' court, sited just outside Lucca's city walls.

These outlying *curtes* also have another characteristic in common: the number of *mansi* of each of them is relatively low compared to the rest of the public patrimony. So why secure *these very curtes* via the dower? And why administer them as independent *curtes*-based businesses, instead of uniting them with the large holdings of the imperial monasteries which were situated in the same areas? An explanation can be tentatively put forward, by suggesting that they controlled particular resources, which were economically and politically strategic. This would also explain their significant economic importance, attested positively at least in one instance, despite the limited agricultural production guaranteed by the (relatively) few *mansi*[5].

We shall begin by looking at the northernmost complex, in the case of which, pending archaeological investigation which is more than just occasional, our analysis must set out from the written sources, from the observation of the natural environment, and from known local resources. The *curtes* surrounding Monte Pisano (Nozzano, Avane, and Lugnano, to which was later added the *curtis* of Pappiana, mentioned as of 1014) comprised a limited number of *mansi*

[2] Calculations based on Luzzati 1979 (considering both the *Inventarium* and the *Breve de feora*). The calculation does not take into account lands rented out by the bishopric, for which it received fixed rents (often ceded as *beneficia*), but which it no longer had effective control over. The Bishop had a list drawn up of these lands too (relating to the *livellarii* of his predecessor, Gherardo), recently published in Tomei 2012 (worth consulting also for its bibliography on the Lucca inventories).

[3] As well as the assets of the monastery of S. Salvatore of Sesto located in the area adjacent to its site, also belonging to the complex were the *curtes* of Bientina (60 mansi), *Cortenuova*/Empoli (70 mansi), S. Quirico (40 mansi) and *Pionta*, near Pistoia (500 mansi). This last *curtis* must have been the one which managed all the holdings of the *comitatus* of Pistoia.

[4] Cf. Bianchi, Cantini, Collavini forthcoming. For the traces of weaving in the *curtis* of Bientina see Tomei forthcoming; for craft production at at S. Genesio, see Cantini 2018.

[5] On the fact that the dower made exceptions, protecting properties from potential usurpers, see Lazzari 2012 and Vignodelli 2012: this leads us to think there was royal planning behind the choice of *curtes* included in the dower, and that it didn't passively record the fiscal properties present at the time in the region.

(Nozzano 40, Avane 60, Lugnano 30)[6]. However, these were located on the south-western slopes of Monte Pisano and on the other rocky outcrop situated immediately to the west of the former (Monte Spazzavento), between Lucca and Pisa, closing off the course of the Serchio. This area was intensively exploited ever since Medieval times for quarries for building stones. If one considers that the rest of the Monte Pisano massif was also public property, primarily by means of the monastery of S. Salvatore of Sesto, it follows that the king and/or marquis had a de facto monopoly over this huge quarry, the products of which provided the material for the construction of churches, city walls and palaces in the lower Valdarno and the plain of Lucca[7].

Nor was stone for construction the only product, probably: almost on the top of Monte della Verruca, one of the south-eastern hills in the Monte Pisano massif, at least as of the beginning of the 9thc, there stood a church which was certainly publicly-owned, given that the few references to it are connected to individuals and institutions, not related to each other, but all close to the power of the king and the marquis. The chapel, dedicated to San Michele, was transformed into a monastery probably by Marquis Hugh at the end of the 10thc, although it remained under S. Salvatore of Sesto, and thus part of the fiscal estate system[8]. Why, in financial terms, found a church in a place so apparently devoid of resources, and so geographically remote? Well, the path which, still today, leads to the monastery from the Arno (and from the *pieve* of Caprona, which stands at a bend in the river) passes through an area with large outcrops of slate, suited for the production of roof-tiles. For that matter, stone-quarrying, even if perhaps not explicitly slate, and its transportation all the way to the Arno (presumably to Caprona), on mule-back, are positively attested to in a written source specifically in connection with S. Michele alla Verruca itself, albeit only for the first half of the 12thc[9].

Finally, as confirmation of the great attention to the exploitation of "stone-as-resource" ever since the 10thc, and also – something even more significant for us – of the early appearance of forms of productive specialization connected both to this specific resource and to the public sphere, we can consider the case of Fibbialla in Versilia. Although it does not appear in the dower, Fibbialla was part of a large complex of fiscal land, small elements of which were separated off and ceded to individuals connected to the kings or the dukes of Lucca, while other, larger parts were granted in precarious form to the Cunimundinghi, a prominent family from Lucca, who was part of the marquis' entourage (Tomei 2017, pp. 121, 133-34, 149-51, 180). The Bishop of Lucca was also one of the beneficiaries of these land-grants: thus, three Fibbialla *mansi* appear in the late 9thc *Breve de feora* (the inventory of episcopal assets granted as *beneficia*). However, what we are interested in are not the *mansi*, but the place-name, and the gloss which explains it. Indeed, there is a reference to a *Flabianula Archaria, ubi arche faciunt*[10]. Regardless of what exactly were the *archae* in question (sarcophaguses, articles for the storage of cereals, both, or something else), it is clear that at Fibbialla – in the second half of the 9thc – not only were stones quarried and worked, but people were also so specialized in making *arche* that this activity had lent its name to the place itself[11]. Just like nicknames deriving from trades, this is one of the first traces of artisanal specialization conveyed by sources such as charters, notoriously low on information on economic activities other than agriculture. Fibbialla – it needs to be stressed – was certainly for a long time part of a public complex, and its production of raw materials and finished articles must therefore have been directed towards the fisc (at the time, the Adalberti dukes) when the nickname became established, before the end of the 9thc. It should also be stressed that the nickname, although never in as explicit a form as in the inventory, was later used regularly until 1063: it is not clear whether this was only a case of inertia, or whether we have to see this fact as the sign of a long-lasting artisanal vocation[12]. In any case, only when the "fiscal economic system" entered its crisis, and then declined, at the end of the 11thc, in the context of the collapse and later the dissolution of the March of Tuscia, did this specialized activity seem to disappear. Indeed, from 1081 onwards there is no longer any trace of the nickname; and in the following centuries, given the need to distinguish it from a place in the Pescia area which bore the same name, the nickname which is still part of the modern place-name, *Fibbialla dei Canonici*, became established, the rest of the toponym referring to the Canons of S. Martino of Lucca which became the lords of the castle in the 1120s[13].

[6] The first mention of Pappiana comes from the date of two diplomas of Henry II (DD. HII, nos. 295, 296); on the later history of the *curtis*, deriving from the March, and on the location of its castle, see Ceccarelli Lemut 1998, pp. 464, 475-80.

[7] On the use of stone from Monte Pisano, cf. e.g. Franzini, Lezzerini, Mannella 2001 and Franzini, Lezzerini 2003; a doctoral thesis in Archaeology is being prepared on this issue by Giuseppe Tumbiolo under the supervision of prof. Federico Cantini.

[8] For a review of the written sources on S. Michele see Ceccarelli Lemut, Sodi, 2017, pp. 223-26 and, for more detail, Giuliani 2005, who underestimates the centrality of the public element in the history of the monastery, though. The site of S. Michele has been the subject of a long-lasting excavation campaign (1996-2003), the results of which are published in Gelichi, Francovich 2003 and Gelichi, Alberti 2005.

[9] See Scalfati 2006, n. 166 [1150 c.]: many witnesses refer to the quarrying and cutting of *petras* and *lapides* (it is not clear whether these are two different products, or two ways of referring to the same raw material) also on the part of *magistri* in several different places, including *Serra de Plaia* (which has not been identified with certainty). One of the witnesses stated that *lapides incidit, quos deferebat ad Sarnum et solvebat ei* [*sc.* to the abbot] *pretio et alii asinarii*. Cf. Andreazzoli 2003, pp. 44-45, although here it must be said that nothing in the source leads us to believe that the quarry was started with a view to the monastery's reconstruction.

[10] Luzzati 1979, p. 231: *In Flabianula Archaria, ubi arche faciunt, habet manentes duo et sinditio uno*. Cf. also the parallel *placitum* of 897, the result of the property surveys of Peter II, in which the place name, written by a foreigner notary, is incorrectly given as *Flaviana seu Arcana* (mentioned among the property held by Cunimundo), Manaresi 1955-60, I, n. 102.

[11] Cf. Collavini 2013, p. 71 (with a reference to the source to be corrected) and *passim* for the functions of the *arche*.

[12] Barsocchini 1841, n. 1268 (939) *Flabbianula Arcaia*; n. 1539 (983) idem; n. 1540 (983) idem; n. 1566 (983) *Flabbianula Archaia*; n. 1654 (991) *Flabbianula que dicitur Archaia*; n. 1716 (997) *Flabbianula Archaia*; Archivio Storico Diocesano di Lucca, Archivio Arcivescovile di Lucca, *Diplomatico*, +C 21 (983) idem; A 17 (1062) *Fabianula que dicitur Arcaia*; ++ B 82 (1063) *Fabianula Archaia*; Angelini 1987, n. 26 (1034) *Fabianula que dicitur Archaia*. For the unpublished documents, I am indebted to Paolo Tomei, whom I thank for the information.

[13] The first example of the dropping of the nickname is Guidi, Parenti 1910, n. 453 (1081): the witnesses include Ugo *de Fabianula* son of the late Pietro. When the *curtis*, now with a castle, was ceded by the Cunimundinghi to the

1.4. Can we make similar considerations also for the *curtes* of the Maremma? I believe we can. In this case, moreover, far more stringent findings, which by and large converge with what has been stated thus far, come from archaeology, including the initial results of the nEU-Med project. Indeed, for the *curtes* of *Cornino* and *Valli*, it is not hard to glimpse characteristic forms of artisanal specialization, connected to the exploitation (and transformation, as seen in the case of Fibbialla *Arcaria*) of raw materials present *in situ*; rare and strategic raw materials, which were vital for a political power whose horizon was at least regional.

We shall start with the Val di Cornia, which is better illuminated by the written sources, before moving on to the Val di Pecora. The great dynastic patrimony centred on the public *curtis* of *Cornino*, which controlled a large part of the lower Val di Cornia, is attested to at least as of the start of the 8thc, and is situated in an area which is well-investigated archaeologically (excavations and field-walking). Despite this, its *caput curtis* has not yet been excavated, or even identified with any certainty (see Dallai *et al.* above). In the dower, the *curtis* is estimated as 30 *mansi*. These were only the remains of the vast Lombard complex: the kings and the dukes of Lucca had detached the more marginal parts of it (like the outer layers of an onion) on behalf of their protégés. The fact that one of those who received the concessions was the Bishop of Lucca explains why we know the area so well[14].

Despite the land-grants to private individuals – and the probable division of property in the upper Val di Cornia, the so-called *Gualdo regis* – the *curtis* of *Cornino* retained a significant strategic value, and continued to guarantee sizable financial revenue: only this can explain why it was included in the dower, despite its peripheral location. While in 937 it was in the hands of the king, in the 11thc it had passed to the Aldobrandeschi, the most powerful family in the Maremma, which in former times had also been Counts of Populonia. Meanwhile, the *curtis* had changed its name, but not its nature. It was called the *curtis* of *Franciano* (a place-name which still exists, in the form *Franciano*, in connection with which, however, no traces have as yet emerged of the *caput curtis*), but it remained – unlike the more usual Tuscan *curtes* known from written texts – not an aggregate of *terra dominica* and *mansi* dotted across a larger or smaller area, but one very large, compact unit of land, precisely delimited (Collavini 2016, pp. 67-68). This was not a unique case in the Val di Cornia, given that the *curtis* di Gualdo also had the same characteristics, in the 11thc, being detached from the extensive, original public complex, at an unspecified time, and being attested in the mid-11thc as being in the hands of the Aldobrandeschi[15]. In this instance, moreover, toponyms in the hinterland, much more conservative than those in the coastal area, revolutionized by land drainage operations, even allow us to hazard a broad reconstruction of the borders. For that matter, it is possible, although in these cases the sources are ambiguous, that the same occurred also for other *curtes*[16].

We owe our detailed knowledge of the *curtis* of *Franciano* to the fact that, between late 11thc and the year 1121, half of it was ceded by the Aldobrandeschi, first on a precarious basis and later on definitively, to the monastery of S. Quirico of Populonia. The charters relating to these transactions, preserved by the monastery's cartulary, reveal clearly three essential points. The *curtis*, although reduced in size, remained compact, and was situated in the end section of the valley, just back from the coastal lagoon[17]. Despite modest agricultural production (suggested by the fact only 30 of the *mansi* were in the dower, and by the fact the surrounding natural environment was unsuited to agriculture), it guaranteed a substantial income. As soon as it received half of the *curtis* of *Franciano*, the monastery began an operation to reconfigure its identity – from a small local church to a monastery with regional yearnings – attested to both by excavation findings, and by written texts (Collavini 2016, pp. 68-69). The wealth of *Cornino*/*Franciano* derived primarily from control of the coastal salt-works. They are explicitly mentioned in charters and in the 1143 papal privilege; they are attested to by the other medieval sources and by modern cartography; traces, although only concerning late medieval features, have emerged from the excavation of the site of Carlappiano (situated within the space of the *curtis*), investigated in the context of the nEU-Med project (Collavini 2016, pp. 75-76 on the salt-works; for the excavation, see Dallai *et al.* above).

1.5. Basically converging considerations, although based on a more limited handful of sources, may also be made for the Val di Pecora and the *curtis* of *Valli*. In this case, though, the fact that the bishopric of Lucca had fewer interests in the area makes our knowledge more fragmentary. Originally, the *curtis* of *Valli* must have corresponded to the final section of the *Teupascio* (that is, "king's water"), as it was then called – with a very eloquent name – what is now the Pecora. As well as by analogy with the explicitly attested cases of *Cornino*

Canons of S. Martino, it had disappeared once and for all, see Guidi, Parenti 1910, n. 796 (1123), n. 800 (1123), n. 562 (1099), n. 564 (1099), n. 826 (1126) and so on; the new name was not established before the end of the 12thc, see *Fibbialla dei Canonici* 2004. For the Fibbialla near Pescia see Barsocchini 1841, n. 1639 (988), n. 1737 (998) and Ghilarducci 1990, n. 21 (1019).

[14] The most detailed analyses of the sources on the *Cornino* are those by Ceccarelli Lemut 1985 and 2004; cf. also Garzella 2005 and Collavini 2016. For the first mentions of the estate complex in the Val di Cornia, dating to the times of King Aripert II and King Liutprand, see von Glanvell 1905, III, 191, p. 155, for the dating and interpretation of which cf. Tomei forthcoming.

[15] Archivio di Stato di Firenze, *Diplomatico*, *Vallombrosa*, *S. Maria di Acquabella*, 1053 June 10 (id. 0007438), a copy from 1501, cf. Collavini 1998, pp. 115, 156.

[16] These were the *curtes* of S. Vito (held by the Bishop of Lucca), although its size is attested to by a late charter (and thus it may have only been a recent acquisition connected to the creation of the territorial lordship) and the *curtis* of Casalappi, for which we do not have border records, but which is used to identify the location of some property (situated inside the *curtis*) and which thus must have had a "territorial" nature, cf. Collavini 2016, p. 67 and Ceccarelli Lemut 2004, pp. 6-8, 20 and nt. 108.

[17] Giorgetti 1873-74, n. 40 (1121): *Petralata est ex una parte et Cornachini et rivus Pertuli currit in Notulo et Notulo vadit in stagno, ex altera parte est terra Sancti Petri de Monteviridi et Sancte Marie Grasse et tenet secus stagnum et usque in Notulum* (text corrected on the basis of the original in the Archivio di Stato di Firenze, *Diplomatico*, *Riformagioni. Atti pubblici*, 1029 Jenuary 4 [id. 0000401]). The *curtis*, accordingly, included the lands overlooking the lake with the salt-works, mentioned as being among its adjacent parts, extending on both sides of the Cornia (probably corresponding at the time to the later Corniaccia): to the NW as far as the Notro, to the SE as far as an unspecified point, located before Vignale. It also bordered on land belonging to the royal abbey of S. Pietro of Monteverdi, and on the lands of another monastery (*S. Marie Grasse*), perhaps St. Mary of Lagrasse, in the area of Carcassonne, confirming its public origin, and the gradual dismemberment of parts of the property complex in favour of individuals or churches linked to royal power.

and Castiglione della Pescaia[18], this is also suggested by the toponym itself, clearly referring to an area connected to the depression in which the river flowed before forming the lagoon which, back then, covered much of what is now the plain of Scarlino. The sources on this estate complex, although scant, allow some certainties: first, the fact it was part of the public estate. The first notice of *Valli* (and of its *curtis*) comes from the dower of Adelaide (937), which mentions the 50 *mansi* which belonged to her. Meanwhile its continuity until the end of the 10thc is suggested by the absence of other references to the site, which remained in the hands of the queen, and later of the monastery of S. Salvatore of Pavia, which she founded. We are led to the same conclusion by the fact that the Aldobrandeschi, who were the main rising power in this area too, could not claim rights over *Valli* at the end of the 10thc, but only over Scarlino, a marginal appendage to it, probably detached from the central nucleus of the *curtis* (see Kurze 1981, n. 203, cf. Collavini 1998, pp. 80-85).

However, things changed radically at the beginning of the 11thc. Indeed, *Valli* no longer appears in the diploma of Otto III for San Salvatore monastery (1000): by retiring to a private life (in around 995), Adelaide undermined the structure of the dower, and the very attribution to the monastery of the *curtis* (Vignodelli 2012). It therefore once again became a bone of contention on the part of those who aspired to administer those public assets (the March, the families in the marquis' entourage, the comital families, and the royal and marquisate monasteries). Although documentary references are few and far between, this is made clear by the few sources we have. In 1010 we find Rudolph III Aldobrandeschi dating a deed from the castle of *Valli* (Cavallini 1972, n. 11; cf. Collavini 1998, p. 96): this must have been a new fortified structure built within the *curtis*, perhaps by the counts themselves. At the time, a phase of fierce civil warfare was coming to an end, fought out over the inheritance of the throne of Otto III (between Arduin of Ivrea and Henry II) and of the March, following the death of Hugh. In Tuscia became victorious the faction led by the Aldobrandeschi and Gherardeschi, favouring Henry II (Collavini 1998, pp. 100-101). It is not surprising that, in this context, the Aldobrandeschi wanted to take over the *curtis* of *Valli* and fortify it, and that they knew how to do so. Indeed, one may suppose that these very political and military events may be the backdrop against which an initial crisis of the site of Vetricella took place, at least in functional terms, if not in terms of its material structures.

In any event, the Aldobrandeschi did not take possession of it definitively, because the reinforcement both of Henry II and of the *ex officio* marquises imposed by him in Tuscany (especially with Ranieri) placed a new question mark over the equilibrium which emerged from the civil war. The Aldobrandeschi had to renounce their control both over S. Pietro of Monteverdi, whose status as a royal abbey was reiterated by a diploma (1014), and, most likely, over the *curtes* of *Valli* and Scarlino[19]. Indeed, we find that, over the following 50 years, possession of *Valli* oscillated between various different individuals and institutions connected to royal power and the marquisate, without anyone taking full control over it: first, the Rolandinghi, a prominent family from Lucca, and later the bishops of Lucca and the S. Bartolomeo of Sestinga monastery[20]. The only known dealings with the Aldobrandenschi were purely negative: in 1055 Count Hugh I, the grandson of Rudolph III who had drafted the 1010 deed from the castle of *Valli*, promised the bishopric of Lucca that he would not damage its property, or vie for ownership of it, in several places, including *Valli* itself[21]. Thus, the sources suggest not only that disputes broke out over the rights to the *curtis*, but also that it may have been broken up between several individuals. This certainly contributed to it losing political and economic importance. There is no further indication that *Valli* retained any economic centrality at the turn of the 12thc, unlike *Franciano*. We can attribute this decline both to the subdivision of the *curtis* into several farming properties, and to a crisis in its original vocation for artisanal production.

The few available documents, which, moreover, contain little information regarding the structure of the *curtis* of Valli, do not shed light either on its size and exact spatial structure (which, indeed, probably changed over time), or on what the raw material was which led King Hugh to safeguard control over the area, first, and later Adelaide and the S. Salvatore monastery to retain possession of it for a long time, and, finally, the Aldobrandeschi and their opponents to try to take it over after the year 1000. By contrast, clear answers to this question are being offered by the archaeological investigations begun some time ago by Lorenzo Marasco, and now taken further in the framework of the nEU-Med project at the site of Vetricella, which was definitely part of the *curtis of* Valli. The significant investments in the site during the course of the 10thc, and their connection with other interventions planned in the Pecora valley, and the relationship between these interventions and iron-working, will be discussed below by Giovanna Bianchi (they are also referred to in the other contribution to the volume). What matters here is just to underline that archaeological findings relating to Vetricella (perhaps momentarily the *caput curtis* of *Valli*, or else a specialized appendage of it, geared towards production) fully confirms the developmental trends emerging from the few available texts: an initial, large-scale investment in the mid-10thc (connected to the dower), its continuation in the second half of the century (control by Adelaide), and then a crisis at the beginning of the 11thc which was a prelude to the site's definitive abandonment in the course of that century (probably connected to the fragmentation of the *curtis*, and its loss of function).

S.M.C.

[18] The fact that the *curtis* of Castiglione was a unified complex, with specific boundaries, emerges from DD. LI, n. †46 (814), although interpolated.

[19] DD. HII, n. 285 (1014); S. Pietro of Monteverdi had been claimed as a possession of the family in 973 (Kurze 1981, n. 203) and, indeed, it was not listed in the 937 dower. Scarlino, in the hands of the counts in 973, also seems to have been handed on to other persons, all linked to the *publicum*: clearly it had been reclaimed by the king and reinstated in the circuit of public assets, cf. Ceccarelli Lemut 1985 for the subsequent history of Scarlino.

[20] For the rights of the Rolandinghi see Guidi, Parenti 1910, n. 227 (1048); for the rights of S. Bartolomeo of Sestinga Manaresi 1955-60, III/1, n. 397 (1055), in a interpolated passage of the *placitum*; for the rights of the Bishop of Lucca see the subsequent note.

[21] Ghilarducci 1995, n. 97 (1055), the other locations mentioned in the oath are *Sussiano*, *Cangna*, Teupascio, Portiglioni and *Monte di Muro*, see Collavini 1998, p. 116; the family's interests in Valli re-emerge in the mid-13thc, but at the time they derived from a purchase from the Alberti Counts, see Collavini 1998, pp. 329-30.

2. AN OVERVIEW OF THE ARCHAEOLOGICAL RECORD

The writing of articles, already published, produced during the first few months of the nEU-Med project, has made it possible to draw up certain initial hypotheses regarding the issue addressed in this article, which the findings made with the project's continuation are largely confirming or adding to.

In the publication of research on the monastery of San Quirico di Populonia (*fig.* 1), in the chapter devoted to the promontory between Late Antiquity and the Early Medieval period (Gelichi 2016), Sauro Gelichi, setting out from the results of the recent excavations on the Populonia acropolis, found that, after widespread abandonment beginning in Late Antiquity, the original settlement saw a renewed (albeit limited) vitality between the end of the 8thc and especially in the first decades of the 9thc. Gelichi suggests that, in those decades, Populonia was made the site, albeit only temporarily, of the *comitatus* of Roselle-Populonia, which at the time was probably in the hands of the Aldobrandeschi counts. The material consequence of this operation can be seen in a number of adaptations of the older features, and especially in the presence of a particular material culture characterized by imported pottery wares, almost wholly absent in the coastal and inland circuits in this territory. The monastery's subsequent connection to the Aldobrandeschi would have helped that political and economic advancement which transformed the monastery from a mere bit-part player to a lead actor, in a geographical area in which the comital dynasty had a prominent public role ever since the Early Medieval period. Indeed, it was the donations of the Aldobrandeschi which increased the quantity and quality of the monastery's holdings, starting with the *curtis* of *Franciano*, above all, with its salt-works, sited near the lagoon of Piombino which, at the close of the 11thc, merged with the patrimony of San Quirico (Collavini 2016, and above). Furthermore, it is possible that the monastery also derived from the Aldobrandeschi the rights over the promontory which, in the Later Medieval period, would have justified a series of attempts to repopulate the acropolis, with the intention of establishing a fortified site on the summit area which came under the monastery (Bianchi 2016). Accordingly, these findings, taken together, reveal a number of new, essential points: the interest in this territory on the part of the public power, to the extent of organizing a seat of power, albeit a provisional one, on the Acropolis; the important role of the Aldobrandeschi counts as public officials; and the value of the wetlands with the presence of significant resources such as salt, which were controlled up until the end of the 11thc by a *curtis* which was originally public. We will return to these points later.

The subject of the link between the sites which were part of the public holdings, and the possible economic circuits connected to them, is at the centre of an article, in which reference is already made, albeit only in a limited way, to the initial findings of the nEU-Med project (Bianchi 2018).

In this article, for the end of the 9th and the 10thc (connected to which was the chronology of the sequences and finds made up until then), it was imagined that Vetricella had played a prominent role in the system of trade between the coast and the hinterland, precisely owing to the fact it was part of the public holdings, perhaps royal holdings, a point we shall return to later on below. Furthermore, it was suggested that activities involving the storage of goods, and the production of specialized articles, took place at Vetricella, connected especially to the manufacture of iron objects. The vocation of the site, its particular structure, and the already partial data on the organization of its construction processes, liken it to the nearby hilltop centres of Donoratico and Monterotondo Marittimo (*fig.* 1) at which, for contemporary sequences, archaeological investigation had identified similar characteristics, namely a major, monumental change of structure, and the presence of specialized forms of production (sparse glaze pottery at Donoratico; cereal storage at Monterotondo M.mo).

In the article, these sites were called 'out of scale', so as to differentiate them from contemporary sites, which have been the subject of archaeological investigation, and which feature simpler sequences.

One feature which these 'out of scale' sites are said to have had in common was the fact they were public possessions, albeit differing in their origin and their forms of administration. This common origin would justify this kind of economic strategy, which was seen in the article as a typical feature of public power. It was suggested that, at least for the 10thc, the public power was one of the main players, rather than a secondary player, in the sphere of economic growth. The creation of 'out of scale' sites, and thus public investment, linked to important transformations in the natural and forest environment, allegedly created the conditions for new links, and new exchanges, between the countryside and the city, helped by the existence of possible extensive economic systems, also connected to each other, administered by the public power.

As in the case of the aforementioned article, so too will we continue here, in this article, to refer to the time period between the second half of the 9th and the 10thc, in view of the fact that it is to this period that the material evidence so far investigated belongs which is best dated, and which, as a result, can be interpreted most certainly.

As regards the site of Vetricella, as one infers from the articles in this volume (see Marasco *et al.,* above), after the 2016 excavation campaign, we can posit a series of facts with greater certainty than in the past. The site was definitively abandoned in the course of the 11thc; unlike what was believed in the past, the site was not formed only in the course of the 9thc, but was established on a pre-existing site dating back to the beginnings of the Early Medieval period, regarding the nature and form of which future archaeological investigations will shed light; it is only as of the last decades of the 9thc that large-scale reorganization took place, giving the site its particular layout, already detected in the diagnostic phase. However, this important change took place in several phases: an initial phase involved the creation of the water channels and the moats, with a central building perhaps already present; a second phase, during which the moats were filled in, and an outer wall built, above the fill of the innermost moat, a defensive wall with its lower courses built of masory, and the upper part perhaps of perishable materials, while in the

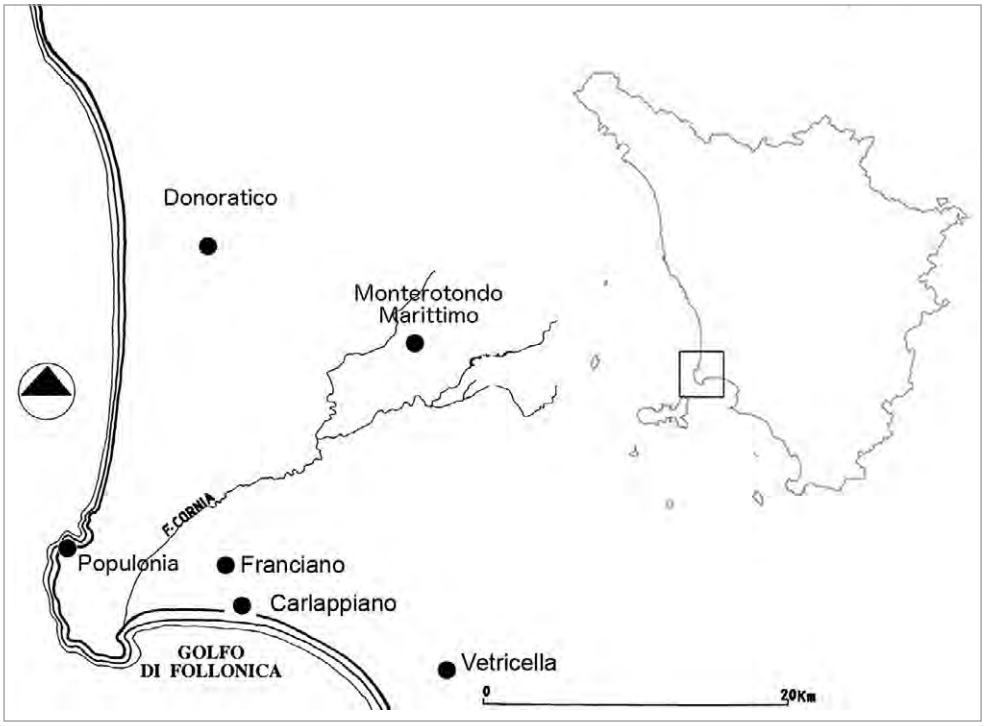

fig. 1 – Map of Tuscany showing location of sites mentioned in this article.

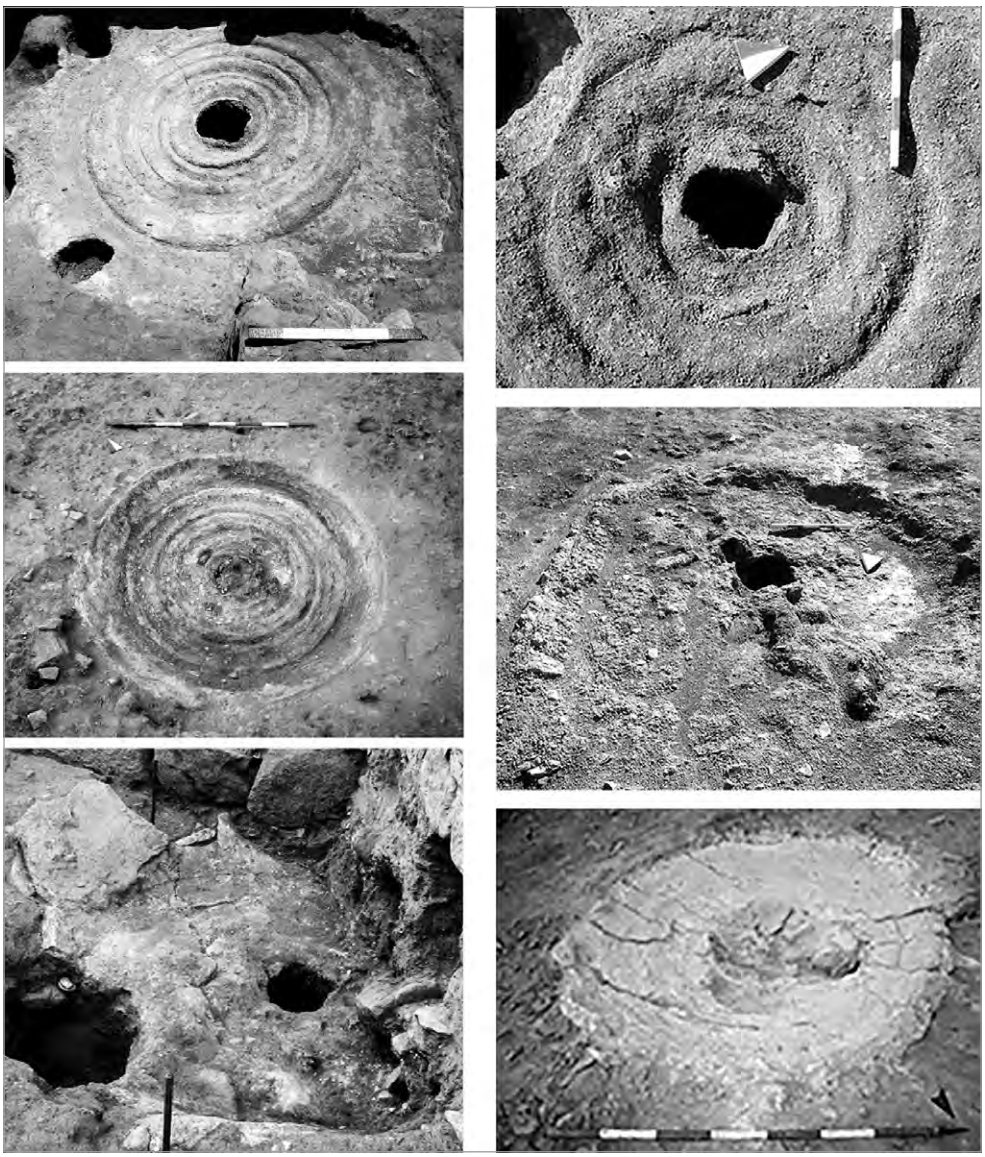

fig. 2 – Mortar mixers: on the left, the three mixers present at Donoratico; on the right, from top to bottom, the mixer at Vetricella and the mixer at Monterotondo Marittimo.

outermost ring a wooden palisade was erected. As shown by the finds, and especially by the numerous radiocarbon dates, the two phases were very close in time to each other, and may be placed between the last decades of the 9th and the 10thc. Unfortunately the figures from radiocarbon measurements do not enable us to define more limited time periods; this is a problem which we hope to solve with the arrival of new data. Indeed, the period in question, as we know, is associated with a complex history, and dating the transformations more precisely could make a substantial difference in the historical interpretation of the events.

In any event, the operations carried out in these phases reveal complex planning with the use of a specialized workforce, and also a large-scale involvement of manpower necessary to dig the moats. The presence of specialists is also proven by the use of mortar mixers (*fig.* 2), which a recent reinterpretation now indicates were definite *markers* not only of specialized knowhow, but also of skilled workers from an external geographical context (Bianchi 2011). While it is hard, in the case of the first phase, characterized by the moats, to speculate as to the presence and possible form of a central building, this building is certainly easier to define in the second phase. The tower-shaped building, in the exact centre of the circular boundaries, had masonry foundations and a wooden elevation, and it had a large canopy, perhaps on all sides, which covered an area which, at least on the western side, had a sort of flooring made of lime-based mortar. The large amount of pottery found in the 2016 excavation campaign is still largely identified as coming from storage containers, and thus designed for storing food (see Briano *et al.,* above), confirming the hypotheses advanced in previous articles on the site's vocation. Given that no other structures were found in the space within the central ring with a residential function, it is plausible that both the interior of the tower, and the external, covered spaces were designed for the storage of various products. The fact that a very large number of iron objects were found (more than 700 finds), including small knives, as well as the presence of numerous pieces of slag from forges, suggests that there may have been a concentration at the site of places where these objects were processed. This hypothesis will only find definitive confirmation with the identification, in future investigations, of the production features themselves, since the bulk of the objects found so far comes from secondary deposits[22]. Moreover, continuation of the research will make it possible to date more precisely this important production phase, which currently oscillates between the end of the 9th and the start of the 11thc (see Marasco *et al.*, above).

Recently there had been suggestions that Vetricella had a role in the processing of metals used for coinage, especially silver. Now, in the light of archaeometric analyses conducted on 10thc coins, an important initial finding has been made, to be checked as and when the number of samples increases: namely that metals used for coinage were by and large mined in the imperial mines in the Germanic area (Benvenuti *et al.,* above). Accordingly, any processing connected with silver or other minerals such as copper and silver-bearing lead, if proven with certainty at Vetricella, would have to be related to the production of precious objects, and not to the coin production cycle.

Initial analyses carried out on the forge slag indicate, on the other hand, the presence at the site both of iron, from the Colline Metallifere, and of hematite, from Elba[23]. This finding is to be appraised with caution, however, since the slag analyzed comes from secondary deposits, and is thus not connected to specific sequences. If confirmed, this would be of great importance, because it would attest to the fact that the specialist workers had sufficient knowhow to be able to use minerals from differing contexts, in order to obtain an alloy that was qualitatively superior. Furthermore, in the context of exchange relations with Elba, Vetricella's position on the edge of the lagoon would make more sense: goods from what is now the Gulf of Follonica would have been able to cross the lagoon, both to and from the site.

It is hoped that future excavations may also be able to clarify another point which is still unresolved, namely the presence of an inhabited space. As stated above, the findings from the excavation in the inner circle at the moment rule out such a presence. We still have to find out whether a residential nucleus existed in the spaces between the outer circles, or else in the immediate vicinity of the site.

In the economy of the activities carried out at Vetricella, this detail could, however, be unimportant, since the survey carried out in the recent past attests to the presence of several small agglomerated settlement sites in the plain close to the site, and in particular the presence of one not far from Vetricella which, also thanks to the most recent diagnostic analyses, seems to show a certain solidity and size (Marasco 2013; Marasco *et al.*, above).

Thus, if Vetricella was a site where, between the end of the 9th and the 10thc, goods were stored and products were made, we cannot rule out the possibility that much of its workforce came from the nearby satellite settlement sites.

Vetricella would thus have been at the centre of a system of exchange and resource exploitation where goods and materials would have arrived in order to be stored or worked. This particular role of the site might explain the fact that 17 coins, all datable to between the end of the 9th and the start of the 11thc, were found here. This is a large number compared to the almost total absence of coins at contemporary sites in the territory already investigated archaeologically (Rovelli in Benvenuti *et al.,* above).

The almost monumental layout of Vetricella in both phases, confirmed by the recent excavation, and its central economic role in this portion of the coastal territory, increasingly support the notion that we are looking at a site which was directly administered by the king. This had already been mooted in the past, also owing to its proximity to the *curtis* of Valli (see the remarks made above by Collavini). Future research will make it possible to better define the relationship

[22] The presence of a small forge, and limited stratigraphy associated with possible metal-working, dates only to the phase prior to the site's abandonment (see Marasco *et al.,* above).

[23] These are the preliminary findings made from specific investigations conducted at the Department of Earth Sciences, Florence, for the preparation of the sample, and by the Actlabs Laboratory (Ancaster, Ontario, Canada) for tests on the same samples.

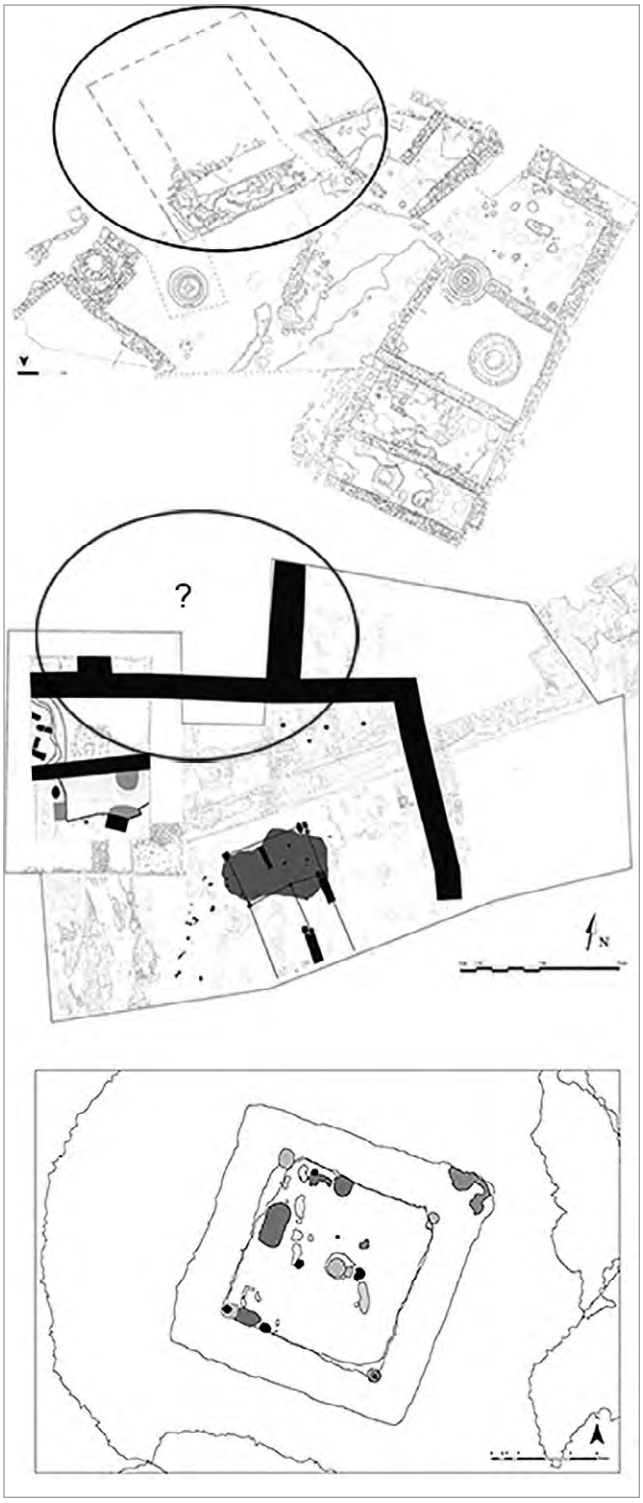

fig. 3 – The towers mentioned in the text: from top to bottom, plan of site of Donoratico, showing the remains of the tower; Monterotondo Marittimo, showing the possible remains of the tower; the robber trench of the perimeter walls of the tower at Vetricella.

between this site and the *curtis* centre itself, thus far believed to coincide with the castle bearing the same name located not far from Vetricella, atop a small hill (Ceccarelli Lemut 2004, p. 5; Cucini 1985, pp. 235-236). However, at present we can go by the considerations formulated by Collavini in the previous paragraph, which moot the possibility that Vetricella was the *caput curtis* of Valli or else a specialized appendage of it.

Regarding the scale of production, at present we can put forward some approximations, setting out from the number of finds made. The aforementioned fragments of storage vessels, mostly identifiable as containers of undecorated, levigated pottery, are indicative of storage on a considerable scale, given that, at other sites in the area, numbers of finds of the same pottery types and chronologies are considerably fewer. The same consideration holds true, exponentially, for iron finds. A large number of iron objects found are of a type which, unfortunately, could belong to a long time period, usually ranging from the Early Medieval period to the middle centuries of the Medieval period. However, the fact that Vetricella was certainly abandoned in the course of the 11thc rules out a later chronology for them, and allows them to be dated to the 11thc at the latest, when metal finds are few in excavations in Tuscany (Belli 2015).

The comparison between the finds made at this site and at the other contemporary sites in the area also places the emphasis on another important aspect, namely the apparent absence of repercussions of this production on the surrounding territory.

The same considerations can also be formulated for another site mentioned earlier as being 'out of scale'. This is Donoratico, where a specialized production of sparse glaze pottery is suggested, attested thus far by the presence of more than 3,000 fragments. There is no parallel for such a statistic at the other sites investigated, where sherds of this pottery ware number a few dozen, at most. The study of this pottery, which is the subject of a doctoral thesis, will certainly provide valuable data for understanding the definite chronology and the destination of this production (for initial considerations, see Briano *et al.,* in this volume).

The common features of these 'out of scale' sites, therefore, are particularly significant, despite the fact that they were probably public possessions of differing sorts: a property that perhaps came directly under the king in the case of Vetricella; public property granted to important institutions, such as the monastery of S. Pietro in Palazzuolo (Monteverdi Marittimo) in the case of Donoratico; and perhaps the Bishop of Lucca himself, or the same monastery, for Monterotondo Marittimo.

The different natures of these properties does not mean that there was no homogeneous programme of reorganization at the sites, as shown by the fact, already highlighted above, that mortar mixers were found at all of them. The presence of a tower is another feature common to the sites of Vetricella, Donoratico and perhaps Monterotondo Marittimo (*fig.* 3). This is true in the case of the last of these sites if we interpret as the remains of just such a structure the remains of a very thick wall adjacent to the outer enclosure, which would define a large building, one located, moreover, in a position strikingly similar to the one at Donoratico, in other words connected to the circuit of walls. As a result, a tower could also be interpreted as the sign of a specific vocation of the 'off the scale' sites, within which this building could be associated with the storage of specific products, as well as performing the more customary

function of living quarters. For that matter, it is no coincidence that the presence of towers, destined to become the distinguishing feature of the later feudal castles, is indicated by the written documents in this area only in the context of large properties, probably the result of important public grants, as in the case (to remain in this territory) of the *curtis* of S. Vito al *Cornino*, the property of the Bishop of Lucca, and bordering on the public *curtes* of *Franciano* and Valli itself (Ceccarelli Lemut 2004, pp. 6-8).

It remains to be seen, from future research, whether the most discordant element among these 'out of scale' sites is to be ascribed to this differing nature of the public properties. The discordant element in question is the absence of a clearly defined borgo in the case of the possible public *curtis* of Vetricella, which contrasts with the presence of a definite residential area at Donoratico and at Monterotondo Marittimo (as one deduces from the written and archaeological sources). It may not be a coincidence that this dishomogeneous feature is connected to the differing fates which befell the three sites, given that the definitive abandonment of Vetricella, in the course of the 11thc, was matched by a gradual transformation in castles associated with the new territorial seigneurships in the case of Monterotondo Marittimo and Donoratico.

Despite the fervid building activity and production at the 'out of scale' sites, a large part of this territory, both in layout and in terms of pottery production, does not seem to undergo major transformations in this phase, being characterized, up until the later 11thc, by local forms of production, albeit in some cases more specialized. This latter fact is borne witness to by the circulation of small transportation vessels made between Roccastrada and the area of Monterotondo Marittimo, discussed in this volume (Briano *et al.,* above). However, this could be a sign of the vitality of the rural communities which populated this area with their small élites, a vitality already noted in recent studies which was probably also the reason for the success of this sort of programme, backed by the central authorities (see, for example, Bianchi 2015). In future investigations, it will be essential to understand whether the absence of any enrichment of the material culture of these communities is indicative of the fact they were almost totally impermeable to this public programme, or whether its impact had consequences in spheres which are yet to be defined.

Analysis of pottery finds in this territory also highlights the lack of imported wares up until the later 11thc, barring exceptions such as the heavy glaze found at the acropolis of Populonia, the presence of which is now more plausible if we consider that that location may have been the site of the *comitatus* of the same name (Gelichi 2016).

The study, in this volume, of the pottery finds from *portus Scabris*, situated on the edge of the Gulf of Follonica, shows the very small amount of imported pottery throughout the Early Medieval period also at this maritime port (Vaccaro above). Accordingly, this fact would lead one to interpret it more as a stopping-off point along the sailing routes up and down the Tyrrhenian coast, rather than as a full-scale port geared towards trade between the coast and the hinterland.

This kind of picture thus reveals a considerable discrepancy, at least in the 10thc, between the almost total absence of commerce or trade movements linked to the Tyrrhenian routes and geared towards the hinterland, and the considerable vitality of projects and changes which we see in rural areas, not only in relation to 'out of scale sites', but also to profound changes in the landscape.

Geomorphological and archeobotanical analyses relating to the former course of the river Pecora, presented in this volume (Pieruccini *et al.,* above), date important interventions involving both the course of the river itself and in the surrounding territory especially to the final decades of the 9th and 10thc, with possible fires designed to clear more land for arable use or pasture. These actions suggest a close link between the site of Vetricella and the new strategies for exploiting the surrounding territory pursued on such a large scale as to leave little doubt as to the fact they were planned as part of a wide-ranging programme connected to important political operators. The creation of the 'out of scale' sites would thus seem, at least for the Pecora valley, to be linked to a project to reorganize the territory.

It is hoped that future investigations in the adjacent Cornia valley may provide equally useful findings for this interpretation. Indeed, in this valley stood another important public possession, the *curtis* of *Cornino*, also mentioned in the dower of Hugh of Arles. In the first paragraph of this article, Collavini suggests that this *curtis*, which initially belonged to the king, later passed to the Aldobrandeschi, counts of this *comitatus*, changing its name to become *Franciano*, and donated, under this name, to the monastery of S. Quirico di Populonia in the course of the 11thc. The value of this possession is indirectly reflected by the monastery's economic and political shift up in gear at the time of its acquisition. *Franciano* (and, earlier, the *curtis* of *Cornino*) also comprised the area near the original marsh of Piombino. This zone, as we know from contemporary sources, was characterized by the presence of salt-works. The excavations at the site of Carlappiano enabled the rediscovery of traces of some of these facilities, although they can only be related to the Late Medieval centuries. It is nevertheless possible, as suggested by Dallai, that these features stood in an area which had been set aside for some time for this purpose, and that the older traces (given their perishable nature) of these have been lost, despite the fact that it was possible to infer long frequentation thanks to the pottery found during the survey campaigns (Dallai *et al.,* above).

If these hypotheses were correct, a scenario never contemplated before in any historical reconstruction would take shape, namely the presence of important nodal sites for production, for managing local resources, and perhaps also possible administrative centres, situated in the costal area, directly subordinate to the public power. These centres would possibly be connected to other centres in the hinterland, and this link would have formed, or been strengthened, especially in the course of the 10thc, when a total reorganization of these sites took place, and a wider, interlinking system was created, geared towards the exploitation of important resources, or to specific forms of production.

G.B.

3. CONCLUSIONS: THE SIGNIFICANCE OF "OUT-OF-SCALE" SITES

In an attempt to draw provisional conclusions, which might help formulate the questions which might guide the continuation of the nEU-Med project, we try to sum up the salient points which have emerged from our interpretation, with the aim of backing up and implementing the considerations set out by Hodges in this volume (Hodges above).

The case of Vetricella, placed alongside Donoratico and Monterotondo Marittimo, has brought to the foreground the presence of sites which display a profound difference in their layout and function, compared to other sites in the same geographical district, which have been the subject of archaeological investigation for some time. At present, their formation can be dated between the final decades of the 9th and the 10thc. Future investigations, especially at Vetricella and in its surrounding territory, will make it possible to specify its chronology more precisely, also in relation to subsequent, possible adaptations and reorganizations of the sites.

In an attempt to place late 9th-11thc Vetricella within interpretative frameworks associated with northern Europe, Richard Hodges describes it, for the 10thc, as a centre of administration and production on a par with a *solar central place*. This description would fall away in the course of the 11thc, when, prior to its abandonment, absorbed within a possible seigneurial district, Vetricella may have only retained the function (perhaps on a reduced scale) of a centre for the production of iron objects, above all.

For Donoratico and Monterotondo Marittimo, the available archaeological findings do not make it possible to adopt, for the 10thc, the same definition of *solar central place*. Pending future investigations, we therefore prefer to give the sites analyzed here the more generic definition of 'out of scale', to underline their peculiar nature.

On the basis of our current knowledge, we can try, first, to reflect on what these 'out of scale' sites *are not*. First and foremost, they are not central places for local trade, because the forms of specialized production do not seem to have any repercussion on the surrounding lands. At the same time, the 'out of scale' sites do not seem to be the fulcrums of complex regional or extra-regional trade networks, given the absence of the main indicator of trade itself, namely imported pottery, absent until the later 11thc in the hinterland, and present in very scant amounts at coastal ports.

The material record and information from written sources also show, fairly clearly, what these sites *are*. They are very homogeneous sites, belonging to a single property. In fact, they are public possessions managed directly by the royal power, or else entering the possessions of important political figures that received benefits directly from the kings and/or from the marquises, of Tuscia with parts of the public patrimony. Together, these sites, closely comparable to the aforementioned cases coming from northern Tuscany, eventually achieved a significant critical mass, especially as of the 10thc, within a unified political space, the March of Tuscia, which was in a phase of full expansion at this time. These sites had forms of specialized production, specific or otherwise, and these activities seem to be placed in a complex economic context, which was planned by the central power. In the case of Vetricella, its development did not lead to the formation of a settlement, although this was present in other instances, such as at Donoratico, at Monterotondo Marittimo, or, in northern Tuscia, at San Genesio. Future investigations will be able to clarify whether this absence was connected to the particular forms of administration of this public property (which remained under the king's direct control), to the type of production which characterized Vetricella, primarily (i.e. iron), or, finally, to other factors yet to be identified.

How was the system able to work? On the basis of archaeological findings, above all, we can say that it consisted of a network of sites (*curtis* sites or otherwise) which served the needs of a "very important owner" (the fisc); this had been set up to manage large agricultural holdings, to exploit natural resources, and to produce goods, often of a certain complexity and designed for specific uses: pottery, iron (weapons, and also tools needed for artisanal work, such as the small knives found at Vetricella), stone (military and prestige constructions), foodstuffs, and salt. Again, the exceptional size – compared to standards of the other *curtes* – suggests the development of forms of complex specialization able to create an infrastructure network which lies at the foundation of a system of exchange. At present we can take the view that the circulation of these products did not take actually place, at least initially, in plain commercial forms, since the products made at these centres were probably geared both for the cities and the court, and perhaps for the other 'out of scale' sites and the other major public properties. Within this infrastructure network, one of the purposes of the sites situated along roads and the coast was to enable the movement of products, acting as departure points for local products towards the centre of the system, represented, as stated earlier, by the court, the city, and other major public properties.

What is the role of this system in the economic evolution of Tuscia? At present, pending the new findings which will come from our project, and a more detailed and mature reflection, we can already put forward the hypothesis that a truly economic and commercial impact derived, indirectly, from the workings of this system. The public economy linked to the 'out of scale' sites and to their territories and resources could, indeed, be that "dark matter", given little consideration in reconstructions of economic history, that was capable of constituting the conditions (demographic, productive, technological) which underpinned the prodigious, and sudden, dynamism in the economy of Tuscany from the end of the 11thc (cf. Molinari 2010), when the system, with the crisis of the March of Tuscia, stopped working, and some of the key sites, such as Vetricella, were abandoned, while others saw further and rapid expansion, such as San Genesio.

The crisis of the March, which spelled the end of this public economic system, was also followed by an economic reorganization in the direction of a greater localization, connected in particular to the more marked development of *seigneurie banale*, as happened in the political and social spheres. Some of the original nerve-endings of the estate system, who became important pieces in the process whereby local seigneurships became established, eventually became more closely connected to the local economies, as is shown

by archaeology, becoming in some cases reference points in the new signorial districts (see the cases of San Genesio/San Miniato, Donoratico or Monterotondo Marittimo, cf. Cantini, Salvestrini 2010; Bianchi 2004; Bruttini, Grassi 2009).

This kind of proposed interpretation would make it possible to explain the conditions – or at least some of the conditions – which allowed Tuscany to become, at the height of the Medieval period, one of the richest regions in Europe, despite a modest aristocratic fabric, fragmented estate ownership, and a limited connection to networks of supra-regional trade prior to the 11th-12thc (Wickham 2005, e.g. pp. 214-16, 387-93; Cantini 2015).

The validity of these provisional hypotheses will need to be verified on the one hand with the continuation of research in the sample territory, and, on the other hand, by means of a wider and more detailed comparison with other parts of Tuscany and central-northern Italy.

G.B., S.M.C.

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Abstract

This article aims to bring together findings from material and documentary sources, with a view to a comparison for the purposes of understanding the appropriate historical context relating in particular to the 10thc. The information gathered so far from research shows, indeed, that it is above all at this moment in time that important transformations took place in the nEU-Med project sample area, affecting both natural and anthropic landscapes, as is shown by the transformations involving the site of Vetricella.

Setting out from information that can be gleaned from the double dower, dated to 937, issued by Hugh of Provence, attention is focused in the first part of the article on the foundations of public power in the geographical areas of northern Tuscia and the Maremma area, to highlight the fact that this was a prominent player in the regional economy at the time. This information make it possible to reveal a parallel relationship between the development of the site of Vetricella and the general economic strategies implemented by this player.

In the second part of the article, the synthesis of the material information deriving from the interdisciplinary investigations makes it possible to see similarities between the transformations that took place at Vetricella in the course of the 10thc and those that affected a number of other sites connected to public powers present in the area investigated by the project. This makes it possible to reveal a contemporaneous relationship between actions designed to fortify and expand the sites in question, with a view to creating centres that were often characterized by the production of specialized items.

In the final part of the article, the findings made on the basis of the various sources are brought together to circumscribe as precisely as possible the characteristics of these sites having a public physiognomy, and a different, higher scale of production and settlement than those present in many parts of Tuscia already explored archaeologically, in an attempt to make suggestions as regards what relationship they may have had with the economic growth which was a feature of the 10th and 11thc.

ITALIAN ABSTRACTS

Giovanna Bianchi, Richard Hodges

INTRODUZIONE

Il progetto nEU-Med, rientra nel programma Horizon 2020 e nella categoria dei progetti ERC Advanced. Il suo inizio è stato nell'ottobre 2015 mentre la sua conclusione avverrà nell'ottobre 2020.

Il progetto, finanziato con 2,5 milioni di euro, ha come host institution l'Università degli Studi di Siena e si svolge nel dipartimento di Scienze Storiche e dei Beni Culturali. Per la forte impronta interdisciplinare partecipano al progetto anche i dipartimenti di Biotecnologie, Chimica e Farmacia e di Scienze Fisiche, della Terra e dell'Ambiente con docenti facenti parte del senior team.

Negli ultimi trenta anni l'Archeologia Medievale ha fornito molti dati in grado di cambiare la canonica interpretazione della storia dell'Europa dopo la caduta dell'Impero romano sino ai secoli centrali del Medioevo. Recentemente sono stati elaborati importanti quadri di sintesi riguardanti soprattutto l'Europa del Nord che, a differenza di quella del Sud, tra VII e IX secolo ebbe una importante ed omogenea crescita economica. È solo a partire dal IX secolo che alcune regioni dell'Europa meridionale, come l'Italia, furono coinvolte in analoghi processi di trasformazione. Ciò comportò la formazione graduale – a partire dal XII secolo – di un più equilibrato scenario economico, preludio di un più ampio ed unitario sistema di scambi commerciali e culturali tra Nord e Sud d'Europa. Le modalità ed i tempi di questa prima, fondamentale crescita dell'area occidentale del Mediterraneo, avvenuta tra VII e XII secolo, debbono però ancora essere comprese nella loro interezza. Questo progetto ambisce alla comprensione di tale processo attraverso un'attenta analisi dei cambiamenti degli insediamenti umani, dei paesaggi naturali ed agricoli in relazione allo sfruttamento delle risorse e delle diverse strategie politiche.

Per affrontare simili quesiti storici il progetto nEU-Med ha scelto di indagare un settore della Maremma settentrionale compreso tra i rilievi delle Colline Metallifere, le vallate solcate rispettivamente dai fiumi Cornia e Pecora e l'area costiera, che si estende dal golfo di Follonica a quello di Piombino (*fig.* 1). Qui, in età medievale era presente un sistema di lagune e paludi associato ad alcuni importanti approdi come *portus Scabris* (nell'attuale golfo di Follonica) e il porto di Falesia (presente nel golfo di Piombino). La varietà di ambienti naturali e di risorse presenti in quest'area (sale, cerealicoltura, silvicoltura, filoni minerari etc) rendono questo comprensorio un territorio-tipo del Mediterraneo occidentale, rappresentativo di altri contesti con simili peculiarità.

Per il territorio è già disponibile una notevole quantità di dati, risultato di precedenti indagini archeologiche e documentarie condotte negli ultimi trenta anni dall'Università di Siena ed avviate sotto il coordinamento di Riccardo Francovich[1].

Nelle Colline Metallifere sono stati indagati otto castelli di cui quattro scavati in estensione (Rocca S. Silvestro, Francovich 1991; Donoratico, Bianchi 2004; Cugnano, Bruttini, Fichera, Grassi 2009; Bianchi, Bruttini, Grassi 2012; Rocchette Pannocchieschi, Grassi 2013) e quattro nella loro area sommitale (Campiglia, Bianchi 2004; Suvereto, Ceglie, Paris, Venturini 2006,; Rocca Alberti, Bianchi, Grassi 2013; Scarlino, Francovich 1985). Di questi otto castelli sette hanno fasi altomedievali e tre (Rocca San Silvestro, Rocchette Pannocchieschi; Cugnano) sono legati allo sfruttamento dei minerali argentiferi. Sono stati poi scavati due monasteri alto e basso medievali (S. Quirico di Populonia, Bianchi, Francovich, Gelichi 2006; S. Pietro a Monteverdi, Francovich, Bianchi 2006) ed effettuati scavi urbani nel centro di Piombino (Berti, Bianchi 2007) e di Montieri (Aranguren, Bianchi, Bruttini 2007), sede dell'originario castello ed oggetto di un'estesa indagine in tutto il suo territorio comprensiva anche dello scavo di un sito prossimo al castello denominato Canonica di S. Niccolò (Bianchi, Bruttini, Grassi 2012; Bianchi c.s.). A questa antecedente stagione di ricerche appartengono anche le prime indagini nel sito della Vetricella (Marasco 2013a). Gli scavi sono stati affiancati da ricognizioni di superficie che hanno riguardato sei comprensori comunali (Campiglia, Scarlino, Piombino-Populonia, Massa Marittima, Montieri, Monterotondo M.mo (Francovich, Dallai 2005; Dallai *et al.* 2009).

I dati desunti da queste ricerche costituiscono una preziosa base di partenza e rendono concretamente raggiungibili gli obiettivi proposti nei cinque anni di progetto.

Questo volume raccoglie i risultati del primo anno e mezzo di ricerca dopo la discussione di questi ultimi in occasione del primo nEU-Med-workshop tenutosi a Siena l'11 ed il 12 aprile 2017 a cui hanno preso parte colleghi inclusi o meno nello scientific board[2].

In questo periodo, seguendo gli obiettivi che ci eravamo proposti, un alto numero di giovani ricercatori di diversa formazione è stato coinvolto nelle varie indagini[3].

Il progetto nEU-Med nel suo svolgimento ed in base ad i suoi obiettivi prevede una approfondita ricerca nel territorio campione che consentirà di formulare delle specifiche domande in grado di indirizzare ragionate comparazioni con altri territori toscani e non, legati al comprensorio di questa parte di Mediterraneo occidentale.

Nel primo anno e mezzo di attività si è deciso di avviare innanzitutto lo studio dell'area costiera per poi rivolgersi, in tempi successivi, all'interno. Tale scelta è stata determinata da una serie di cause concomitanti:

a) il cosiddetto modello toscano legato alle dinamiche insediative tra alto e basso Medioevo elaborato in passato da Francovich è stato prevalentemente basato su indagini in siti di altura posti nell'immediato entroterra costiero o nell'interno (Francovich 2002; Francovich Hodges 2003; Francovich 2008), mentre la costa non era stata mai analizzata sistematicamente. Era, quindi, importante intervenire in questa area, soprattutto a fronte di indagini puntuali svolte in un recente passato (in particolare Marasco 2013) da cui si percepivano le sue potenzialità informative in grado o meno, quindi, di confermare od integrare il modello toscano pensato da Francovich.

b) Come si scrive nel primo contributo di questo volume, studiare il tema della crescita economica di questa parte del Mediterraneo presuppone anche studiare il sistema dei traffici

[1] Nelle attività legate alla dissemination del progetto è stata organizzata a Siena una mostra dedicata a Riccardo Francovich in occasione del decennale dalla sua scomparsa. La reale fattibilità del progetto nEU-Med si lega fortemente, infatti, alla ricerca svolta in passato da questo noto ed importante archeologo. La mostra dal titolo *Riccardo Francovich. Conoscere il passato, costruire la conoscenza*, è stata allestita presso il Dipartimento di Scienze Storiche e dei Beni Culturali dal 30 marzo al 26 maggio 2017 per poi essere trasferita in altre sedi della Toscana.

[2] A tale proposito ringraziamo vivamente Marie-Christine Bailly-Maitre (CNRS Aix-Marselille), Marc Bompaire (Ecole Pratique des Hautes Etudes, CNRS Orleans), Luc Bourgeois (Université de Caen), Michael McCormick (Harvard University), Sauro Gelichi (Università Ca' Foscari, Venezia), Alessandra Molinari (Università degli StudiRoma Tor Vergata), Chris Wickham (University of Oxford) per la loro partecipazione e per gli utili suggerimenti forniti durante la discussione.

[3] Per un dettaglio del numero e delle attività dei giovani ricercatori coinvolti si rimanda al sito del progetto www.neu-med.unisi.it

e dei commerci via mare. Iniziare le indagini del progetto dalla costa avrebbe consentito di integrare le informazioni sinora acquisite da precedenti ricerche sui vari approdi che nel Medioevo contraddistinguevano questa porzione di costa, verificando la reale portata e le caratteristiche degli scambi

c) In questo territorio costiero erano posti due dei tre siti chiave del progetto: Carlappiano e Vetricella. Avviare delle ampie indagini in questi contesti avrebbe consentito di comprendere come siti di questo tipo, inseriti in un sistema paesaggistico lagunare, potevano funzionare sia come cerniera tra interno e mare, sia anche come centri di sfruttamento/gestione di specifiche ed importanti risorse: il sale ricavato dalle saline poste intorno allo stagno di Piombino e attestate con certezza a partire perlomeno dall'XI secolo; i giacimenti minerari presenti nell'immediato interno il cui sfruttamento, nell'alto Medioevo, doveva essere collegato al contesto politico istituzionale facente capo a Lucca.

A questa strategia di ricerca si lega, quindi ed innanzitutto l'edizione di indagini svolte in passato nel promontorio di Baratti-Populonia (Piombino) per l'occasione rielaborate con un preciso sguardo ai risultati delle ricerche svolte nell'ambito del progetto nEU-Med[4].

Le scelte, invece, legate alla presente edizione partono dal presupposto che il progetto è composto da diverse unità di ricerca facenti riferimento a molti campi di indagine e relative metodologie, nell'ottica di un approccio più possibile interdisciplinare. In questo volume si è, pertanto, deciso di non rendere conto delle attività svolte all'interno di tutte le unità ma di selezionare quei filoni di indagine che, alla fine del primo anno e mezzo dall'inizio del progetto, hanno consentito di raccogliere dati sufficientemente completi per offrire spunti di ricerca necessari ad articolare e sviluppare maggiormente la strategia di ricerca nell'immediato futuro.

Se il primo contributo del volume (Hodges *infra*) ha l'obiettivo di inquadrare le tematiche storiche affrontate dal progetto all'interno di un più ampio contesto mediterraneo ma anche nord europeo, in due contributi successivi, scritti da più autori (Marasco *et al.*; Dallai *et al. infra*), ci si focalizza di nuovo sul territorio campione, attraverso un primo resoconto dei risultati delle prime indagini archeologiche estensive, ancora in corso, svolte nei siti di Vetricella e Carlappiano nell'estate-autunno 2016.

I territori relativi a questi siti sono stati analizzati con un approccio non solo prettamente archeologico (survey; diagnostica di vario tipo etc) ma anche con analisi geomorfologiche, archeobotaniche e chimiche. In questa sede si illustrano i risultati sinora acquisiti per la valle del fiume Pecora (Pieruccini *et al.*), alle cui ultime propaggini si trova il sito della Vetricella. Il proseguo della ricerca consentirà di raccogliere altrettanti, importanti dati per l'area più interna di questa valle e per il comprensorio immediatamente confinante, solcato dal fiume Cornia e dai suoi affluenti.

Di seguito si è poi scelto di presentare i dati relativi allo studio di alcune classi di reperti in particolare quelli ceramici. I contributi contenuti nel volume fanno volutamente riferimento a due specifici contesti di indagine: *portus Scabris* (Vaccaro *infra*), il principale approdo nell'attuale golfo di Follonica dove confluiva la laguna ai cui margini si trovava il sito di Vetricella; il territorio interno (Briano *et al. infra*). Lo studio della ceramica proveniente da *portus Scabris* ha pertanto consentito di tracciare un importante quadro diacronico della caratteristiche e del volume dei traffici e dei possibili scambi che caratterizzarono questo come gli altri approdi marittimi presenti in questa fascia costiera in rapporto all'intero contesto toscano e tirrenico.

L'analisi di classi ceramiche circolanti solo nei territori interni comincia, invece, a gettare luce su produzioni locali, legate ad un sistema economico forse di maggiore complessità rispetto a quanto ipotizzato in un recente passato.

Se i reperti ceramici illustrano la quotidiana cultura materiale seppure all'interno di differenti sistemi di scambio e produzione, il contributo dedicato a Lucca e alla sua corte nell'alto Medioevo (Tomei, *infra*) si focalizza sui complessi sistemi di autorappresentazione e più o meno direttamente sulla circolazione di merci destinate ai ceti dominanti. Un aspetto, questo, rilevante nell'ottica di una ricerca volta alla definizione di sistemi economici anche incentrati su produzioni puntuali di lusso che potevano fare uso di materie prime magari provenienti da ambiti esterni a Lucca e relativi ai vasti territori che politicamente facevano riferimento a questo centro urbano.

Un progetto che ha come obiettivo lo studio della crescita economica non poteva, poi, tralasciare l'aspetto legato alla produzione e circolazione monetaria (Benvenuti *et al. infra*). Questo anche per la presenza, nel nostro territorio campione, di importanti filoni minerari da cui potevano essere ricavate le materie prime per la fabbricazione di monete in argento, del cui sfruttamento per il periodo basso medievale molto è noto grazie alla pregresse ricerche (per una sintesi Benvenuti *et al.* 2014). Se inizialmente, durante la stesura del progetto, si riteneva solida l'ipotesi di uno sfruttamento di tali metalli monetabili a partire dall'alto Medioevo, il contributo dedicato a questo tema, in cui si presentano i risultati delle prime analisi archeometriche su di un campione di monete databili tra X ed XI secolo, apre sicuramente nuovi ed importanti scenari.

L'ultimo contributo (Bianchi, Collavini *infra*) si origina dalla constatazione di una assonanza cronologica di molte delle evidenze materiali sinora studiate ed in parte presentate in questa sede, che riporta soprattutto al X secolo importanti trasformazioni. Attraverso un dialogo tra fonti scritte e fonti materiali si cerca, pertanto, di mettere a fuoco il contesto storico di riferimento e le possibili comparazioni tra alcuni siti di questo come di altri territori, a partire dalla stessa Vetricella, per meglio comprendere le dinamiche politiche, economiche ma anche sociali legate a questi cambiamenti.

Riassumere in questa breve introduzione quelli che saranno i punti chiave della futura agenda della ricerca sarebbe impossibile per il loro numero e la loro complessità. Spunti anche consistenti di una simile agenda sono presenti in ognuno dei contributi qui presentati in riferimento ai differenti filoni di indagine. Il proseguimento della ricerca sta già arricchendo tale agenda rispetto alle tematiche trattate nel primo anno e mezzo di lavoro e le domande sorgono ogni giorno più numerose in contemporanea a nuove ed a volte inaspettate acquisizioni.

Quest'ultime saranno presentate nel prossimo workshop, previsto per il 2019, che sarà il punto di partenza per le conclusioni finali di questo progetto.

[4] Si tratta del volume dal titolo *Un monastero sul mare. Ricerche archeologiche a S. Quirico di Populonia (Piombino, LI) / A Monastery by the sea. Archaeological research at San Quirico di Populonia (Piombino, LI),* a cura di G. Bianchi e S. Gelichi uscito nel marzo 2017 per la casa editrice All'insegna del Giglio nella collana Biblioteca di Archeologia Medievale. Il volume pubblicato in open access è scaricabile gratuitamente al seguente link https://www.insegnadelgiglio.it/prodotto/un-monastero-sul-mare-ricerche-a-san-quirico-di-populonia/

Richard Hodges

VERSO UNA NUOVA NARRATIVA MEDITERRANEA PER L'ALTO MEDIOEVO TOSCANO

Questo articolo offre un'introduzione al progetto nEU-Med, collocandolo all'interno delle linee di ricerca dell'archeologia medievale italiana e proponendo al contempo un modello relativo ai cambiamenti funzionali dei siti localizzati nella Valle del Cornia e del Pecora tra VII e XII secolo, a seguito della prima stagione di ricerche sul campo svolte nel 2015-2016.

Le basi del progetto si fondano su oltre trent'anni di ricerche archeologiche condotte da Riccardo Francovich nella Maremma Toscana prima della sua prematura scomparsa. In tal senso pochi distretti sub-regionali dell'Europa Medievale sono stati sottoposti ad un vaglio archeologico così approfondito come l'area che comprende le Colline Metallifere, il litorale costiero che si estende dall'antica città di Populonia al centro urbano che diverrà suo erede nel Medioevo, Piombino, proseguendo a sud fino a Grosseto. Obiettivo del progetto è quello di mettere in luce le dinamiche che hanno coinvolto una porzione di costa italiana, che racchiude anche il comprensorio delle Colline Metallifere nell'immediato entroterra, e come questa si è interfacciata con il Mediterraneo nel corso dell'epoca post-classica. Il progetto nEU-Med ha colto sin dal suo avvio che l'attuale dato archeologico testimonia l'illusorietá di un Mediterraneo (post-classico) unitario ed immutabile. Esso in realtá, in seguito alla dissoluzione dell'Impero Romano, si andó articolando attorno ad una serie di reti frammentarie e localizzate, come prima dell'avvento del mondo classico.

Il nostro scopo è dunque quello di comprendere come i corridoi fluviali dei fiumi Cornia e Pecora, localizzati tra il Tirreno e le Colline Metallifere, andarono a rapportarsi con il Mediterraneo dopo la tarda antichitá, se ció mai avvenne, in assenza di un chiaro sbocco portuale, prima dell'emergere di Pisa tra XII e XIII secolo, e quale ruolo giocarono i possibili interventi politici dal Nord Europa nel condizionare l'evoluzione di questo distretto territoriale.

L'emergere di nuovi dati solleva una serie di quesiti che si concretizzeranno in ulteriori ricerche da portare avanti nei prossimi tre anni. Questi dati possono essere riassunti nei seguenti punti

1. Ricerche paeloambientali hanno dimostrato come la Valle del Pecora ha subito una rilevante trasformazione tra la fine del IX e l'XI secolo. Durante questo periodo il fiume fu probabilmente irregimentato e parallelamente, a partire dal X secolo inoltrato, furono introdotte nuove coltivazioni tra cui l'olivo ed il castagno. Tali cambiamenti sembrano avvenire in concomitanza alla creazione a Vetricella di un sito ubicato tra il tracciato della via Aurelia e la porzione orientale della laguna interna di Scarlino.

Lo schema insediativo subì diverse trasformazioni tra VII e XII secolo.

2. Durante il VII secolo la funzione di porto di cabotaggio, svolta da *Portus Scabris*, sembra in larga parte perduta.

È probabile che Vetricella fosse concepito come un piccolo "punto di scalo", anche se la sua esatta funzione deve essere ancora definita. In questo senso è rilevante l'assenza di anfore globulari e altri beni d'importazione.

Nel IX e X secolo (in base alle datazioni al radiocarbonio) Vetricella divenne un sito amministrativo caratterizzato da un'inusuale ma ben distinta articolazione planimetrica, anche se l'apparente mancanza di strutture quali alloggiamenti per un seguito, officine, oppure un edificio con funzioni religiose, porterebbe a suggerire un ruolo ben piú limitato. Questo forse consisteva nell'amministrare, come punto di snodo, attivitá di stoccaggio e produttive metallurgiche possibilmente svolte nell'immediato circondario (anche se questo é ancora da stabilire con certezza). Non è ancora chiaro se queste ultime sono da ricondurre alla produzione di utensili e di equipaggiamento equestre in ferro, qui documentati in significative quantitá. Per il sito non si possono escludere funzioni di tipo fiscale; in tale senso la presenza di un cospicuo numero di monete è particolarmente interessante. La ricca cultura materiale sinora rinvenuta non offre quasi nessuna evidenza che porti a suggerire un nesso tra il sito ed il Mediterraneo. Anfore globulari e pietra ollare, ad esempio, non sono documentate e malgrado la prossimità con il Tirreno, i beni d'importazione sono evidentemente esigui.

Dall'XI secolo inoltrato, con il revival dei traffici marittimi nel Mediterraneo, l'emergere di Pisa come potenza navale, l'espansione del ruolo urbano giocato dalla vicina Massa Marittima e l'aumentare dell'output produttivo nei villaggi, Vetricella assunse una nuova forma che perdurò almeno per un paio di generazioni. I precedenti edifici furono demoliti o rimossi, rimpiazzati da anonime strutture in materiale deperibile in alcuni casi associate ancora a strutture di lavorazione del ferro. Un tale cambiamento deve essere ancora spiegato. È ugualmente poco chiaro come tale cambiamento possa essere in qualche modo rapportato allo sviluppo dei vicini villaggi d'altura tra cui Scarlino. Tra questa fase e la fine della precedente è da ricondurre una serie di sepolture di individui di età adulta e infantile forse facenti parte di una più estesa area cimiteriale ancora da indagare Nel corso dell'XI secolo il sito, la cui vita si era dipanata per circa trecento-quattrocento anni, fu abbandonato.

3) Le analisi archeometriche condotte sulle monete hanno evidenziato la presenza di diversi elementi in traccia, che riconducono le origini dell'argento impiegato nelle monetazione dell'Italia centro-settentrionale alto medievale a diverse fonti di approvigionamento, tra cui la catena montuosa dell'Harz. Di contro l'argento dalle Colline Metallifere non sembra essere stato utilizzato.

In seguito ai primi due anni di progetto appare evidente che esistono le potenzialitá per revisionare alcuni dei temi principali della storia del Mediterraneo attraverso un approccio multidisciplinare che attinge in egual misura da metodologie d'indagine archeologica ed ambientale.

Mentre prendiamo coscienza che buona parte delle microstorie sull'ascesa delle signorie in questa regione dovrá essere rivalutata, ciononostante, se potremo finalmente identificare cronologie precise, il progetto non solo offrirá una finestra sul Mediterraneo ed il Mar Tirreno in particolare, ma renderá anche giustizia alla visione di Riccardo Francovich di riscrivere la storia della Toscana nei primi secoli del Medioevo.

Pierluigi Pieruccini, Mauro Paolo Buonincontri, Davide Susini, Carmine Lubritto, Gaetano Di Pasquale

ALTERAZIONI DI PAESAGGIO NELLE COLLINE METALLIFERE NELL'ALTO MEDIOEVO: PALEOIDROLOGIA E PIANIFICAZIONE TERRITORIALE NELLA VALLE DEL FIUME PECORA

I riempimenti sedimentari delle valli fluviali costituiscono degli eccellenti archivi per stabilire variazioni le ambientali e quindi di paesaggio occorse all'interno dei bacini idrografici. Infatti le valli funzionano come trappole sedimentarie per i depositi provenienti dall'erosione dei versanti e dei suoli che successivamente vengono trasportati e ridistribuiti all'interno del sistema vallivo. L'analisi delle facies sedimentarie e delle successioni stratigrafiche consente di stabilire se gli stili fluviali e, di conseguenza, l'ambiente a scala di bacino ha subito nel tempo variazioni legate a dinamiche superficiali sia naturali che antropiche. Inoltre, i sedimenti all'interno delle valli possono contenere altri tipi di *proxies*, anche di origine biologica, che possono fornire dati e informazioni circa l'evoluzione dell'ambiente e del paesaggio biologico alla scala del bacino.

Circa 1 km a NO del sito di La Vetricella, a partire dal 2015, i lavori di realizzazione di una cassa di espansione in sinistra idrografica del Fiume Pecora hanno consentito l'osservazione e l'analisi della sequenza sedimentaria fluviale relativa all'apporto fluviale e, di conseguenza, le relazioni con l'insediamento della Vetricella in termini di ambiente fisico e biologico. Lo spessore totale di sedimenti osservati all'interno dell'opera idraulica è di circa 8 m nelle sezioni parallele al corso attuale del Fiume Pecora e di circa 3 m nelle sezioni perpendicolari al corso stesso. L'analisi geomorfologica e sedimentologica ha consentito di definire la successione stratigrafica e di eventi che ha condotto alla formazione della superficie su cui si sviluppa l'insediamento de la Vetricella. Questa superficie costituisce la sommità di una conoide alluvionale re-incisa dal corso del Fiume Pecora, la cui parte apicale si trova sospesa di circa 5 m sul fondovalle diminuendo progressivamente di quota verso sud. I sedimenti osservati indicano la presenza di una sequenza argillosa di origine lagunare o palustre antica a cui si sovrappone in discontinuità erosiva una sequenza tipica di conoide alluvionale prevalntemente ghiaiosa. L'assenza di materiali databili non ne consente una precisa attribuzione cronologica ma è probabile che si trattidi una sequenza legata a condizioni climatiche caldo umide e di alto stazionamento marino (Ultimo Interglaciale) a cui si sovrappone il *record* grossolano legato alle fasi fredde ed aride e di basso stazionamento marino dell'Ultima Glaciazione.

Di maggiore interesse, per la cronologia relativa al Progetto nEU-Med, si è rivelata l'analisi delle sezioni perpendicolari al corso d'acqua e che mostravano il riempimento sedimentario del fondovalle attuale. Infatti qui gli scavi hanno mostrato la presenza di un paleoalveo ampio circa 50 m e profondo circa 3 m, al cui interno si riconoscono due distinte facies sedimentarie che indicano in origine la presenza di un corso d'acqua molto sinuoso o meandriforme a cui succedono in discontinuità facies associabili ad un corso d'acqua a canali intrecciati. L'aspetto più caratteristico delle due facies è costituito dalla composizione dei sedimenti che nel paleoalveo più antico contengono scarsi clasti provenienti dall'erosione di Tufi Calcarei mentre in quello più recente tali clasti diventano predominanti. Complessi sedimentari costituiti da Tufi Calcarei sono diffusamente presenti nel tratto a monte sia del Fiume Pecora sia del tributario di sinistra Le Venelle-Le Ferriere. Gli ambienti deposizionali tipici dei Tufi Calcarei sono costituiti da alternanze di paludi e cascate la cui morfologia è chiaramente distinguibile ancora oggi e la cui presenza fino a tempi recenti è anche suggerita da alcuni toponimi. La cronologia delle variazioni occorse nella deposizione del paleoalveo è stata resa possibile dalla datazione al radiocarbonio dei rari frammenti di carbone presenti all'interno del primo riempimento del paleoalveo e dell'eccezionale quantità di carboni associati ai sedimenti provenienti dall'erosione dei Tufi Calcarei che costituiscono il riempimento più recente. I carboni, provenienti da incendi della vegetazione, inoltre consentito di definire il tipo di vegetazione interessata dagli incendi e la variazione nel tempo delle porzioni di paesaggio interessate. Nel complesso l'analisi integrata ci ha consentito di stabilire che il Fiume Pecora aveva un corso molto sinuoso e con scarso apporto di sedimenti provenienti dall'erosione dei Tufi Calcarei almeno fino al VI secolo AC mentre il paleoalveo più recente ha restituito una cronologia compresa tra l'VIII e il XIII secolo DC. All'interno di questo paleoalveo infine si possono riconoscere tre diverse fasi deposizionali attribuibili rispettivamente al VIII, IX-XI e XII-XIII secolo. La fase deposizionale più antica (VIII secolo) è caratterizzata da un sottile record sedimentologico a cui sono comunemente associati carboni mentre la seconda fase (IX-XI secolo) è più spessa e con resti di carboni molto abbondanti. Infine la terza fase (XII-XIII) mostra una diminuzione in termini di sedimenti e di carboni associati. Il drenaggio e la successiva erosione dei complesi di Tufi Calcarei sono quindi associabili a interventi antropici nel tratto a monte della Valle del Fiume Pecora i cui effetti deposizionali si osservano nel tratto a valle, in prossimità della pianura costiera. La variazione di sedimentazione indica come tali processi abbiano avuto gli effetti maggiori nell'intervallo IX-XI secolo impattando sia sui sistemi idrici e quindi sul paesaggio fisico sia sul paesaggio vegetale attraverso un graduale ampliamento delle aree interessate da incendi di vegetazione. Infatti nella fase più antica i resti paleoantracologici ci rivelano che la vegetazione interessata da incendi era quella palustre e ripariale mentre nelle fase successiva, la più importante, gli incendi si estendevano a tutta la pianura alluvionale andando ad interessare i versanti nell'ultima e più recente fase.

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LE RICERCHE A CARLAPPIANO: NUOVE EVIDENZE ARCHEOLOGICHE TRA PAESAGGI ANTROPICI E NATURALI

«Il sale che io sento
Mi dice che sto diventando mare
E mare sia. Perché ho capito, adesso
Non cambio in qualcos'altro, ma in me stesso»
B. Tognolini, *Filastrocca dei mutamenti*

1. PREMESSA

Questo contributo offre una prima sintesi dei dati raccolti durante lo scavo dei mesi di settembre-ottobre 2016 sul sito di Carlappiano, località posta a ridosso del Parco della Sterpaia (Comune di Piombino), lungo la costa del Golfo di Follonica. Nella porzione della pianura del Cornia di cui ci occuperemo, anticamente parte del territorio della città di Populonia, la lunga stagione di ricerca avviata negli anni '90 ha conosciuto, grazie al progetto nEU-Med, nuove opportunità di sviluppo[1]. Carlappiano in particolare costituisce uno dei siti chiave individuati dal progetto per indagare in profondità i caratteri dello sfruttamento diacronico delle risorse nella fascia costiera medio tirrenica.

Per una migliore comprensione dei dati acquisiti ci si propone di fornire in primo luogo un quadro del contesto ambientale in cui il sito si inseriva (par. 2), ricostruendolo sulla base di diverse fonti (cartografiche, fotografiche, geologiche, archeologiche e storiche). I dati relativi al popolamento antico della pianura di epoca classica e fino alla tarda Antichità, in massima parte frutto di ricognizioni archeologiche, offrono una prospettiva diacronica all'interno della quale si inserisce anche l'occupazione della duna di Carlappiano (par. 3); lo studio degli indicatori ceramici di superficie evidenzia che essa si protrasse anche nell'Alto Medioevo (par. 4). Tuttavia le stratigrafie messe in luce con la campagna di scavo 2016 non consentono di precisare i caratteri dell'occupazione per cronologie anteriori al XII secolo; esse vengono presentate in forma analitica per ciascuno dei tre settori di scavo, e sono precedute dalla descrizione delle indagini preliminari svolte sul sito (par. 5, 6).

I materiali rinvenuti nel corso dell'indagine sono presentati e discussi nei paragrafi seguenti; in particolare dall'analisi dei carboni (par. 7) si propone la ricostruzione della vegetazione relativa alle colline circostanti il sito. I 1678 frammenti ceramici vengono quantificati per classe (par. 8); dalla loro analisi si ricostruisce la provenienza e con essa si inserisce il sito all'interno dei sistemi economici e commerciali già attestati nel territorio. Le analisi geochimiche (par. 9) forniscono un utile supporto all'interpretazione dei dati archeologici in senso produttivo ed introducono alle prime conclusioni (par. 10). Queste, appoggiandosi su tutti i dati presentati nei paragrafi precedenti, propongono di identificare nel sito di Carlappiano dei secoli XII-XIII una salina ad evaporazione. Per facilitare l'immediata comprensione di tale interpretazione si offre una ricostruzione 3D (par. 11), elaborata a partire dai dati di scavo e cartografici. In appendice si propone infine l'edizione dei materiali rinvenuti sul sito nel corso di tre distinte campagne topografiche (anni 2002-2003; 2009; 2016); essa rappresenta un contributo alla ricostruzione delle dinamiche insediative e di commercio del Medioevo, anche in considerazione della scarsa documentazione di contesti ceramici di epoca post-classica nella bassa Val di Cornia.

L.D.

2. IL CONTESTO AMBIENTALE

Il sito di Carlappiano si posiziona su una duna, lungo un tratto di costa bassa e sabbiosa del golfo di Follonica (*fig.* 1). Come in altri tratti del litorale toscano, anche qui un lido, allungato fra le alture di Piombino e Punta Ala che ne costituiscono i capisaldi, separò dal mare una vasta laguna interna generata dallo sbocco in pianura di una serie di corsi d'acqua che la attraversavano con il loro carico di detriti (Pasquinucci, Mazzanti 1987, pp. 96-98). Dall'analisi dei dati sino ad oggi disponibili si stima che le acque interne dovessero raggiungere la loro massima espansione nel corso dell'Olocene ed in particolare attorno a 5000 anni a.C., in corrispondenza dell'*optimum* climatico e di un livello marino giudicato inferiore all'attuale di 1-2 m (Censini *et al.* 1991, p. 60 con relativa cartografia). Attorno alla laguna sin dal Neolitico è attestato lo stanziamento di gruppi umani che si avvantaggiavano delle risorse rese disponibili dalla presenza delle acque salmastre (Fedeli 1983, pp. 65-74, in particolare siti 331 e 334 localizzati nell'area di Franciana). Tra il Bronzo finale e la prima Età del Ferro sui cordoni sabbiosi costieri, a Nord e a Sud del promontorio di Piombino e fino al Puntone di Scarlino, è documentata la presenza di stanziamenti (Fedeli 1983, pp. 65-74; Botarelli 2004, pp. 223-224); la stessa duna di Carlappiano ha restituito alcune evidenze ceramiche riferibili proprio a queste cronologie (Dallai in Patera *et al.* 2003). In taluni casi i siti individuati mostrano spiccati caratteri produttivi; in particolare il sito ubicato in località San Vincenzo-Riva degli Etruschi e quello rinvenuto a Torre Mozza (De Marco, Poesini, Galiberti 2015-2017, pp. 219-223) hanno restituito accumuli o scarichi di frammenti ceramici pertinenti ad olle dall'impasto grossolano, dal colore bruno-rossiccio, e tracce di attività di fuoco che sono state collegate alla produzione del sale (De Marco 2017). Questa specifica tipologia di insediamento trova attestazioni in diversi punti del litorale medio-tirrenico ed è documentata, come detto, anche nel vicino territorio scarlinese (località Portiglioni e Portiglioni-Campo da Gioco; Aranguren *et al.* 2014), a testimonianza della rilevanza che la produzione del sale ebbe nel contesto costiero e lagunare di cui ci stiamo occupando già fra la Tarda Età del Bronzo e la prima Età del Ferro.

Il considerevole apporto di detriti generato dal corso dei fiumi, nel caso del golfo di Follonica in particolare da Cornia e Pecora, è all'origine dell'accumulo progressivo di sedimenti alluvionali e lagunari-palustri che caratterizzano la geologia superficiale della pianura di Piombino e la sequenza stratigrafica più profonda (i sondaggi effettuati hanno individuato fino a 50-100 m di sedimenti detritici fini ed alternanze ripetute di conglomerati); tuttavia mancano al momento indicazioni cronologiche esatte relative a questa sequenza (Censini *et al.* 1991, p. 52). Gli stessi sedimenti sono anche una delle cause della crescita, per altro modesta se comparata alle aree deltizie di Arno ed Ombrone, della linea di costa nel corso del tempo. A questa crescita si combina un fenomeno di subsidenza attestato

[1] Il territorio di Piombino è stato oggetto negli anni di numerose e significative attività di ricerca di carattere storico-archeologico. Per una sintesi bibliografica dei contributi si rimanda in ultimo a quanto proposto da chi scrive in un recente contributo tematico: Dallai 2016 e relativa bibliografia.

per lo meno negli ultimi 100 anni (Cappuccini 2015, p. 573 con bibliografia).

I sedimenti del tipo "beach rock" riconosciuti a Nord e Sud del promontorio ed oggi localizzati al di sotto del livello del mare, a distanze variabili fra 50 e 100 m dall'attuale costa, segnano il limite dell'antica riva; la presenza di resti delle lavorazioni siderurgiche di epoca etrusco-romana contenuti al loro interno permette di contestualizzarne la cronologia (*ibid.*, pp. 570-571; Pasquinucci, Mazzanti 1987, p. 104). L'individuazione di una sepoltura a fossa databile alla seconda metà del II secolo a.C. in località Sterpaia, a breve distanza dal sito di Carlappiano ed oggi posizionata al di sotto del livello marino, a circa 6 m dalla linea di riva (Fedeli 1989) testimonia ulteriormente l'arretramento subito dalla costa nell'area a ridosso del nostro sito fra l'Età Romana e i giorni nostri[2].

La causa di questo fenomeno, molto evidente sia per il golfo di Follonica che per quello di Baratti, è conseguenza dell'incremento costante del livello marino, alla fine del I secolo d.C. stimato inferiore di circa 1 m rispetto ad oggi (Pasquinucci, Mazzanti 1987, p. 96) e, a partire dalla metà del XIX secolo, delle imponenti attività di bonifica avviate con il *motu proprio* granducale del 1828[3]. La bonifica delle aree umide di questa parte della Maremma fu realizzata attraverso arginature dei corsi d'acqua, prosciugamenti e colmate. Queste ultime furono utilizzate specificamente per la bonifica dei paduli di Piombino e Torre Mozza; chiuso lo sbocco a mare del Puntone, i sedimenti del Cornia servirono a riempire le vaste aree umide del primo entroterra. Il corso della Corniaccia in particolare fu deviato verso il Padule di Torremozza ed i sedimenti utilizzati per riempirne la depressione, come efficacemente raffigurato dalla *Carta della Pianura di Cornia in via di bonificamento* dell'anno 1864[4]. Con le colmate si ottennero nuove terre utili alle produzioni agricole[5], ma la sottrazione dei materiali inerti portati dai corsi d'acqua non permise il naturale ripascimento dei lidi, che da allora si sono consistentemente ridimensionati.

L'accrescimento storico dei cordoni dunali, sostanzialmente paralleli all'attuale linea di costa, attestato per l'epoca precedente alle bonifiche, determinò la creazione di depressioni interdunali verso l'interno, che sono ancora oggi percepibili sulla base delle quote rilevabili al suolo. Queste sensibili differenze altimetriche (fra il tracciato stradale dell'attuale Geodetica e la linea di costa si oscilla fra 3,9 e 0,7 m slm) permettono di immaginare un paesaggio dove le aree allagate si alternavano alle aree asciutte, sede queste ultime di percorsi e viabilità trasversali alla pianura, attraverso le quali si potevano mettere in raccordo zone solo apparentemente isolate a causa della prossimità delle acque interne (Dallai 2016).

Sulla base degli elementi sin qui raccolti possiamo così definire alcuni tratti essenziali del paesaggio nel quale il sito di Carlappiano si inseriva prima dei mutamenti profondi del secolo XIX; dobbiamo immaginare un'area certamente asciutta (l'altimetria ci viene in soccorso, così come la prolungata occupazione della duna), relativamente vicina alla riva (ma decisamente meno di oggi, come è possibile comprendere sia dai dati archeologici che dalla presenza dei depositi di beach rock), prossima al fiume Corniaccia (il cui corso a meandri è ancora visibile nella cartografia ottocentesca ed anche nelle foto aeree storiche, ad esempio IGM 1938 e GAI 1954[6]) e più in particolare alla sua foce (sulla base delle distanze ricavate dal *Catasto Leopoldino* quest'ultima dista poco più di 700 m dalla più meridionale delle aree di scavo, l'Area 2000). Il sito era inoltre piuttosto vicino alle aree umide anch'esse rappresentate sul medesimo *Catasto*; ad Ovest quella del Padule di Piombino (che si posiziona a circa 2 km da Carlappiano); ad Est quella di Torremozza (distante poco più di 1 km, come in *fig.* 1B). Le distanze del sito dalle lagune sono, tuttavia, tra gli aspetti più problematici da definire; sappiamo infatti che negli anni 20 del XIX secolo, cioè al tempo della redazione del *Catasto*, della laguna che fino alla prima Età Moderna aveva offerto ricetto a navi della stazza di un brigantino[7] era rimasto solo il relitto, in quest'area denominato significativamente *Paduli*. I molti contributi sino ad oggi dedicati alla definizione dell'estensione lagunare in epoca storica dimostrano che la questione è complessa e controversa[8]. Significative variazioni nel corso dei secoli sono state ipotizzate sia in base al record archeologico (per i quadri di sintesi si veda Fedeli 1983; Botarelli, Cambi 2004-2005; Cambi 2009;) che sulla base delle indicazioni di carattere geologico ed ambientale (una sintesi in Cappuccini 2015 e Dallai 2016). Tali variazioni non interessarono però direttamente la duna prossima alla Foce di San Martino, che offriva un vantaggioso punto di contatto asciutto fra laguna e mare lungo un tratto di costa interessato da costanti traffici commerciali, testimoniati dal rinvenimento di resti di contenitori da trasporto nel tratto di mare antistante l'antica foce (Fedeli 1983, p. 422, scheda 339) (*fig.* 2).

In conclusione il sito di Carlappiano si inseriva in un tipico ambiente costiero "marino marginale", ricco di risorse economiche diverse e fortemente integrate: sale, peschiere (traccia delle quali è ancora presente nella cartografia ottocentesca e proprio lungo l'ultimo tratto del fiume Corniaccia, in prossimità della foce) e pascolo, che furono tutte ampiamente valorizzate nel corso del tempo[9]. D'altra parte è proprio la peculiarità, oltre che la forte complementarietà, di alcune di esse che rese questo territorio costiero, un'area economicamente rilevante e saldamente sottoposta al controllo del potere pubblico sin dai primi secoli del Medioevo, in quest'area rappresentato dai duchi/marchesi che avevano la propria sede nella città di Lucca (sul tema si rimanda alle considerazioni proposte da Bianchi e Collavini in questo volume) e, con il IX secolo, di quello comitale (Collavini 2016, in particolare alle pp. 66-68).

[2] Il dato è citato e commentato in Giroldini 2010, pp. 201-224.

[3] La bonifica fu concretamente realizzata fra il 1831 e gli anni dell'annessione al Regno d'Italia; le attività proseguirono fino agli anni '30 del 900; Pellegrini 1984, pp. 13-27.

[4] Archivio di Stato di Grosseto, *Genio Civile*, *Pianura di Cornia in via di bonificamento anno 1864*. Una analisi della cartografia disponibile per l'area in questione in Bartoli c.s.

[5] Sul tema delle bonifiche si veda: Rombai 1997; Rombai, Signorini 1993; Federci, Mazzanti 1995.

[6] Questi due importanti voli aerei furono realizzati dall'Istituto Geografico Militare (1938) e dal Gruppo Aeronautico Italiano – GAI – per conto dell'Istituto Geografico Militare. Il volo del 1954 in particolare fu il primo volo stereoscopico a coprire l'intero territorio nazionale dopo la fine della seconda Guerra Mondiale. Dettagli disponibili online: https://www.igmi.org/

[7] ASP, *Piombino*, *Consigli*, 19, c. 45. 1494. Regesto citato in Cardarelli 1938, p. 342, nota 1.

[8] Per una recente sintesi sullo stato della questione si veda: Dallai 2016, in particolare pp. 92-95. Per contributi di dettaglio si rimanda a: Fedeli 1983; Bardi 2002; Isola 2009; Giroldini 2012; Cappuccini 2015; Camilli 2005, pp. 203-214.

[9] Lo sfruttamento a pascolo delle zone prossime alle acque salmastre è documentato sin dall'antichità; si veda in specifico Vanni, Cambi 2015, pp. 111-112. Per la zona della Sterpaia è verosimile un utilizzo analogo; nell'Età Moderna ciò è documentato specificamente da un atto del 19 marzo 1514, con il quale i Padri Anziani di Piombino donavano a Jacopo V la bandita della Sterpaia col patto che tutti i Piombinesi vi potessero pascere gratis «le bestie dome ed un paio di bestie brade»; Fani 1930, p. 152.

3. L'ASSETTO INSEDIATIVO DELL'AREA DI CARLAPPIANO DAL I SEC. A.C. AL VII SEC. D.C.

I rinvenimenti ceramici provenienti dalla duna di Carlappiano, frutto di raccolte di superficie realizzate a più riprese ed in ultimo preliminarmente alla campagna di scavo (Dallai in Patera *et al.* 2003, pp. 300-301; Marasco 2013, pp. 63-64), attestano una occupazione stabile del sito che a partire dal I secolo a.C. si protrae fino alla tarda Antichità (VII secolo d.C.).

Per l'arco cronologico compreso fra il I secolo a.C. e la media Età Imperiale (III d.C.) il sito ha restituito una significativa selezione di indicatori ceramici che includono ceramiche comuni, da fuoco e da mensa, resti di contenitori da trasporto (fra cui anfore Dressel 2/4), alcune scorie, qualche frammento di ematite, pietre, laterizi e frammenti di cocciopesto. Complessivamente il quadro rimanda ad un insediamento con aspetti probabilmente legati alla produzione[10].

La presenza della vicina tomba della Sterpaia, forse parte di un più vasto sepolcreto, e, a breve distanza, del coevo insediamento di Campo al Fico, distante da Carlappiano appena 1 km, come quest'utlimo posto a ridosso del corso della Corniaccia e certamente legato alla lavorazione dell'ematite[11], restituisce l'immagine di un'area di pianura prossima alla foce del fiume diffusamente utilizzata e vissuta.

Dal III secolo a.C. in particolare il pattern insediativo ricostruito dalle numerose indagini archeologiche di superficie e di scavo condotte nell'area di nostro interesse evidenzia dinamiche di crescita numerica degli insediamenti legate ad una molteplicità di fattori: economici, politici e commerciali[12]. Il IV e III secolo a.C. rappresentano, è bene ricordarlo, il periodo di maggiore sviluppo dell'industria siderurgica populoniese (Cambi 2009, p. 224). I dati paleoclimatici testimoniano che questa fu una fase relativamente calda, con piovosità paragonabile a quella attuale[13]. Rifuggendo da qualunque determinismo storico, è possibile affermare che le dinamiche di crescita demografica e produttivo-commerciale registrate sul territorio populoniese fra il III secolo a.C. e la prima Età Imperiale si avvantaggiarono di un contesto climatico sostanzialmente stabile, dove alla fase di minore piovosità, già avviata con la metà del IV secolo a.C., si accompagnò probabilmente anche un minore apporto di detriti da parte dei corsi d'acqua. Questo favorì una capillare valorizzazione delle aree di pianura poste a ridosso delle lagune interne, dei principali corsi d'acqua e delle aree deltizie.

Sul territorio si individuano frattanto alcune aree insediative "privilegiate", sulle quali l'occupazione antropica insisterà significativamente per un lungo arco cronologico; ne sono un buon esempio le zone di Franciana, Vignale e Casal Volpi (localizzazione dei siti citati in *fig.* 1), solo per citare quelle più prossime al sito di nostro interesse, le quali tutte conoscono una occupazione consistente in epoca repubblicana e continueranno ad essere insediate fino al V secolo d.C.[14].

La forte contrazione insediativa registrata sul territorio populoniese a partire dal III secolo d.C. è evidente anche per i siti posti a ridosso del corso del fiume Corniaccia e del limite lagunare nella zona di nostro interesse: alla diffusa occupazione attestata nella prima Età Imperiale lungo il basso corso del fiume, in particolare in località Masseria Paduletto, Campo al Pero[15], Campo al Fico, e naturalmente Carlappiano, fa seguito una selezione che risparmia, oltre il II secolo d.C., il solo sito di Carlappiano ed i ben più distanti insediamenti di Vignale e Franciana. In queste tre aree la frequentazione, con caratteri ancora da precisare, è attestata sino al VII secolo (Giorgi, Zanini 2014; Botarelli 2004, pp. 230-231)[16].

A Carlappiano in particolare gli indicatori ceramici relativi a cronologie successive alla media età imperiale, pur presenti, sono poco numerosi: si tratta di forme da cucina (casseruole e tegami di imitazione africana; olle in acroma grezza e forme in africana D, in particolare tegami e piatti-coperchio), dettagliate puntualmente nel successivo repertorio ceramico. Essi testimoniano l'uso e la frequentazione di quest'area "di frontiera" per tutta la tarda Antichità.

4. L'ALTO MEDIOEVO

La presenza di frammenti ceramici la cui datazione ci conduce oltre il VII secolo (catini con orlo rientrante e bordo arrotondato realizzati in acroma depurata; brocche/boccali con orlo arrotondato e ansa a nastro impostata direttamente sotto l'orlo; catini con orlo a tesa e bordo leggermente squadrato; un frammento pertinente ad una brocca realizzata in vetrina pesante) attesta che la frequentazione della duna di Carlappiano continuò anche nei secoli dell'Alto Medioevo. Questo dato è molto significativo; pur nell'esiguità del campione disponibile siamo infatti in presenza dell'unica attestazione certa di natura archeologica relativa alla frequentazione di questa parte della pianura fra VIII e X secolo. Il vicino sito di Vignale, unico superstite della selezione insediativa più sopra ricordata, sul quale le ricerche sono in corso, restituisce al momento cronologie di natura insediativa fino al VII secolo d.C. (Patera *et al.* 2003, pp. 290-291; si rimanda in specifico alle tabelle materiali, pp. 290-291) ed anche dall'area di Franciana, il cui toponimo ricorre nella documentazione scritta altomedievale ad identificare il *caput curtis* di una vastissima proprietà fiscale documentata sin dall'VIII secolo (Collavini 2016), come detto mancano ad oggi riscontri archeologici che datino oltre il VII secolo.

È proprio grazie ai documenti storici che i pochi indicatori archeologici relativi alle cronologie altomedievali sin qui raccolti possono essere inquadrati all'interno di una più ampia cornice di carattere economico e giuridico che riguarda buona parte della bassa valle del fiume Cornia. Quest'ultima, così come la vicina Val di Pecora, con le sue importanti risorse (il sale su tutte), fu lungamente una proprietà pubblica, saldamente controllata dal fisco (Tomei c.s.). La *curtis* di Franciana in particolare comprendeva buona parte della valle del fiume Cornia ed includeva i boschi delle colline interne, le pianure, le lagune, le peschiere

[10] Per i dettagli relativi ai materiali si veda più oltre il repertorio ceramico a cura di A. Briano ed E. Ponta.

[11] Per il sito localizzato presso Campo al Fico non è attualmente disponibile bibliografia. L'area, ricognita nel corso delle attività di diagnostica geoarcheologica e chimico fisica realizzate all'interno del progetto ERC (stagione 2016-2017) e coordinate da chi scrive, si presenta come una vasta concentrazione di frammenti ceramici, laterizi e materiali da costruzione, misti a scorie e frammenti di minerale. Sono inoltre attestate anfore tipo Dressel 2/4 e Dressel 1.

[12] Per una sintesi: Botarelli 2006, in particolare alle pp. 481-500.

[13] Il record ambientale ampio e dettagliato del vicino lago dell'Accesa, disponibile da 12000 anni cal BP fino ai giorni nostri indica che, fra metà IV secolo a.C. e IV secolo d.C., il livello delle acque del lago decrebbe e si attestò grossomodo sul livello odierno; Magni *et al* 2007, in particolare fig. 10, p. 1750.

[14] Per Vignale si veda Giorgi, Zanini 2014; per Franciana, oltre alla schedatura presente in Fedeli 1983, p. 419, sito 332, si veda anche Botarelli, Cambi 2004-2005, p. 165; Cambi 2009, p. 225, pp. 229-230); per Casal Volpi i dati da ricognizione che attestano la frequentazione sino al V secolo d.C. sono frutto delle indagini di A. Casini, *Ricerche di archeologia mineraria e archeometallurgia nel territorio populoniese: i monti del Campigliese* (tesi di laurea inedita, Università di Siena, A.A. 1991/92), siti 147-148.

[15] Giroldini 2010, siti 97, 98, 100.

[16] I recenti sopralluoghi effettuati nell'area di Franciana in occasione delle già ricordate indagini geoarcheologiche e geochimiche hanno individuato alcuni frammenti di ceramica africana D (in particolare tipo Hayes 109) che attestano una frequentazione dell'area protratta fino al VII secolo d.C.

e naturalmente gli approdi offerti dalle insenature costiere[17]. Da questa grande proprietà furono nel tempo distaccate delle parti per così dire marginali, le *curtes* di *Casalappi* e *San Vito*, attestate fra la seconda metà dell'VIII ed il primo trentennio del IX secolo e controllate dal vescovo di Lucca[18].

La zona di nostro interesse ricadeva pienamente nella grande proprietà fiscale e la presenza di ceramiche cronologicamente riferibili all'VIII-X secolo, pur in numero modesto, testimonia che essa continuò ad essere frequentata, evidente eccezione in un panorama costiero particolarmente laconico di informazioni.

Le peculiarità topografiche del sito non erano frattanto certamente mutate rispetto al periodo precedente. La stretta vicinanza alla foce di un corso d'acqua importante, la Corniaccia, che i documenti individuano come elemento topografico di centrale rilevanza nell'area in questione, va probabilmente considerato un dato a vantaggio della scelta del luogo, così come la vicinanza alle aree lagunari e ad un sistema di viabilità di lunga durata, efficiente raccordo fra la costa, gli approdi e la via Aurelia[19]. Sulla base dei dati disponibili è però impossibile definire con maggiore precisione caratteri e finalità dell'occupazione ed offrire una risposta definitiva alla interessante e promettente ipotesi che collocherebbe proprio qui il *castellare* della *curtis*, menzionato nel documento del 1125 con il quale gli Aldobrandeschi cedettero al monastero di San Quirico di Populonia la metà di *Franciano* (si veda su questo Bianchi 2016, p. 379; Collavini 2016, p. 69). Proprio quel documento ci dice però qualcosa di più del territorio di cui ci stiamo interessando; oltre a citare l'esistenza del castellare allora abbandonato, circondato da fossati e da un canale, il documento elenca le importanti risorse presenti nel territorio della *curtis* ed i diritti acquisiti dal monastero attraverso la cessione, in primo luogo quelli sulle saline che erano presenti al suo interno, sulle terre coltivate e sugli incolti. È in questo quadro di risorse economiche che dobbiamo inserire la frequentazione della duna di Carlappiano fra VIII ed XI secolo.

A partire da tutte queste premesse i dati di scavo hanno fornito le prime risposte ai molti quesiti relativi alle forme di valorizzazione delle risorse economiche della bassa Val di Cornia fra XII e XIV secolo.

5. LO SCAVO

Il sito individuato dallo scavo 2016 si colloca a circa 700 m dalla costa, su quote che oscillano fra 2,30 ed 1,54 m slm; ricordiamo però, per quanto spiegato in premessa, che l'area in antico dovette essere maggiormente rilevata.

La presenza di una strada detta *via che dalla Torre del Sale va a Vignale*, rappresentata sul *Catasto Leopoldino* e sviluppata in direzione SW/NE, consente l'immediata individuazione di un significativo limite di quota; tale percorso segna il confine fra l'alto e il basso di questa piccola ma articolata porzione di pianura.

L'area scelta per la campagna di scavo è stata individuata sulla base di precedenti indagini di telerilevamento (analisi di foto aeree, in particolare volo IGM 1938), dalle quali si evidenzia la presenza di un segno scuro, molto netto, di forma rotondeggiante, interpretato come la traccia di un probabile fossato (Marasco 2013, p. 64, fig. 5). L'anomalia racchiude una superficie di circa 35.000 m² ed è ancora rintracciabile nella cartografia francese immediatamente precedente alla bonifica[20] (*fig.* 2); essa si inserisce a sua volta all'interno di una fitta rete di tratti scuri e sinuosi, corrispondenti a numerosi paleoalvei tutti riferibili al corso d'acqua principale di questa zona già più volte menzionato, cioè la Corniaccia. Lo sviluppo di tale corso d'acqua, oggi rettificato, è facilmente rintracciabile dall'analisi delle stesse foto aeree nonché in parte dall'osservazione del *Catasto Leopoldino*.

L'indagine 2016 ha preso avvio con una campagna congiunta di survey ed attività di diagnostica archeologica (magnetometria; drone e micro-rilievo; hhXRF; carotaggi manuali) indirizzata a meglio definire il contesto all'interno del quale si sarebbero selezionate le aree da sottoporre a scavo. I risultati di questa prima fase di indagine hanno permesso di acquisire un ulteriore nucleo di materiali da superficie (che sono puntualmente schedati in altra parte del contributo) e di delimitare con maggiore precisione l'estensione dell'anomalia. L'effettuazione di una serie di carotaggi e piccole trincee ha inoltre consentito una ulteriore selezione delle tre aree sulle quali sono state effettuare le indagini di scavo: Area 1000 (corrispondente alla trincea T1); Area 2000 (corrispondente alla trincea T7); Area 3000 (corrispondente alla trincea T3) (*fig.* 3).

Dai carotaggi manuali effettuati nel settore NE dell'anomalia sono state ricavate ulteriori indicazioni riguardo alla natura dei suoli presenti nell'area oggetto dell'indagine. In due casi in particolare (carotaggi 1 e 3) la sequenza stratigrafica ha fornito evidenze relative all'apporto di strati sabbiosi e limosi, imputabili a fenomeni di esondazione delle acque del vicino corso d'acqua, depositatisi al di sopra dei contesti riferibili sia alla duna che alle argille massive profonde; queste ultime costituiscono l'orizzonte stratigrafico lagunare prima della formazione della duna stessa[21].

6. LE AREE DI INDAGINE (*fig.* 4)

6.1 *Area 1000*

La più settentrionale delle aree di scavo (Area 1000) è localizzata nella parte nord orientale del sito, in corrispondenza del limite dell'anomalia individuata da fotografia aerea e confermata dalle indagini geomagnetiche. Si tratta di un settore di forma rettangolare di 5×6 m che ha ampliato il saggio esplorativo preliminare T1. Ad una profondità di circa 40 cm al di sotto del livello arativo il saggio ha messo in luce un limite netto orientato N/S tra due strati sabbiosi molto diversi tra di loro: ad Est l'US 1002, uno strato friabile di colore grigio, apparentemente privo di inclusi e ad Ovest l'US 1004, uno strato compatto di colore giallo con macchie scure dovute all'ossidazione di noduli di manganese diffusamente presenti nel terreno.

Le indagini hanno mostrato che il limite netto costituisce l'interfaccia di contatto tra il terreno che caratterizza la morfologia originaria del luogo, ossia la duna (US 1004) e la sponda di un canale, a sua volta riempito da limi ed argille ricche di noduli di ferro e manganese e carbonato di calcio (US1003) (*fig.* 5). Di questo canale, che tagliava la duna originaria e che scorreva in direzione NW-SE, è stato intercettato solamente il limite occidentale. Considerando la perfetta correlazione tra l'anomalia visibile da fotografia aerea, i risultati della magnetometria e l'andamento del limite occidentale del canale individuato dallo

[17] Per un inquadramento generale della *curtis* di Franciano si veda ancora Collavini 2016.

[18] San Vito in particolare, di cui si è proposta l'identificazione con l'attuale area di Casal Volpi, zona non distante dal nostro sito, divenne il centro di riferimento per la gestione dei possedimenti vescovili lucchesi in Val di Cornia; Ceccarelli Lemut 1985, pp. 22-23; Farinelli 2007, sito 33.5, s.v. *San Vito in Cornino*; Tomei c.s.

[19] La questione è stata affrontata in diverse occasioni da chi scrive; si rimanda in particolare a Patera *et al* 2003, pp. 296-30; Dallai 2016, pp. 94-95.

[20] Archivio di Stato di Firenze, *Miscellanea di Piante*, c. 278a, 1806, *Plan du Grand Marais de la Principauté de Piombino.*

[21] Le indagini geoarcheologiche condotte in parallelo alle attività di scavo sono state coordinate dal prof. Pierluigi Pieruccini, Università degli Studi di Torino, Dipartimento di Scienze della Terra.

scavo archeologico, è stato possibile stimare con buona sicurezza la posizione dell'altra sponda e ciò ha permesso di calcolare una larghezza complessiva di circa 10 m.

Ulteriori informazioni raccolte riguardano la stima della profondità; l'effettuazione di due carotaggi (C1, C2) condotti all'interno del canale a partire da una quota di -1,80 m dall'attuale piano di campagna, ha consentito di stimare una profondità superiore a -2,80 m. Tale quota, rapportata a quella della duna, ha permesso di stabilire che la profondità complessiva del canale fosse superiore ai 2,40 m. L'opera, che sfruttava la presenza di una delle divagazioni del corso d'acqua, fu verosimilmente regolarizzata artificialmente.

Lo scavo dei riempimenti del canale ha restituito numerosi laterizi disposti in modo del tutto casuale, talvolta posizionati a ridosso della sponda. Ciò è stato interpretato come il probabile esito di azioni di butto deliberate, successivamente condizionate dal dilavamento operato dal corso d'acqua. La duna sabbiosa, per lo meno in questo settore di scavo, non ha invece mostrato segni di attività antropiche significative, ad eccezione dell'individuazione di una buca di palo (US 1006) localizzata a quote relativamente alte (-50 cm dal piano di campagna), al cui interno si è recuperato un grosso frammento di legno carbonizzato dalla forma appuntita (US 1007) riferibile ad epoca moderna. Tale rinvenimento va contestualizzato dunque nell'ambito delle attività agricole certamente presenti nell'area di Carlappiano.

G.P.

6.2 *Area 2000*

L'Area 2000 è localizzata all'estremità meridionale dell'anomalia individuata da foto aerea, in corrispondenza di un tratto dal colore chiaro. La realizzazione preliminare di una trincea (T7) aveva portato all'intercettazione di una struttura muraria realizzata con l'impiego di grossi blocchi di calcare sbozzati, anche di reimpiego, orientata N/S (US 2003, 2004). L'ampliamento dell'indagine stratigrafica ha riguardato un'area di complessivi 125 m²; essa a sua volta è stata distinta in tre settori (A, B, C) (*fig.* 6).

M.B., E.P., L.R., S.F.

6.2.1 Settore A

Il settore A è localizzato nella porzione nord-orientale dell'area e misura una superficie totale di 18 m². Alle quote maggiori la stratigrafia presenta evidenze relative alle intense attività agricole che hanno caratterizzato questa zona in anni recenti (US 2002). Sono stati inoltre individuati i resti di una viabilità che attraversava l'area in direzione E/W, oggi non più documentata ma presente nella cartografia tecnica (ad esempio la ortofotocarta del 1978)[22] e sulle foto aeree della metà degli anni '70 (US 2021, 2026).

Le tracce di uso più antiche sono invece state riconosciute in due lacerti murari (US 2006, 2037) che delimitano ad Ovest il settore e che possono essere letti come parte di un unico allineamento orientato N/S (US 2037, US 2006). Nel primo caso (US 2037) la struttura è costituita da un unico filare di pietre di medie dimensioni (20×30 cm) legate da terra e disposte in maniera regolare, anche con l'impiego di piccole zeppe. Le pietre appoggiano direttamente sul deposito argilloso (US 2050); non sono stati riconosciuti tagli di fondazione. La presenza di labili tracce di malta sulla superficie superiore dell'allineamento può far supporre l'uso originario di leganti.

[22] Regione Toscana, Ortofotocarta 1978, sezione 317040. Online resources: http://www502.regione.toscana.it/wmsraster/com.rt.wms.RTmap/wms?map=wmsofc

A breve distanza dall'US 2037 sono stati individuati i resti di una seconda muratura (US 2006) che misura 2,80×0,53 m; anche in questo caso si tratta di un unico filare di pietre che appoggiano direttamente sul deposito argilloso US 2050. L'apparecchiatura risulta del tutto analoga a quella precedentemente descritta; le due murature sono separate da un taglio di asportazione chiaramente individuabile (US 2030) che ne ha compromesso l'originaria continuità.

A testimonianza delle azioni distruttive intervenute durante l'utilizzo tardo dell'area, corrispondente alla fase di abbandono funzionale della stessa, sono state individuate ulteriori rasature operate sulle superfici sommitali e sul corpo delle due murature. A copertura di queste ultime è stato individuato un deposito argilloso molto consistente (US 2020), esteso su tutta la superficie del settore ed interpretato come un piano di calpestio formatosi in seguito alla frequentazione prolungata della zona.

Sebbene lo stato di conservazione delle evidenze emerse sia estremamente compromesso, è possibile ipotizzare che i due lacerti murari facessero parte di un sistema di delimitazione di aree aperte, forse destinate alla produzione, da mettere in relazione alla fase d'uso della canalizzazione orientata N/S individuata nel vicino settore B (US 2003, 2004).

6.2.2 Settore B

Il settore B è localizzato nella parte centrale dell'Area 2000; la forma allungata dello stesso in direzione N/S (4,2×17,5 m) ricalca l'andamento dell'evidenza strutturale principale individuata già con l'effettuazione della trincea T7, cioè la canalizzazione US 2003-2004 (*fig.* 7).

I due allineamenti murari si sono conservati per una lunghezza complessiva di 12 m e rappresentano i perimetrali di una struttura di canalizzazione inclinata verso Sud e finalizzata a convogliare le acque da questa porzione di area verso il fossato circolare leggibile dalle foto aeree. Da qui le acque venivano a loro volta collegate al corso della Corniaccia attraverso una "bretella" localizzata proprio nella porzione SE dell'anomalia.

La rimozione dei depositi posti a Nord della canalizzazione ha consentito di individuarne l'imbocco. Gli strati rimossi sono piccoli depositi di terra sabbiosa mista a resti osteologici animali e ceramica da fuoco annerita (US 2016, 2034, 2046), cronologicamente inquadrabili nel pieno Medioevo; il loro accumulo si lega alla fase di obliterazione della struttura avvenuta in seguito all'abbandono dell'area.

Ad una quota inferiore sono stati individuati altri strati composti sia da materiali di scarico, veicolati dallo scorrere delle acque verso la canalizzazione (US 2052, 2059), sia da crolli di parte della muratura avvenuti in seguito alla sua mancata manutenzione (US 2060). Nel suo insieme questo deposito costituisce la fase più antica di defunzionalizzazione della struttura idraulica.

La delicata condizione ambientale di questa parte dell'area, compresa tra l'imbocco della canaletta e la sezione Nord del settore e sottoposta ad un evidente scorrimento di acque, è testimoniata dalla presenza di strati composti da laterizi frammentati e lastre di pietra di piccole dimensioni legate da terra argillosa, che sono stati interpretati come opere di drenaggio e consolidamento della superficie calpestabile (US 2054 in particolare). Tali strati riempiono un taglio individuato nel deposito di argilla US 2038 (US 2055), probabilmente di origine naturale, causato dal passaggio o dal ristagno delle acque.

Lo scavo dei depositi interni alla canalizzazione ha individuato un consistente deposito di terre di matrice sabbiosa e argillosa (US 2007, 2016, 2064) sostanzialmente omogenee tra loro, ed un certo numero di materiali inclusi al loro interno. Nello specifico, i depositi più superficiali (US 2007, 2016, 2064)

sono caratterizzati da una prevalenza di terra e ghiaia; a quota inferiore (US 2067, 2068, 2072) si sono individuati accumuli di laterizi, tra cui si distingue una netta prevalenza di coppi misti a frammenti di ceramica da mensa e cucina, particolarmente numerosi nelle US 2067 e US 2068 ed inquadrabili nei secoli centrali del Medioevo. La sostanziale omogeneità di questi strati, sia a livello di consistenza che di composizione, e la loro deposizione che segue il progressivo digradare verso Sud della canaletta, suggerisce che possa trattarsi di accumuli di materiale antropico veicolati dallo scorrere delle acque. Le caratteristiche dell'US 2077 in particolare, consistente strato sabbioso ricco di reperti ceramici e osteologici esteso per l'intera superficie interna della canaletta e nella parte adiacente al suo sbocco meridionale, fanno ritenere che essa possa essersi formata in seguito ad un consistente evento alluvionale avvenuto in una fase di abbandono della canalizzazione.

L'asportazione del deposito interno alla struttura ha permesso di metterne in luce il fondo; l'imbocco Nord e l'estremità Sud sono caratterizzati dalla presenza di lastre di pietra di dimensione medio grande (mediamente 30×20 cm), forma irregolare, lisciate in superficie (US 2075, 2082), adagiate su uno strato argilloso molto plastico che ne costituisce il letto di posa (US 2076, 2079). Tale evidenza non è stata invece individuata nella parte centrale della canalizzazione, il cui fondo è costituito dal solo deposito argilloso.

M.B., E.P.

6.2.3 Settore C

Il settore C è situato nella porzione NW dell'Area 2000 e si estende per circa 30 m².

La rimozione dello strato di humus, caratterizzato da un'alta concentrazione di reperti (frammenti ceramici, laterizi, elementi in ferro e piombo, scorie, vetro) ha permesso l'individuazione di alcune evidenze murarie solo parzialmente conservate.

Ad una fase relativamente tarda (prima Età Moderna) si data la realizzazione di una muratura molto irregolare (US 2014), localizzata in corrispondenza del limite Ovest dell'area di scavo e realizzata con l'uso di materiale composito (pietre di piccole dimensioni e laterizi).

L'intervento costruttivo più significativo localizzato in questo settore è la realizzazione della muratura US 2013; essa si sviluppa in direzione NW-SE per una lunghezza di 2,80 m ed una larghezza media di circa 50 cm. Della struttura si è conservato un solo filare composto da pietre di dimensioni medio-grandi non lavorate, poste in opera in modo irregolare. Anche in questo caso, così come descritto per le murature del settore B, non sono stati individuati tagli di fondazione e la muratura US 2013 risulta impostata direttamente sul piano di argilla.

Nella porzione centrale della stessa sono state identificate azioni di restauro o rifacimenti dell'alzato (rispettivamente sul lato Nord – US 2040 – e Sud – US 2061). Le azioni si sostanziano nel posizionamento di lastre in pietra di forma squadrata e piccole dimensioni sistemate di taglio.

Sia a Ovest che a Est della muratura sono stati individuati due ulteriori lacerti murari (US 2042 localizzata a Ovest; US 2043 localizzata ad Est), assimilabili ad essa per messa in opera, dimensioni, orientamento e stato di conservazione. Anche in questo caso delle murature si conserva un solo filare apparecchiato in modo irregolare ed uno sviluppo di poco superiore al metro.

Azioni di butto (US 2019, 2036, 2032, 2035) localizzate immediatamente a Nord della muratura US 2013 hanno restituito cenere, carboni, una calotta di forgia, numerosi frammenti di ceramica (grezza e depurata) e altrettanto numerose ossa animali, probabili resti di pasto.

La muratura US 2013 divide in due parti il settore C. L'intera porzione meridionale del saggio si caratterizza per la presenza di concentrazioni di laterizi frammentati, di una piccola quantità di scorie siderurgiche e per un taglio (US 2041) allungato in direzione N/S, con un'estensione di 1,50 m di lunghezza ed una larghezza media pari a circa 50 cm. A quest'ultima attività di asportazione-spoliazione fece seguito una piccola sistemazione realizzata con frammenti laterizi, alcuni dei quali presentavano tracce di esposizione al fuoco (US 2051).

Per comprendere meglio la natura degli strati argillosi sui quali si sono impostate le murature rinvenute in quest'area si è optato per l'effettuazione di un saggio di approfondimento di 2,18×2,30 m, localizzandolo nella metà Ovest del saggio. La sezione così ottenuta ha permesso di analizzare un primo strato argilloso (US 2062), spesso circa 0,24 m e di distinguerlo da un deposito più antico sottostante (US 2063), spesso circa 0,30 m, anch'esso composto da argilla e contraddistinto dalla presenza di numerosi noduli di carbonato di calcio ($CaCO_3$). Questi ultimi vanno messi in relazione con fenomeni di naturale risalita del cuneo salino o, alternativamente, con l'esito di attività artigianali connesse all'uso di acqua salata.

L'analisi del tipo di deposito indagato in associazione ai materiali rinvenuti permette di inquadrare anche la stratigrafia relativa a questa parte dell'Area 2000 nel pieno Medioevo, in un arco compreso tra XII e XIV secolo. La natura degli strati individuati evidenzia in particolare una frequentazione dello spazio che sembra protrarsi anche oltre la fase di vita della canalizzazione US 2003-2004, messa in luce nel contiguo settore B.

L.R., S.F.

6.3 *Area 3000*

L'Area 3000 è situata ad una distanza di circa 80 m in direzione NW rispetto alla precedente Area 2000; la scelta di impostare qui il saggio, dal perimetro irregolare e dall'ampiezza di circa 75 m², è conseguente all'individuazione di una significativa anomalia di carattere geofisico rilevata durante le attività preventive allo scavo, alla quale ha fatto seguito l'apertura di una trincea esplorativa (T3) (*fig.* 8).

Al di sotto dello strato arativo (US 3001) rimosso con l'uso di mezzo meccanico, è emersa una stratigrafia complessa, almeno in parte frutto di fenomeni naturali, le cui tracce più antiche sono costituite da alcune strutture murarie delle quali si conserva la fondazione ed il primo filare di pietre. Un significativo evento alluvionale (US 3014) testimoniato dall'accumulo di uno strato di sedimenti grigi e gialli presente in gran parte del saggio, ad esclusione della porzione Est (posta a quota maggiore), segnò l'inizio dell'abbandono definitivo delle strutture che qui, come nella vicina Area 2000, furono costantemente soggette ad inondazione. Mentre tuttavia le evidenze individuate nell'Area 2000 sembrano essere direttamente correlate ad attività produttive, le murature e gli spazi dell'Area 3000 appaiono piuttosto come strutture di servizio o possibili magazzini.

La più antica delle murature è orientata N/S (US 3027); ad essa si lega una seconda muratura orientata E/W (US 3017): le due murature delimitavano un ambiente che si sviluppava in direzione Est.

In un momento costruttivo successivo vennero realizzate ulteriori murature, in particolare: US 3076, del tutto simile per tecnica costruttiva e materiali alle due precedenti, la quale determinò un ampliamento verso Ovest; US3030, sviluppata E/W, per la quale furono utilizzate pietre di dimensioni più piccole, a delimitare verso Nord lo spazio creato dalle US 3027 e 3076.

A causa della risalita della falda non è stato possibile indagare gli strati di fondazione di queste strutture murarie e dunque,

dove non evidente, non è possibile formulare ipotesi accurate sull'esistenza di rifacimenti a livello di fondazione. Sembra però plausibile ritenere che l'intento legato alla costruzione delle murature più tarde fosse di realizzare una ripartizione funzionale dell'ambiente già esistente.

A queste attività di edificazione fece seguito un momento di abbandono dell'area, attestato dall'accumulo di un significativo strato di sedimenti limosi totalmente privo di materiale antropico, individuato in più punti dell'area di scavo ad eccezione del settore Ovest (US 3040). Tale limitazione potrebbe testimoniare come, al momento della formazione del deposito, alcune delle strutture murarie, pur rasate, abbiano comunque costituito un argine al processo di deposizione dello strato.

La fase che segue questo periodo di abbandono vede lo svolgersi di alcune attività sia di spoliazione che di costruzione: nella porzione Nord del saggio sono stati riconosciuti una serie di tagli e riempimenti, il più antico dei quali, con il suo riempimento (US 3058 e US 3019) è stato interpretato come la fossa di spoliazione di un muro che costituiva il prolungamento in direzione Nord della muratura US 3027. La fossa di spoliazione venne riempita da uno strato ricco di frammenti di laterizi (US 3073); tale composizione risulta molto simile a quella dell'US 3041, localizzata lungo il lato Est della muratura stessa.

Lo strato di terra e frammenti laterizi risulta quasi del tutto asportato dal taglio di fondazione (US 3049) di un muro con orientamento E/W, la cui esistenza è ricostruibile sulla base di 3 lacerti sopravvissuti alle attività di distruzione (US 3085, 3066, 3068). Esso è realizzato con pietre di medie e piccole dimensioni e finalizzato alla definizione di uno spazio ad E della struttura muraria centrale US 3027. Nella porzione Nord della fossa di fondazione sono state rinvenute pietre e laterizi ed i resti di una testa di cavallo.

Lo strato US 3060 che colma questa fossa sembra di origine alluvionale, come ipotizzato sulla base dello studio dei sedimenti che lo compongono; l'evento alluvionale che lo ha determinato potrebbe essere anche all'origine della distruzione parziale della muratura US 3085.

Questo significativo evento alluvionale ha avuto ripercussioni anche sulla porzione Ovest e SW del saggio, ed ha portato alla formazione di accumuli di materiale eterogeneo (US 3078, 3015; laterizi, vetro, ceramica, pietre) a ridosso del muro US 3076.

Le successive frequentazioni si concentrano nell'area Est e NE del settore di scavo e consistono nella asportazione di gran parte del nuovo muro E/W (US 3085 3066, 3068) e nella realizzazione di un piano di calpestio in malta e pietre (US 3038), forse una sistemazione finalizzata all'utilizzo della zona che sembra nel frattempo diventata una cava di materiale da costruzione (US 3065) ed un'area di scarico (US 3057 ed US 3079). Questa fase di frequentazione si conclude con la realizzazione di un piccolo intervento di restauro della struttura US 3038 (US 3070), effettuato con malta di scarsa qualità e poche pietre.

A.B., L.D.

7. IL CONTESTO CERAMICO DALLO SCAVO DI CARLAPPIANO

La campagna di scavo condotta a Carlappiano nell'autunno 2016 ha restituito un discreto quantitativo di materiali ceramici caratterizzati da una significativa varietà formale e tipologica. I reperti, seppure frammentari, presentano in molti casi le parti diagnostiche ben conservate; ciò ha reso possibile determinarne tipologie formali e funzione.

Nello specifico, queste ceramiche rientrano all'interno dei due macro gruppi funzionali della mensa/dispensa e della cucina, rappresentate in maniera piuttosto omogenea e paritaria sul sito.

Le analisi condotte hanno evidenziato come, accanto a produzioni di ambito regionale e sub-regionale rappresentate per lo più dal vasellame acromo e rivestito, si affianchino prodotti di importazione provenienti dall'area nord-africana; per quanto riguarda la cronologia, nella quasi totalità dei casi le caratteristiche tipologie consentono di inquadrare questi reperti in un arco compreso tra XII e XV secolo.

E.P., L.R.

7.1 *La ceramica da mensa/dispensa*

Rientrano in questo primo gruppo il 52% dei materiali provenienti dall'Area 2000 (174 frg.) e il 58% (173 frg.) di quelli riferibili all'Area 3000[23]. Si tratta nella percentuale maggiore di brocche e boccali (52%)[24] realizzati in ceramica acroma depurata, caratterizzata da un impasto di colore rosato, superfici rifinite ed un ottimo grado di cottura. Dal punto di vista morfologico, essi presentano caratteristiche del tutto simili e si distinguono esclusivamente in base alla dimensione; sono infatti dotati in entrambi i casi di orlo trilobato o circolare, corpo globulare, fondo piano (*tav.* 1, 1) e, ove conservata, ansa a nastro schiacciato, decorata, in taluni casi, da bollo radiale (*tav.* 1, 2). Le caratteristiche tipologiche consentono di inquadrare tali forme nei secoli centrali del Medioevo, mentre quelle tecniche, ad esempio l'impasto, rimandano a produzioni di scala regionale e sub-regionale e per alcuni esemplari, all'area pisana, come ampiamente attestato nel territorio[25].

Associate a boccali e brocche, per le quali si può ipotizzare una funzione duplice da mensa e dispensa, si trovano alcuni contenitori aperti, perlopiù catini troncoconici (1%), riconducibili a produzioni coeve realizzate in ceramica acroma di ambito sub-regionale[26]. Un unico esemplare, proveniente dagli strati di obliterazione della canaletta di drenaggio scavata nell'Area 2000, caratterizzato da un impasto molto depurato

[23] I materiali qui presentati provengono, nella quasi totalità dei casi, da giacitura secondaria. Per la descrizione dei contesti di provenienza, si rimanda alla parte relativa alla stratigrafia del sito.

[24] In questo caso la percentuale fa riferimento al conteggio totale dei frammenti delle due aree indagate.

[25] Per un quadro sulla diffusione di questa forma nell'ambito delle Colline Metallifere si veda in ultimo Grassi 2010, p. 43; riguardo ai rinvenimenti sui siti dislocati nella relativa fascia costiera si segnala: Boldrini 2003, pp. 285-292 per Campiglia Marittima (LI); per Rocca San Silvestro Francovich 1991, figg. 97-98, p. 110; per l'area scarlinese Cucini 1985, tav. X, n. 2; su scala regionale: per il contesto urbano fiorentino si veda Bruttini 2007, pp. 303-307, in particolare cfr. tavv. VIII-IX, pp. 379-380; per Pisa: Piazza Dante Menchelli 1993, pp. 478-479; Piazza dei Cavalieri: Menchelli, Renzi Rizzo 2000, pp. 123-162. In particolare per la produzione pisana di brocche con bolli radiali incisi sulle anse: per il sito di *Portus Scabris*-Portiglioni (Puntone di Scarlino, GR), Vaccaro 2011, Plate XCV, nn. 1-8; per il contesto urbano di Pisa: Piazza Dante, Menchelli 1993, p. 483, n. 6; via Bovio Berti G., Gelichi S. 1995, p. 200, tav. 3, n. 4; per il contesto rurale pisano, a titolo di esempio, si veda il caso di Calcinaia (Alberti, Baldassarri 2004, p. 73, tav. 6 n. 20). Per la Toscana meridionale: Grassi 2010, p. 32, n. 7, fig. 26; per il sito di Rocca San Silvestro Boldrini, Grassi 1997, p. 356 tav. 2, n. 14; per l'areale interno ed in particolare il sito della Canonica di S. Niccolò, Montieri (GR): Briano A. 2010-2011, *La Canonica di San Niccolò a Montieri (GR): i reperti mobili provenienti dal complesso ecclesiastico medievale (XI-XIII secolo)*, tesi di Laurea Magistrale, Università degli Studi di Siena. Per Rocca degli Alberti (Monterotondo Marittimo, GR): Russo L. 2013-2014, *La ceramica di Rocca degli Alberti a Monterotondo Marittimo (GR) tra alto e basso medioevo (VIII-XIV secolo),* Tesi di Laurea Magistrale, Università degli Studi di Siena, in particolare tav. 24, n. I.1.7; Boldrini 1999, p. 158, tav. 2, n. 9. Per le forme circolanti nel territorio interno Ponta E. 2011-2012, *Dinamiche di formazione e trasformazione del paesaggio tra Tarda Antichità e Alto Medioevo. Il caso di Monterotondo Marittimo (GR)*, tesi di laurea specialistica in archeologia, Università di Siena, Relatore Prof.ssa G. Bianchi.

[26] Per la Toscana meridionale si veda Grassi 2010, p. 44; per l'area interna si veda ad esempio il contesto fiorentino: Bruttini 2007, tav. I, n. 20.1.2, p. 372 (XIII secolo); per un confronto tra le due aree si veda Cantini, Grassi 2012, pp. 129-137, in particolare p. 134; per Pisa Piazza dei Cavalieri: Renzi Rizzo 2000, fig. 1 n. 2, p. 168.

ed un corpo argilloso di colore arancio rosso, si differenzia dal punto di vista morfologico: si tratta infatti di un catino dotato di orlo introflesso decorato da un motivo di linee sinusoidali incise sulla superficie esterna (*tav.* 1, 3); l'alta attestazione di tale tipologia in ambito pisano nel corso del XIV secolo (Giorgio 2017, p. 118), unita alle caratteristiche dell'impasto, consente di attribuire al nostro esemplare la medesima area di provenienza.

Il repertorio ceramico proveniente dalle stratigrafie di Carlappiano non si limita tuttavia alle sole produzioni acrome, che risultato infatti essere affiancate da vasellame rivestito; lo studio effettuato ha evidenziato come la percentuale maggiore di queste sia costituita da maiolica arcaica (6%; 38 frg.) e maiolica arcaica blu (1%; 6 frg.), a cui si affianca una percentuale minima di ceramica ingobbiata (9 frg.).

Per quanto riguarda la prima classe, la forma più attestata è rappresentata dalla brocca/boccale (55%); dal punto di vista morfologico si tratta di esemplari caratterizzati da forma globulare, ansa a bastoncello, orlo trilobato e piede distinto, ampiamente diffusi nel territorio costiero e nell'immediato entroterra (*tav.* 1, 4)[27]. Associate a queste si trovano alcune forme aperte, interpretabili come scodelle (3%), estremamente frammentate ma caratterizzate dai medesimi aspetti tecnici osservati per le brocche ed i boccali. In particolare l'impasto, che risulta essere molto depurato, oscilla tra un tono arancio-rosato e arancio rosso, indicando un areale di provenienza piuttosto ampio che spazia dalle officine senesi a quelle pisane, senza tralasciare l'ipotesi che per alcuni esemplari si possa parlare di officine dislocate nell'area volterrana o, forse, massetana (Briano 2015). In ogni caso la cronologia di riferimento per questi esemplari è riconducibile al XIV secolo. Ad un orizzonte cronologico di poco successivo si attribuiscono invece alcune ciotole emisferiche dall'orlo indistinto in maiolica monocroma bianca, attribuibili alle produzioni di fine XIV-inizi XV, ampiamente diffuse su scala regionale (Giorgio 2011, p. 225).

Dalle stratigrafie di Carlappiano provengono pochi frammenti di maiolica blu, nella quasi totalità dei casi appartenenti a brocche (80%); si tratta di prodotti di buona qualità, attribuibili alle produzioni senesi di pieno XIV secolo (Caroscio 2007, p. 427; Grassi 2010, pp. 47-48).

Un'ultima considerazione riguarda il rinvenimento di prodotti in "cobalto e manganese" (<1%) provenienti dall'area tunisina, a testimonianza dell'inserimento del sito in dinamiche di scambio anche durante il basso Medioevo. Si tratta di alcuni frammenti riconducibili a piatti con larga tesa e piede ad anello, la cui superficie interna è decorata con motivi vegetali in blu e bruno (*tav.* 1, 5), inquadrabili tra l'ultimo quarto del XII e la prima metà del XIII secolo (Grassi 1997, pp. 107-108).

Importazioni in cobalto e manganese sono documentate anche in altri siti del territorio sia costiero, come San Quirico di Populonia (Grassi 2016, tav. 2, n. 4, p. 262), che interno, come dimostrano i due esemplari di ciotole rinvenute nel sito di Montemassi (Grassi 2010, p. 36), e alla Canonica di San Niccolò di Montieri[28].

E.P.

7.2 La ceramica da cucina

Accanto al vasellame da mensa/dispensa, sono state rinvenute forme da cucina, caratterizzate dal consueto impasto refrattario; si tratta di recipienti impiegati nella preparazione e cottura degli alimenti e per questo adatti alla diretta esposizione al fuoco (Cuomo di Caprio 2007, pp. 125-129).

È attribuibile a questa classe ceramica circa il 30% dei frammenti recuperati nell'Area 2000 (99 frg.), ed il 32% (97 frg.) di quelli provenienti dall'Area 3000.

Per entrambe le aree indagate il vasellame da fuoco, che per tradizione si contraddistingue per un repertorio formale limitato (Grassi 2010, p. 42), è rappresentato in prevalenza da olle (circa il 50%), caratterizzate da orli variamente sagomati, colli allungati, corpi globulari o emisferici e fondo piano (*tav.* 1, 6-8). Tali tipologie, di produzione sub-regionale, e bene attestate nelle Colline Metallifere e relativa fascia costiera, presentano i tratti maggiormente diffusi tra i manufatti riferibili ai secoli XIII-XIV[29].

Fra le forme aperte si registra inoltre un netto prevalere dei testi per la panificazione (*tav.* 1, 9), che raggiungono nel complesso delle due aree il 24% dei reperti, cui si aggiunge al momento 1 solo frammento, attribuibile ad una ciotola, anch'essa impiegata nelle attività culinarie di preparazione dei cibi (Grassi 2010, p. 41).

Al totale delle forme ricostruibili si affianca un quantitativo significativo di frammenti talvolta non determinabili (11%) ed in altri casi attribuibili soltanto generiche "forme chiuse" (13%) o "forme aperte" (2%).

Nonostante lo studio dei reperti sia ad uno stadio ancora preliminare[30], il contesto di Carlappiano ben si inserisce nel quadro delle produzioni e circolazioni ceramiche già noto per il territorio delle Colline Metallifere e la costa durante i secoli centrali del Medioevo. Ancora una volta il rinvenimento di prodotti di importazione dall'area nordafricana risulta significativo nel sottolineare la vitalità economica e commerciale della fascia tirrenica.

L.R.

8. IL PAESAGGIO FORESTALE: UNO SGUARDO ATTRAVERSO I RESTI ANTRACOLOGICI

Dai depositi di carboni campionati sia nell'Area 2000 (US 2016, 2018, 2019, 2029, 2032, 2033, 2035, 2051, 2054, 2064, 2072) che nell'Area 3000 (US 3010, 3016, 3018) è stato possibile determinare quali piante legnose fossero utilizzate come combustibile e quindi quali boschi caratterizzassero le aree di approvvigionamento.

La metodologia usata ha previsto la campionatura parziale di quei depositi antracologici, detti dispersi, che sono il risultato delle varie fasi di uso, di svuotamento e di pulizia dei focolari e dei forni domestici, e che permettono, pertanto, una caratterizzazione più composita del paesaggio arboreo e arbustivo (Chabal 1997; Figueiral, Mosbrugger 2000).

Il sedimento campionato è stato vagliato tramite flottazione su una colonna di setacci con maglie di 4, 2 e 0,5 mm. I carboni determinati sono stati prelevati dalla frazione superiore ai 2 mm e osservati con un microscopio ottico a luce riflessa con

[27] Per una panoramica della diffusione di questa classe nel territorio interessato si veda in ultimo Grassi 2010, pp. 46-47 con bibliografia di riferimento; su scala regionale si veda Luna 1999, pp. 411-427; Degasperi 2007, pp. 409-426.

[28] In questo sito si trova come reperto residuale in strati datati alla seconda metà del XIII secolo (Briano 2010-2011, pp. 90-91; fig. 57, p. 138).

[29] Per una bibliografia di riferimento in relazione ad areali e cronologie di interesse: F. Grassi per le Colline Metallifere (Grassi 2010), R. Francovich per il sito di Scarlino (Francovich 1985) e di Rocca San Silvestro (Francovich 1991), G. Bianchi per Campiglia Marittima ed il territorio (Bianchi 2003), F. Cantini per Firenze (Cantini, Cianferoni, Francovich, Scampoli 2007), e B. Fatighenti per la zona del Valdarno (Fatighenti 2016), A. Alberti, E. Abela, S. Menchelli per Pisa (Bruni 1993 Piazza Dante; Bruni, Berti, Abela 2000 Piazza dei Cavalieri), C. Citter, A. Arnoldus-Huyzendveld per Grosseto (Citter, Arnoldus-Huyzendveld 2007), infine, per Castel di Pietra E. Boldrini (Bianchi *et al.* 1999).

[30] È da sottolineare che i dati qui presentati fanno riferimento solo ad un conteggio dei singoli frammenti e non alla quantificazione del numero minimo di esemplari.

ingrandimenti di l00x, 200x e 500x, utilizzando atlanti di anatomia del legno (Abbate Edlmann, De Luca, Lazzeri 1994; Schweingruber 1990; Vernet *et al.* 2001) e la collezione di confronto in uso presso il Laboratorio di Storia della Vegetazione e Anatomia del Legno del Dipartimento di Agraria (Università di Napoli "Federico II"). L'analisi antracologica ha riguardato 178 frammenti di carbone per un totale di 12 *taxa* identificati, con una netta prevalenza di *Quercus* gruppo caducifoglie (67,2%), seguita da *Ulmus*, *Fraxinus ornus* e *Ostrya carpinifolia*. Sono stati identificati anche *Quercus ilex*, *Erica*, *Rhamnus*/*Phillyrea*, *Rosaceae*/*Maoloideae* e *Olea europaea* (*fig*. 9).

Come suggeriscono i dati della vicina stazione meteorologica di Venturina, il territorio dove sorge il sito di Carlappiano rientra nella fascia bioclimatica mesomediterranea (temperatura media minima del mese più freddo 2.9°C), caratterizzata da regime medio annuale di precipitazioni subumido (700-800 mm). Attualmente la pianura alluvionale in cui sorge il sito è diffusamente interessata da colture a seminativo specializzato che hanno fortemente compromesso la potenzialità per la vegetazione spontanea. Sui rilievi le formazioni forestali più rappresentate sono le leccete, i boschi di sclerofille sempreverdi dominate da *Quercus ilex* L., con *Arbutus unedo* L., *Viburnum tinus* L. e *Phillyrea latifolia* L., e, sui versanti più freschi, i boschi a dominanza di latifoglie decidue termofile con *Q. pubescens* Willd., *Q. cerris* L., *Ulmus minor* Mill. and *Acer monspessulanum* L.

Mostrando l'uso predominante di *Q. cerris*, *Q. pubescens*, *Ulmus* e *O. carpinifolia* come combustibile, l'analisi antracologica suggerisce che la legna da ardere provenisse da querceti e boschi di latifoglie decidue fino all'età moderna (*fig*. 9). La componente oggi più presente del bosco di sclerofille sempreverdi, come *Q. ilex* e *Rhamnus*/*Phillyrea*, è poco rappresentata. Considerato che, in termini di potere calorifero, le specie arboree e arbustive sempreverdi eguagliano o addirittura superano le latifoglie decidue (Doat, Valette 1981; Madrigal *et al.* 2011; Dimitrakopoulos, Panov 2001; Todaro Scopa, De Franchi 2007), l'uso predominante di *taxa* decidui non è correlabile ad una scelta di combustibile migliore, bensì ad una loro maggiore presenza e disponibilità nell'area. Si può supporre che le formazioni forestali a caducifoglie termofile dovessero caratterizzare ampiamente nel passato l'area dei versanti della bassa val di Cornia. Tuttavia, si tratta di boschi che prediligono suoli asciutti, non pesanti né soggetti a inondazioni frequenti o alluvioni stagionali come doveva essere la piana dell'ultimo tratto del Cornia e, in particolare, l'area di Carlappiano. Pertanto i dati antracologici suggeriscono una scelta intenzionale di risorse forestali non immediatamente reperibili nei pressi del sito archeologico.

M.P.B., G.D.P., M.R.

9. IL CONTRIBUTO DEI DATI GEOCHIMICI ALL'INTERPRETAZIONE DEI DATI DI SCAVO

A supporto delle attività preliminari allo scavo, sul sito di Carlappiano si è impostato uno studio di carattere multi-analitico e multi-disciplinare con finalità predittive utilizzando la fluorescenza portatile a raggi X (pXRF).

L'analisi di suoli e sedimenti fluviali in contesti archeologici è ormai diventata una tecnica ben consolidata e abbastanza diffusa in archeologia e, se combinata alle classiche tecniche di prospezione archeologica, come la magnetometria ed il georadar, può assumere un prezioso valore per l'acquisizione di informazioni sia a livello predittivo che descrittivo. Le analisi pXRF effettuate sui suoli possono dare informazioni riguardo ad attività intense e prolungate svolte in un determinato contesto archeologico; i dati possono essere riferiti ad attività domestiche, metallurgiche, a concimazioni, alla presenza di accumuli di ossa, di sepolture e ad attività costruttive[31]. Le alterazioni composizionali e strutturali dei suoli derivanti dalla combinazione di fattori antropici e fenomeni naturali (processi geologici, pedologici e idrogeologici) risultano inoltre utili per la comprensione e ricostruzione delle dinamiche ambientali che hanno caratterizzato il paesaggio di una determinata zona in un periodo storico ben preciso (Wilson Davidson, Cresser 2008; Simniškytė-Strimaitienė *et al.* 2017; Oonks *et al.* 2009b).

Nel caso di Carlappiano, le analisi pXRF sono state effettuate sia all'interno che all'esterno dell'anomalia osservata dalle foto aeree storiche, con lo scopo di ottenere informazioni essenziali sulla composizione chimica del suolo e favorire l'identificazione di eventuali attività antropiche svolte nell'area di indagine. I campionamenti sono stati impostati su sei transetti orientati N/S, effettuando una misura ogni 20 m.

I risultati dell'analisi geochimica e multiparametrica che ha incluso Fe, Mn, K, Ca, Sr, Zn, Pb e Cu hanno evidenziato la presenza di due zone chimicamente diverse, coincidenti con il limite S dell'anomalia: la prima, posta all'esterno, presenta valori medi più elevati per tutti gli elementi considerati (Fe 33178 ppm; Mn 906 ppm; K 14951 ppm; Ca 12423 ppm; Sr 107 ppm; Zn 55 ppm; Pb 24 ppm; Cu 38 ppm) rispetto alla seconda (Fe 21804 ppm; Mn 516 ppm; K 1179 ppm; Ca 6568 ppm; Sr 70 ppm; Zn 35 ppm; Pb 18 ppm; Cu 22 ppm) (*fig*. 10). Questa particolare distribuzione delle concentrazioni degli elementi chimici considerati è probabilmente l'esito di una attività artigianale, ed è in particolare correlabile alla produzione del sale per evaporazione dell'acqua marina.

In letteratura le analisi chimiche di suoli condotte in contesti archeologici legati al ciclo produttivo del sale prodotto per evaporazione sono rari, mentre più numerosi sono i casi studio connessi a siti produttivi che utilizzavano la tecnica del *briquetage* (siti archeologici di Chan b'i – America centrale e Zhongba – Cina centrale). In questo caso le analisi chimiche hanno riguardato suoli provenienti sia dall'interno delle strutture dove veniva bollita la salamoia sia dalle aree esterne e circostanti gli edifici di produzione.

Sulla base della letteratura disponibile anche nel caso di Carlappiano sono stati selezionati gli elementi chimici maggiormente diagnostici dell'esistenza di attività connesse alla produzione del sale: Mg, Ca e K (Flad *et al.* 2005; Cory Sills 2016).

L'impianto di produzione del sale, come noto, era organizzato in una sequenza di vasche (prima evaporazione, seconda evaporazione e cristallizzazione) di dimensioni variabili, poste dal mare verso l'interno e tutte collegate tra loro mediante un sistema di canalizzazioni. Nelle prime vasche di evaporazione, quelle più vicine al mare, doveva avvenire la precipitazione dei carbonati di calcio ($CaCO_3$) e degli ossidi di Fe e Mn, mentre nelle seconde vasche di evaporazione, posizionate in un'area più interna, continuavano a precipitare i carbonati di calcio ($CaCO_3$) insieme ai solfati di calcio, in particolare gesso ($CaSO_4$), che si depositavano sul fondo formando delle croste dure e spesse. Il liquido ipersalino purificato passava poi nell'ultimo sistema di vasche, quelle di cristallizzazione, di dimensioni e profondità inferiori alle precedenti, che erano impermeabilizzate con uno strato di argilla (Antczak 2017). In quest'ultima fase della lavorazione si otteneva la precipitazione del sale puro (NaCl),

[31] Oonks *et al.* 2009a; le attività antropiche possono alterare la composizione chimica del suolo naturale in modo irreversibile determinando un arricchimento o un impoverimento nelle concentrazioni di alcuni elementi chimici come Ca, P, Cu, Fe, Mg, K, Zn, Pb ed As.

che veniva raccolto agli angoli delle vasche e poi trasportato all'interno degli edifici di immagazzinamento e stoccaggio.

La distribuzione degli elementi chimici sul sito di Carlappiano ed in particolare l'aumento di concentrazione di Fe, Mn, Zn, K e Ca che si riscontra all'esterno dell'anomalia, potrebbe essere legata alla presenza, proprio in quest'area, di vasche di evaporazione, all'interno delle quali la precipitazione dei carbonati di calcio ($CaCO_3$) e degli ossidi di Fe e Mn avrebbe arricchito il substrato naturale. All'interno dell'anomalia al contrario, dove potevano essere posizionate le vasche di cristallizzazione che contenevano il liquido ipersalino privo di impurità, non si sarebbe prodotto un analogo arricchimento del substrato naturale.

V.V.

10. PRIME CONCLUSIONI ED INTERPRETAZIONE DEI DATI DI SCAVO

Le considerazioni sin qui esposte ed i dati ricavati dalla stagione di scavo 2016 consentono di proporre una prima interpretazione delle emergenze inserite nel quadro ambientale che è stato tracciato in premessa.

Dal punto di vista cronologico, le tre aree hanno fornito informazioni utili a definire una sequenza articolata in 9 distinte fasi (per la sequenza e la sua articolazione di dettaglio si rimanda al matrix di *fig.* 11), che coprono un arco cronologico complessivamente ampio, definito, nella sua fase più antica dalla formazione della duna (fase 1 – **duna**; Area 1000, US 1004); essa costituisce la superficie emersa sulla quale si sono sviluppate le successive attività antropiche registrate dallo scavo.

Al di sopra della duna i depositi limosi accumulati in conseguenza della morfologia del luogo hanno generato spessi strati argillosi, in alcuni casi ricchi di noduli di carbonato di calcio ($CaCO_3$), testimonianza di una lenta evaporazione di acque salmastre stagnanti (fase 2 – **depositi limosi**). Sono questi gli strati che hanno fatto da base alla costruzione delle murature individuate dallo scavo delle Aree 2000 e 3000 (fase 3-**costruzione muri e canalizzazione**) ed alla loro fase d'uso vera e propria (fasi 4/5 – **uso e trasformazione delle strutture; attività costruttive**). Nell'Area 3000 si tratta in particolare di una serie di murature orientate E/W, sviluppate a partire da un primo muro (US 3027) orientato N/S; nell'Area 2000 si tratta invece di una lunga canalizzazione (US 2003-2004), conservata per 12 m di lunghezza e circa 50 cm di alzato, e di alcuni tratti di murature ad essa ortogonali. Provengono da queste fasi materiali utili ad una definizione cronologica delle attività costruttive, certamente inquadrabili fra XII e XIII secolo.

Ulteriori attività di uso dell'area sono documentate anche per il XIV secolo (fase 6 – **frequentazioni XIII-XIV secolo**), ma queste ultime risultano di minore impatto sul contesto indagato.

Un evento ben riconoscibile, di natura alluvionale, chiude la fase di uso dell'area, erodendo il deposito in alcuni casi anche significativamente e seppellendo buona parte della stratigrafia al di sotto di strati formati da sabbie e rari noduli di $CaCO_3$ e Fe/Mn (fase 7 – **evento di natura alluvionale. Probabile esondazione del fiume Corniaccia**). L'impatto di questa esondazione, certamente imputabile al vicino corso del fiume, è particolarmente significativo rispetto al destino delle strutture presenti nell'area, perché ad esso seguiranno solo modeste attività di carattere costruttivo, accompagnate da strati di accumulo. Questi ultimi, pur testimoniando la frequentazione dell'area, marcano anche la mancata manutenzione delle strutture (ad esempio delle canalizzazioni) all'interno delle quali sono stati rivenuti numerosi materiali ceramici e resti di pasto, testimonianza di una progressiva defunzionalizzazione delle stesse (fase 8 – **frequentazioni, XIV-XV secolo**).

Le ultime attività registrate non hanno una forte caratterizzazione, pur evidenziando, ancora una volta, una frequentazione non occasionale della duna di Carlappiano (fase 9 – **frequentazioni tarde, post XV sec.**).

Alla luce dei dati sin qui illustrati, quale è dunque la possibile interpretazione funzionale dei resti rinvenuti al termine della campagna di scavo?

Pur in presenza di un deposito relativamente povero, la natura delle strutture rinvenute unita al contesto ambientale in cui il sito si inscrive contribuiscono in modo determinante alla formulazione della nostra ipotesi di lavoro.

Il primo dato che emerge con notevole certezza dai dati raccolti è il carattere produttivo e stagionale dell'insediamento; ciò è testimoniato dall'assenza di veri e propri strati di vita relazionabili alle strutture rinvenute. Le murature rinvenute nell'Area 2000 in particolare si configurano come apprestamenti di natura produttiva, che trovano nella canalizzazione centrale il loro asse centrale. L'assenza di adeguate fondazioni, la natura dei leganti e la qualità delle strutture stesse fanno dubitare inoltre che esse potessero avere un significativo sviluppo in elevato.

La struttura per la quale risulta evidente un maggiore investimento è certamente la canalizzazione centrale, la quale si collega a sua volta al più ampio canale che circonda questa porzione della duna (Area 1000): queste opere di regimazione e drenaggio sono state evidentemente giudicate cruciali da chi decise gli investimenti sul sito. Le cronologie tuttavia potrebbero divergere sensibilmente, poiché il fossato sembra delimitare l'area di occupazione dell'altura anche nelle epoche più antiche, a giudicare dall'area di concentrazione dei materiali rivenuta in superficie. Più che un investimento *ex novo*, il fossato potrebbe essere stato un'opera preesistente rinnovata e migliorata nel corso del tempo (specificamente nelle fasi di uso delle strutture rinvenute dallo scavo 2016) per adattarla alle esigenze del sito.

A breve distanza (Area 3000), murature più robuste definiscono una serie di ambienti rettangolari, addossati gli uni agli altri: si tratta probabilmente di magazzini, o comunque di strutture collaterali a quelle aree aperte e canalizzate descritte per l'Area 2000. Anche in questo caso, al di là di qualche traccia di uso tarda, lo scavo non ha evidenziato la presenza di focolari o battuti che testimonino un uso continuativo degli spazi con fini abitativi.

Sulla base di quanto esposto e del quadro ambientale ricostruito riteniamo di poter interpretare le strutture rinvenute a Carlappiano come apprestamenti del ciclo produttivo del sale, risorsa economica centrale di quest'area costiera per un arco cronologico amplissimo (Carusi 2008), tanto nota dai documenti quanto invisibile per l'archeologia del Medioevo (*fig.* 12). Elementi a sostegno dell'ipotesi sono, oltre alla presenza di bassi muretti e canalizzazioni, anche la localizzazione vicina del fiume e la presenza del fossato che abbiamo più volte richiamato. È infatti proprio in luoghi prossimi al mare ma riparati e sicuri, e soprattutto con disponibilità di acque dolci, che le saline trovano il loro perfetto impianto, come ben evidenziato anche dal vicino territorio grossetano[32].

Il ciclo produttivo del sale prevede di passare per gradi successivi di concentrazione ed in genere attraverso vasche progressivamente più piccole, dall'acqua del mare (contenuta in grandi vasche evaporanti) alla salamoia (raccolta in vasche più piccole, dette salanti). Il sale così ottenuto veniva infine lavato con acqua salata al fine di depurarlo e poi accumulato in piazze asciutte ed

[32] Per le ipotesi sulla localizzazione degli antichi impianti si veda Citter Arnoldus 2011, in particolare pp. 38-58.

eventualmente stoccato in magazzini[33]. L'acqua dolce in questa serie di passaggi era essenziale, poiché serviva a regolare il grado di concentrazione dei sali all'interno della soluzione durante il processo di evaporazione. L'acqua di mare contiene infatti una miscela di sali diversi, che precipitano al raggiungimento di gradi di concentrazione differenti. I primi a precipitare sono i carbonati e i solfati di calcio e solo successivamente si ottiene la precipitazione del cloruro di sodio ed infine dei cloruri e solfati di magnesio[34]. Quest'ultimo evento è però assolutamente da evitare, perché il prodotto finale sarebbe un sale di pessima qualità e sgradevole sapore; è dunque fondamentale mantenere il controllo della concentrazione della soluzione salina, e per fare ciò è fondamentale l'impiego di acqua dolce. Da qui l'esigenza, sempre documentata storicamente, di posizionare gli impianti produttivi in prossimità di fiumi.

Le condizioni geomorfologiche dell'area di Carlappiano (così come evidenziato nel par. 2) ne fanno un sito ideale per la collocazione degli impianti produttivi di una salina ad evaporazione. Le aree topograficamente più basse circostanti la duna potrebbero essere state facilmente utilizzate per ospitare le vasche evaporanti, cioè quelle di dimensioni maggiori, direttamente collegate al mare.

Le evidenze rinvenute dallo scavo sulla duna sono specificamente collegabili alle fasi di concentrazione della salamoia, durante le quali era necessario l'apporto eventuale di acqua dolce per controllare la precipitazione dei sali di magnesio e servivano piazze aperte dove il prodotto finale potesse essere lasciato ad asciugare. A queste ultime fasi riferiamo in particolare le aree delimitate da bassi muretti identificate nell'Area 2000, e proprio l'accumulo di sale in quest'area potrebbe essere responsabile dell'impoverimento di elementi chimici sul suolo registrato dalle analisi XRF, come proposto precedentemente.

La portata dell'investimento complessivo sul sito ed in particolare sulle opere di canalizzazione si giustifica alla luce dell'impatto economico rilevante che caratterizza da sempre la produzione del sale. Il sale è la risorsa che, come abbiamo avuto modo di accennare in precedenza, a partire dall'Alto Medioevo risulta centrale negli interessi economici del fisco regio in questa parte della Val di Cornia (come detto, fino all'XI secolo esso fu gestito dai duchi/marchesi di Lucca) ed i cui proventi saranno successivamente sottoposti al controllo dei conti Aldobrandeschi (si veda Bianchi-Collavini in questo stesso volume). Sono questi ultimi che, con la fine dell'XI secolo, li passeranno al monastero di San Quirico di Populonia, probabile esecutore delle opere individuate dalle nostre indagini. Le caratteristiche del sito ne fanno inoltre un luogo strategicamente perfetto non solo per la produzione ma anche per la raccolta del sale prodotto in altre aree circostanti, sempre comprese all'interno della *curtis* di Franciana, dove le condizioni topografiche consentivano di impostare impianti analoghi. Da Carlappiano esso avrebbe potuto essere facilmente distribuito a livello locale o regionale, grazie alla presenza di un efficace sistema di viabilità ed alla prossimità del fiume Cornaccia e della Foce di San Martino, aperta verso il mare.

L.D.

11. DALLO SCAVO ALLA RICOSTRUZIONE TRIDIMENSIONALE

Le analisi effettuate sul sito ed esposte nei contributi precedenti delineano Carlappiano come un contesto molto importante all'interno del panorama storico della Val di Cornia medievale, un centro economico e gestionale di quella produzione di sale attestata dalle fonti scritte ma fino ad adesso ignota all'archeologia (Collavini 2016). Per questo motivo, il sito è stato scelto come oggetto di una modellazione tridimensionale che ha proposto la visualizzazione delle diverse ipotesi ricostruttive relative alla fase di occupazione di XII-XIII secolo, quella individuata dallo scavo. Gli obiettivi sottesi alla ricostruzione sono duplici; il primo utilizza la modellazione tridimensionale come parte integrante della ricerca scientifica, perché, come dimostra proprio il caso in questione, essa è un mezzo utile per la validazione delle ipotesi ricostruttive e fornisce, inoltre, spunti di discussione ed idee che possono indirizzare la ricerca stessa. In aggiunta a questo, la rappresentazione visiva è uno degli strumenti più efficaci nella veicolazione delle informazioni grazie al suo evidente impatto emotivo, e si rivela perciò un ottimo strumento per la presentazione del lavoro svolto dal team di ricerca.

Nel caso di Carlappiano, il lavoro di modellazione 3D è iniziato già durante la campagna di scavo. La documentazione grafica del sito è stata realizzata integralmente tramite la tecnica di fotogrammetria tridimensionale che è stata impiegata per il rilievo di ogni unità stratigrafica, ed ha prodotto una libreria di modelli 3D degli strati scavati. La fotogrammetria è stata effettuata tramite l'utilizzo del programma *Agisoft Photoscan,* il quale utilizza algoritmi di *Structure from motion* e *Dense image matching*. A partire da un set di fotografie che ritraggono un oggetto da diverse angolazioni, è possibile estrarre un modello tridimensionale accurato geometricamente e dotato di informazioni riguardo al colore delle superfici. Questi modelli hanno fornito i punti di riferimento geometrici e spaziali che hanno guidato l'intero processo ricostruttivo. L'utilizzo del software *Blender* ha completato il lavoro di produzione della ricostruzione tridimensionale, dalla fase di modellazione delle superfici fino al *rendering* delle immagini finali.

La ricostruzione ha interessato un transetto rettangolare con orientamento N/S di circa 880×1330 m, per un'area totale di 117 ha. Esso contiene al suo interno, oltre alle aree di scavo, anche il contesto ambientale circostante, nella convinzione che questo sia fondamentale per la corretta comprensione di ogni contesto archeologico ed ancor più per un sito produttivo come Carlappiano.

La ricostruzione si è concentrata in primo luogo sul paleoambiente originario, delineando il corso del fiume Corniaccia, localizzato pochi metri ad Est dell'anomalia circolare ed individuabile dalla cartografia storica; si è inoltre proposta una ricostruzione dei limiti dello stagno di Piombino sulla base dei vari studi pregressi (Bardi 2002; Isola 2009; Cappuccini 2015; Dallai 2016); per quanto riguarda nel dettaglio la zona di Carlappiano, ci pare convincente l'ipotesi che la laguna lambisse il limite Sud del cordone dunale sul quale si imposta il sito, così come proposto da Isola. Questa tesi sembra corroborata da alcune evidenze della cartografia storica che segnalano, proprio nel punto di contatto tra la duna costiera e la pianura interdunale, lo sbocco del fiume Corniaccia nella laguna, segnato da un'area di più lento scorrimento delle acque.

Sulla base dei dati di scavo si è proposto di interpretare l'Area 2000 come luogo dedito alla fase ultima del processo di estrazione del sale, durante la quale il prodotto è posto ad essiccare al sole ammassato in cumuli, con una metodologia attestata sia nel contemporaneo dalle saline di Trapani, di Margherita di Savoia e di Cervia, nonché in epoca moderna nelle ormai dismesse saline di Portoferraio (Riparbelli 1998).

L'edificio rinvenuto nell'Area 3000 è stato ricostruito nella fase che vede la presenza di due corpi di fabbrica, con il più antico descritto dalle US 3027, 3017, 3068 e 3066, e quello più recente ad esso appoggiato, delimitato dalle US 3030 e 3076.

[33] Il processo è descritto puntualmente da Agricola, nel XII libro del *De Re Metallica.*

[34] Hocquet 1990, pp. 10-11.

Durante le analisi di superficie e di scavo non sono state individuate le vasche salanti in cui il sale era prodotto, ma solamente, come già ampiamente esposto, l'area di concentrazione. Nel corso dello studio del territorio per la ricostruzione tridimensionale, sono state però ipotizzate due possibili localizzazioni per questi impianti, esterne all'anomalia individuata da foto aerea, nell'area dove le indagini in fluorescenza a raggi X hanno individuato le concentrazioni maggiori di elementi diagnostici (Fe, Mn, Zn, K e Ca).

Basandosi sui dati cartografici, le vasche sono state ipotizzate su un'area di circa 4 ha, posizionata ad Ovest dell'anomalia circolare, caratterizzata dalla presenza di un sistema di infrastrutture viarie ben evidenziato dalla cartografia storica. Una seconda ipotesi propone di collocare l'impianto delle vasche nell'area immediatamente a Sud dell'anomalia circolare, compresa tra la laguna, il fossato ed il corso del Corniaccia, una zona dal posizionamento particolarmente vantaggioso per le operazioni connesse al ciclo produttivo ma maggiormente esposta a possibili eventi alluvionali del fiume (*fig.* 13). Gli impianti proposti riproducono il sistema descritto da Agricola nel capitolo XII del *De re metallica*, che prevedeva l'uso di tre diverse tipologie di vasche di differente dimensione per la graduale evaporazione dell'acqua, del quale abbiamo già avuto modo di accennare in altra parte del contributo.

M.B.

12. APPENDICE. LA CERAMICA DI CARLAPPIANO: STUDIO DEL CONTESTO DI SUPERFICIE

Questo contributo offre l'opportunità di riconsiderare analiticamente i reperti rinvenuti a Carlappiano nelle campagne di ricognizione svolte nell'anno 2000 (Dallai 2003-2004), 2008/2009 e 2014/2015, in vista della campagna di scavo. Il totale dei reperti rinvenuti ammonta a 836 frammenti[35] ed è costituito da materiale ceramico, vitreo, metallico, da costruzione lapideo e laterizio, minerali e scorie. La percentuale maggiore proviene dall'ultima ricognizione effettuata nel novembre 2015 (74%)[36]; questo fattore si lega strettamente alle ottime condizioni di visibilità del terreno riscontrato al momento del *survey*. Infatti, confrontando le percentuali relative agli anni precedenti (anno 2000: 5%; anno 2008/2009: 21%), si osserva come la raccolta dell'anno 2015 sia stata particolarmente 'fortunata'.

In questa sede maggiore attenzione è riservata ai reperti ceramici, tuttavia sembra opportuno menzionare anche i materiali ad essi associati per poter restituire un quadro maggiormente dettagliato del contesto. Sono stati rinvenuti sia materiali da copertura (tegole, coppi) che da costruzione (mattoni); in quest'ultimo caso si tratta di produzioni miste (artigianali e industriali) che determinano un ampio arco cronologico[37]. Inoltre alcuni esemplari sono caratterizzati da una forte vetrificazione della superficie, riconducibile ad una esposizione al calore.

L'attestazione sul sito di pietre regolarizzate, malta e cocciopesto suggerisce la presenza di strutture in muratura e relative pavimentazioni.

Sono state inoltre individuate scorie di fusione e minerali ferriferi (ematite) in percentuale significativa, ed è stato rinvenuto un macinello ricavato da una scoria ferrosa.

L'unico reperto vitreo è costituito da un elemento sagomato in vetro incolore con applicazioni a festone in vetro blu. Nello specifico ipotizziamo che possa trattarsi di un elemento di raccordo tra la parete e lo stelo di un calice tipo "Isings 36/38/40" (Isings 1957, pp. 50-54) prodotto tra la seconda metà del I secolo e il III secolo; in alternativa potrebbe trattarsi di una presa sagomata pertinente ad un tappo o ad un coperchio tipo "Isings 66" (Isings 1957, pp. 85-86), inquadrabili nel medesimo periodo. Tuttavia la presenza dei filamenti applicati in vetro blu potrebbe spostare la datazione del pezzo a partire dal V secolo d.C. (Hayes 1975, n. 405, p. 109, p. 212; n. 394, p. 107, p. 215).

12.1 *I reperti ceramici*

Il totale dei frammenti raccolti dal 2000 al 2015 ammonta a 738, mentre il computo delle forme minime[38] ammonta a 84. Analizzando il campione nella sua interezza sono state individuati tre ambiti funzionali diversi che coprono un arco cronologico molto ampio (*tav.* 2):

I. Ceramica da cucina/da fuoco
II. Ceramica da dispensa/stoccaggio e da mensa
III. Ceramica da trasporto

Appartengono al primo gruppo olle e tegami prodotti in acroma grezza o grezza invetriata (solo sulla parete interna) e i tegami e piatti-coperchio in sigillata africana da cucina.

Il secondo gruppo comprende forme per la dispensa e lo stoccaggio quali brocche, boccali, catini e orcioli in acroma depurata; per la mensa/tavola sono attestate forme prodotte in maiolica arcaica, ingobbiata e graffita, smaltata monocroma, invetriata fine, invetriata verde, cobalto e manganese, ingobbiata di rosso, sigillata africana e vetrina pesante.

Infine nel terzo gruppo si inseriscono le anfore di diversa provenienza.

12.1.1 Ceramica acroma grezza (*tav.* 3)

L'olla è la forma maggiormente attestata ed è distinguibile in due diverse tipologie:

– I.1.1. Olla con orlo estroflesso e insellatura funzionale all'alloggio del coperchio, con bordo arrotondato e corpo globulare (dis. 11; Cantini 2003, tav. 10, I.7.18, p. 93) attestata in contesti di seconda metà VIII-X secolo.
– I.1.2. Olla con orlo estroflesso ed ingrossato con scanalatura esterna posta sotto il bordo (dis. 14; Cantini 2005, tav. 31, 5.83, p. 143; Vaccaro 2011, tav. IX, 8, tipo 3, US 5147), attribuibile alla prima metà del VII secolo.
– I.1.3. Casseruola/tegame con orlo ingrossato e ripiegato all'esterno con scanalatura che evidenzia lo stacco tra orlo e parete verticale; all'esterno, in corrispondenza dell'orlo, è visibile una patina grigia (dis. 12; *Atlante delle forme ceramiche*, tav. CVIII, num. 8, p. 221). La forma ricorda le produzioni di vasellame da cucina africano ed in particolare il tipo *Ostia I,* fig. *270* (datato al III sec. d.C.), ed è pertanto inquadrabile in un arco cronologico di IV-V secolo stabilito sulla base del confronto con diversi contesti di rinvenimento su scala nazionale (Fontana 1998, pp. 83-100; Fontana 2005, pp. 259-278).
– I.1.4. Casseruola con orlo arrotondato e poco pronunciato con all'esterno una patina cinerognola all'altezza dell'orlo (dis. 10; *Ostia III*, fig. 331), ascrivibile allo stesso orizzonte cronologico del punto 3.

[35] Nel conteggio totale sono stati inclusi anche i materiali pertinenti alla scheda dell'UT 92, elaborata da Lorenzo Marasco nell'ambito del suo progetto di dottorato di ricerca anno 2008/2009 (Marasco 2013).

[36] Durante il *survey* è stato stabilito di raccogliere soltanto parti diagnostiche e un campione rappresentativo del materiale da costruzione presente sul sito.

[37] Sono stati individuati diversi tipi di impasto caratterizzati da quantitativi differenti di inclusi e di varia natura ascrivibili da un generico periodo romano all'Età Moderna.

[38] Il conteggio delle forme minime è stata basato sulle parti diagnostiche rinvenute (orli e fondi).

– I.1.5. Casseruola con piede ad anello (dis. 13; *Lamboglia 10A; Atlante delle forme ceramiche*, tav. CVI, nn. 10-11, p. 217), riconducibile anche in questo caso alle imitazioni dei prodotti africani sulla base delle sue caratteristiche tipologiche, databile al IV-V secolo.
– I.1.6. Fondo piano di tegame prodotto in sigillata africana da cucina (dis. 36), sulle cui superfici è visibile uno strato di vernice rossa ben conservato (cronologia II-V secolo).
– I.1.7. Anse tricostolate riferibili a forme chiuse (diss.21-22; A Siena sono attestate già dalla prima metà del VI secolo, Cantini 2005, tav. 19, 4.100, p. 106; Vaccaro 2011, tav. CIV, num.3,5, Podere Serratone), prodotte in semi-depurata, che per la datazione rimandano ad un orizzonte del primo alto Medioevo.
– I.1.8. Ansa a nastro semplice (dis. 25; Cantini 2005, tav. 19, 4.105, p. 106; Vaccaro 2011, tav. CX, num. 8, Casa Steccaia) pertinente ad una forma chiusa in acroma semi-depurata, inquadrabile nell'alto Medioevo,VII-IX sec. d.C.

Un cospicuo numero di pareti in acroma grezza presenta impasti diversificati[39], che in molti casi trovano confronti per tipologia e quantità di inclusi contenuti, con le parti diagnostiche ascrivibili all'alto Medioevo sopra descritte.

Tra le classi da cucina riconosciute 40 rientrano infine anche le acrome grezze invetriate solo all'interno o su entrambe le superfici con una vetrina spessa di colore scuro. Le forme rimandano a tegami e ad olle che per caratteristiche tecnologiche sono riconducibili ad un arco cronologico compreso tra XII e XIII secolo (Grassi 2010, p. 30).

12.1.2 Ceramica acroma depurata (*tav. 3*)

La forma più attestata è la brocca/boccale che sulla base della tipologia degli orli e delle anse rimanda ad un ampio arco cronologico che va dall'Età Romana (vedi dis. 5 per orlo e diss. 20 e 24 per anse con sezione schiacciata, I.2.6) al pieno Medioevo.

In particolare sono attestate:

– I.2.1. Brocca/boccale con orlo arrotondato e ingrossato, bocca circolare, collo cilindrico e ansa a nastro impostata direttamente sotto l'orlo (dis. 15: Cantini 2005, tav. 7, nn. 4.10-4.11-4.12; Vaccaro 2015, fig. 7, num. 2 da Podere Serratone e dis. 23: ansa a nastro insellata; Cantini 2005, tav. 19, num. 4.106; Vaccaro 2011, tav. CIV, num. 2) e fondi piani (dis. 3: Cantini 2005, tav. 16, num. 4.85, p. 104; Vaccaro 2011, tav. CIV, num. 10 da Podere Serratone; diss. 27, 28: Cantini 2005, tavv. 15-16, nn. 4.76-4.87; Vaccaro 2001, tav. CVII e tav. CIV, nn. 9-10 e num. 11 anforette da Casa Andreoni e Podere Serratone); a livello regionale tale forma è attestata dal VII al IX secolo d.C.
– I.2.2. Brocca/boccale con orlo estroflesso e arrotondato e parete che suggerisce un andamento globulare del corpo con ansa a nastro impostata sul collo e leggermente sormontante l'orlo (dis. 18: Cantini 2003, tav. 25, II.6.4; Cantini 2005, tav. 8, num. 4.18); tale tipologia è inquadrabile tra il X e il XII secolo d.C.
– I.2.3. Brocca/boccale (dis. 16: Grassi 2010, fig. 81, brocca gruppo 1, tipo 2-3,), con orlo arrotondato e superiormente appiattito più o meno ingrossato, bocca circolare o trilobata (dis. 4: Grassi 2010, fig. 25, gruppo 1, tipi 1, 2, 3) con eventuale beccuccio poco accentuato, collo cilindrico o leggermente troncoconico, con corpo ovoide e fondo piano, ansa a nastro complanare che si imposta immediatamente al di sotto dell'orlo tipica dei secoli centrali del Medioevo; in un caso sull'ansa è impresso un bollo a raggiera (dis. 17: per il bollo Berti, Gelichi 1995, tipo III.C; Vaccaro 2011, tav. XCV, nn. 1-2), caratteristico delle produzioni pisane di XII-XIV secolo.

Accanto alle brocche e ai boccali è attestata la forma del catino in acroma depurata presente in due tipologie:

– I.2.4. Catini con orlo rientrante e bordo arrotondato o leggermente ingrossato e squadrato, superiormente schiacciati (diss.34 e 35: Cantini 2003, tav. 21, II.2.5, p. 120; Cantini 2005, tav. 13, nn. 4.57-4.58; Grassi 2010, fig. 6, nn. 9-11; Vaccaro 2011, tav. CXIII, num. 8); pur trattandosi di una forma semplice prodotta in botteghe con reti di commercio sub-regionali sembra essere nata tra VI e VII secolo in associazione al vaso a listello, ma a differenza di quest'ultimo la sua diffusione si protrae per tutto l'alto Medioevo (Grassi 2010, pp. 16-17).
– I.2.5. Catino con orlo a tesa e bordo leggermente squadrato (dis. 32: Cantini 2003, tav. 31, III.2.1; Cantini 2005, tav. 13, num. 4.61); nel comprensorio senese è riconducibile a contesti di seconda metà VIII-X secolo.

12.1.3 Ceramica da mensa (*tav. 3*)

Tra i reperti più antichi nell'ambito funzionale della mensa è stato rinvenuto un ingente quantitativo di orli, pareti, anse e fondi in particolare:

– I.3.1. Piatti e scodelle dotati di fondo con piede ad anello (dis. 29: Dyson 1976, fig. 4, CF 54, tardo repubblicano) il cui stato di conservazione ci consente di delineare un generico periodo romano.
– I.3.2. Orlo arrotondato e pendente attribuibile ad un piatto *Hayes 105* in terra sigillata africana D (dis. 33: *Atlante delle forme ceramiche*, tav. XLIII, nn. 3-4, p. 96). Le superfici conservano ancora uno spesso strato di vernice rossa brillante di buona qualità. La presenza sul sito, seppure sporadica, di un prodotto africano datato al 580/600-660 d.C., attesta la persistenza delle merci africane in questo comprensorio.
– I.3.3. Ansa sagomata pertinente ad una forma chiusa (dis. 26: Cantini 2005, tav. 42, num. 7.29; Vaccaro 2011, tav. XXVII, num. 2, 4.) su cui sono visibili tracce di ingobbio rosso, datato al VI-VII secolo.

Relativa ad una fase di poco successiva risulta essere il frammento di una brocca in vetrina pesante, inquadrabile a livello cronologico nel corso dell'alto Medioevo.

– I.3.4. Fondo di piatto con larga tesa e piede ad anello la cui superficie interna è decorata con motivi vegetali in blu e bruno appartenente alla classe "cobalto e manganese" (dis. 6: Berti 2002, tipo B, pp. 93-96; Baldassarri, Giorgio 2010, pp. 43-44, fig. 11; Berti, Giorgio 2011, p. 39). Si tratta di una ceramica di importazione tunisina la cui produzione va dall'ultimo quarto del XII secolo alla prima metà del XIII secolo[41].
– I.3.5. Boccali in maiolica arcaica di produzione senese e pisana inquadrabili nei relativi archi cronologici di produzione (dis. 8: fondo con piede svasato e dis. 19, ansa a bastoncello: Alberti 1993, num. C8, p. 597; Berti 1997, tavv. 106-115, pp. 171-179; Cantini 2003, tav. 35, num. V.4.2-4; Grassi 2010, fig. 50).
– I.3.6. Piede ad anello ingobbiato e graffito (dis. 7: Gelichi 1993). Si tratta del reperto di epoca più tarda in quanto rimanda alla tecnica dell'ingobbio che fu introdotta in Toscana intorno al secondo quarto-metà del XV secolo.

[39] L'analisi degli impasti è stata effettuata a livello autoptico su tutti i frammenti rinvenuti, distinguendo 13 varianti (5 per la ceramica aroma grezza, 4 per la semidepurata-selezionata, 4 per la depurata).

[40] Si tratta di frammenti di pareti di dimensioni troppo esigue per permetterne il disegno.

[41] Importazioni in cobalto e manganese sono documentate anche in altri siti del territorio sia costiero (San Quirico di Populonia) che interno (Montemassi alla fine del XII secolo e alla Canonica di San Niccolò di Montieri). La presenza di ceramiche tunisine sottolinea la vitalità commerciale di questo territorio A. Costantini, *Archeologia in Piazza dei miracoli*, pp. 393-430.

– I.3.7. Brocche e boccali in acroma depurata, ascrivibili al pieno Medioevo (diss.1, 2, 31, anse a nastro di dimensioni medio grandi di produzione senese e pisana del XIII-XIV secolo: Grassi 2010, fig. 34; Vaccaro 2011, tav. XCV, nn. 3-8).

Sono presenti anche alcuni frammenti di pareti che presentano le superfici primarie rivestite da una strato di vetrina con diverse tonalità di verde, riconducibili a forme sia aperte che chiuse databili ad un generico periodo medievale.

12.1.4. Ceramica da trasporto (*tav. 3*)

Tra i contenitori preposti al trasporto delle merci abbiamo individuato due tipologie di anfore vinarie:

– I.4.1. Ansa a doppio bastoncello[42] riconducibile ad un'anfora tipo *Dressel 2/4* che per caratteristiche tecniche rimanda alla produzione delle officine costiere della Spagna *Tarraconense* di I-II secolo, ampiamente attestata nel territorio populoniese.

– I.4.2. Due puntali di *Anfora di Empoli* (dis. 30: Cambi 1986, pp. 564-567; Cantini 2010, p. 353; Id. 2011, p. 163, nota 17; Vaccaro 2014, p. 216). L'analisi autoptica effettuata sugli impasti rimanda con certezza alla produzione di V-VI secolo dell'area valdarnese, attestata nel territorio in questione in numerosi siti tra cui il vicino San Quirico di Populonia (Pagliantini, Ponta 2016, pp. 253-255, con bibliografia di riferimento).

Sono infine 27 i frammenti riconducibili ad anfore di diversa provenienza il cui stato di conservazione non permette il riconoscimento delle tipologie di appartenenza, ma suggerisce come areali di riferimento l'ambito africano e tirrenico.

A.B., E.P.

[42] Salerno R. 2008-2009, *Le anfore romane nel territorio di Populonia*, tesi di Laurea Specialistica, Università degli Studi di Siena, dis. 9, p. 152; Costantini 2011, p. 398 con bibliografia di riferimento

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LE RICERCHE A VETRICELLA: NUOVE EVIDENZE ARCHEOLOGICHE TRA PAESAGGI ANTROPICI E NATURALI

1. LO STUDIO ARCHEOLOGICO A VETRICELLA E "CASTELLINA": LE PRIME RICERCHE ED IL PROGETTO nEU-Med

Il progetto di studio condotto presso Scarlino nell'area di Vetricella (GR), località che indica un'estesa proprietà fondiaria in cui si localizza il sito oggetto di studio, rappresenta un percorso di ricerca archeologica pluriennale (le prime indagini si datano all'autunno 2006) strutturato fortunatamente su una progressione ascendente[1]. Con la stagione 2016, infatti, le possibilità di indagine offerte dal nuovo progetto ERC nEU-Med hanno alimentato uno studio più articolato, con un incremento esponenziale di dati e, soprattutto, di prospettive.

Un percorso di ricerca che in realtà, allargando lo sguardo a tutto il territorio, si deve considerare ancora più lungo e complesso, collegandosi ad un unico filone di studio archeologico che in area maremmana procede da quasi quarant'anni[2]. È stato già ricordato il legame che collega le più recenti ricerche condotte nell'Alta Maremma costiera con le prime indagini avviate da Riccardo Francovich sul finire degli anni '70 del secolo scorso (Francovich 1985; Bianchi 2015a; Ead. 2015b; Marasco 2009, pp. 326-327). Da una lettura unitaria dei dati raccolti, degli interrogativi storici e delle relative risposte, è possibile evidenziare sia il valore di quanto fatto in passato, sia la portata delle novità che vengono presentate in questo volume. Un valore di ricostruzione storica che si esprime nelle reciproche concordanze, ma ancor di più nelle possibilità di integrare i precedenti studi con nuovi schemi interpretativi.

Rifacendosi a quanto già presentato in precedenti occasioni sull'avvio della ricerca nell'area di Vetricella[3], in questa sede si vuole presentare lo stato della ricerca in uno dei contesti principali per lo studio dell'assetto socio-economico del territorio costiero nell'alto Medioevo.

Il sito oggetto di ricerca, che d'ora in avanti verrà chiamato con il nome stesso di *Vetricella*, era stato identificato fin dai primi affondi di indagine con il toponimo *Castellina*, nome assegnato ad un edificio poderale vicino all'area di scavo e ritenuto residuo toponomastico di antiche strutture di età medievale[4]. Il termine *Vetricella*, oltre ad identificare il singolo sito, definisce di per sé un'areale più ampio, richiamando nella sua etimologia un passato di ambiente palustre[5], privo di alcun riferimento storico e collegato ad un corso d'acqua minore, nei pressi della fattoria omonima. L'incertezza manifestata anche in precedenti occasioni nel definire una nomenclatura univoca per il contesto di indagine è, in qualche modo, il riflesso della totale assenza di riferimenti documentari specifici (Farinelli 2013), e della cancellazione della memoria "toponomastica" locale a causa degli impaludamenti ed abbandoni di età moderna[6].

Del resto, fin dai primi anni di indagine l'approccio metodologico è stato di tipo territoriale, nascendo proprio come progetto di ricostruzione dei paesaggi altomedievali di un'areale, più che come indagine di un singolo contesto[7]. In questi termini, proprio le ricerche condotte tra il 2007 ed il 2009, hanno contribuito ad aprire una nuova finestra interpretativa per la ricostruzione degli assetti insediativi nelle aree umide dell'area costiera, stimolando in parallelo con altre contemporanee ricerche gli ampliamenti portati avanti da nEU-Med[8].

Il contesto in cui si colloca il nostro sito è un'area di pianura prossima all'attuale costa di Follonica (GR), solcata dal fiume Pecora e da torrenti minori, e storicamente connotata da presenza di ampi specchi d'acqua, dapprima a carattere lagunare poi paludoso (*fig.* 1). Questo è il quadro che in qualche modo farà da cornice alla particolare morfologia del sito di Vetricella, caratterizzato da una modesta sopraelevazione circolare (in parte artificiale) e dalla presenza di diversi elementi difensivi concentrici (ben visibili fin dalle prime fotografie aeree).

Il particolare aspetto del sito ha determinato da subito l'interesse della ricerca archeologica, avendone evidenziata l'eccezionalità rispetto alle forme note per le coeve strutture fortificate italiane e fornendo lo spunto per uno specifico incontro di studi nell'aprile 2011 (Settia, Marasco, Saggioro 2013). Un'evidente incertezza di inquadramento dei primi dati stratigrafici traspare anche nei tentativi di attribuire a termini o definizioni tipologiche note quanto rinvenuto nello scavo, dove in più occasioni la struttura individuata alla Vetricella è stata letta in relazione alla tipologia delle *motte* di età medievale (Marasco 2013a, p. 57; Marasco 2009, p. 327).

[1] Il progetto inizialmente nasce nell'ambito delle attività del LAP&T – Laboratorio di Archeologia dei Paesaggi e Telerilevamento dell'Università di Siena (Campana, Francovich, Vaccaro 2005; Campana, Francovich, Marasco 2006), per proseguire poi come specifico dottorato di ricerca e progetto di studio territoriale (Marasco 2013b).

[2] Si veda in questo stesso volume il quadro introduttivo di sintesi presentato da R. Hodges, pp. 11-17.

[3] Si rimanda in particolare alla presentazione delle fasi preliminari della ricerca (Campana, Francovich, Marasco 2006; Campana *et al.* 2009) e delle prime campagne di indagine (Marasco 2013a, 2012, 2009).

[4] Nonostante la suggestione della relazione tra toponimo e vicinanza spaziale del sito oggetto di scavo, non possiamo escludere che la presenza del nome in quest'area sia da riferirsi a differenti dinamiche storiche. Il toponimo di *Castellina*, infatti, già attestato nella stessa zona agli inizi dell'800 (Barberini 1985), potrebbe in realtà riferirsi alla presenza nello stesso areale della "Bandita della Castellina" con riferimento ad un altro insediamento castrense posto nel territorio di Massa Marittima (in riferimento al sito massetano di *Castellina*, oggi Pero Castellaccio, si veda Farinelli 2013 e Cucini 1985, p. 247).

[5] Per l'etimologia del toponimo, connessa alla pianta palustre della *vetrice*, si rimanda a Pieri 1969.

[6] Per una prima analisi storica del processo di impaludamento e bonifica in quest'area si rimanda a Azzarri, Rombai 1985, p. 120 e alla recente sintesi, integrata con una lettura archeologica, in Marasco 2013b, pp. 33-52. Per le considerazioni su fonti documentarie indirette relative alla storia di Vetricella si veda *infra* il contributo di Simone Collavini.

[7] Come già ricordato, l'origine del progetto di studio nell'area di Vetricella si lega direttamente alle attività di studio dei paesaggi archeologici grossetani promosse dal Prof. Stefano Campana e dal Laboratorio di Telerilevamento (LAP&T). Fino dalle prime attività di ricerca, quindi, è stata seguita un'impostazione multidisciplinare con l'applicazione integrata di differenti metodologie di indagine: analisi di fotografie aeree e rilievi LiDAR, prospezioni con georadar, rilievi geo-elettrici e misurazioni gradiometriche. Per una ricostruzione delle metodologie adottate si rimanda a Marasco 2013b, pp. 53-57 e ss.

[8] Nel panorama dell'archeologia medievale toscana è da considerarsi recente l'interessamento ai contesti territoriali di pianura, perlopiù costieri, e alle antiche aree lagunari ad esse connesse, contesti storici analizzati solo marginalmente per i secoli altomedievali a favore dei paesaggi d'altura. Si possono citare le ricostruzioni dei paesaggi medievali nella vicina area di Piombino e della Val di Cornia (Dallai 2002; Dallai, Ponta 2009) e le ricerche territoriali condotte nel comprensorio grossetano (Vaccaro 2011). Un contributo fondamentale per un nuovo approccio di studio archeologico a questi contesti viene offerto in particolare dall'applicazione di metodologie di remote sensing estensivo, come sta emergendo chiaramente dalle indagini nell'antico territorio di Roselle (Campana 2017). Per un'analisi della disciplina in riferimento ad esempi di studio archeologico delle aree umide (Wetland Archaeology), troppo spesso considerate erroneamente zone marginali del paesaggio, si veda il quadro europeo proposto in Menotti, O'Sullivan 2013 e le ricerche condotte in Nord Italia da Fabio Saggioro (Saggioro 2012, 2006).

Il proseguimento delle ricerche garantito dal nuovo progetto consente di andare oltre la problematica di un inquadramento terminologico del sito, almeno a questo livello della ricerca, confermando l'inadeguatezza (talvolta) di schematiche definizioni terminologiche rispetto alle differenti soluzioni materiali adottate ed il rischio di un'analisi impostata sulla valutazione delle sole forme (Gelichi 2013).

A livello di definizione morfologica, probabilmente, anche i nuovi dati archeologici inquadrerebbero il nostro sito nel più ampio raggruppamento dei *siti ad anello* con recinzioni o fossati circolari di tradizione nord-europea, sebbene con dimensioni e caratteri interni che rimandano all'immagine delle successive *motte* signorili[9]. Sul piano della lettura storica il sito di Vetricella era stato inizialmente inserito per le sue caratteristiche materiali nel contesto delle prime manifestazioni altomedievali di un'affermazione signorile (un piccolo nucleo fortificato costituito da strutture difensive in terra e legno), anticipazione della successiva nascita dei primi castelli (Marasco 2009; Bianchi 2010; Creighton 2012, pp. 94-45). Vedremo, invece, come i nuovi dati archeologici, integrati con un quadro territoriale sempre più definito, delineano un paesaggio storico di respiro molto più ampio, ipoteticamente collegabile ad una rete patrimoniale di carattere pubblico. Questa nuova lettura interpretativa coinvolge non solo il singolo sito di Vetricella, ma anche il contesto territoriale circostante, dove già le precedenti indagini avevano evidenziato una forte connessione tra i diversi contesti insediativi individuati sul terreno (Marasco 2013b, pp. 198-213; Bianchi c.s.; Bianchi 2015a)[10].

Nei paragrafi che seguono, quindi, verrà definito il quadro archeologico generale, ottenuto integrando i risultati delle precedenti indagini con il nuovo anno di ricerca, procedendo dall'inquadramento del territorio verso lo scavo e presentando in conclusione una prima sintesi analitica[11].

2. LA PIANURA DEL FIUME PECORA TRA PAESAGGIO ANTROPICO E NATURALE

Aldilà di un consuetudinario inquadramento territoriale del cantiere di scavo, la ricerca svolta a Vetricella ha sempre cercato di porre attenzione alle dinamiche del paesaggio e alle sue trasformazioni diacroniche, individuandole come oggetto stesso dell'indagine.

Dinamiche in cui un ruolo centrale è sempre stato giocato da un antico ambiente lagunare che oggi risulta poco percepibile (se non addirittura invisibile) e parzialmente tralasciato, come secondario, nei precedenti studi sul territorio.

Il contesto preso in esame presenta oggi l'aspetto tipico delle ampie pianure costiere che caratterizzano parte della costa tirrenica: ampie aree a coltivazione estensiva, circondate da sistemi di basse colline e rilievi boscati, un tempo occupate da laghi salmastri e lagune, successivamente impaludate e, infine, sottoposte ad interventi di bonifica (Bartolini *et al.* 1977; Federici, Mazzanti 1995). Un tale quadro può già suggerire come i processi di trasformazione del paesaggio abbiano vissuto una particolare accelerazione soprattutto a partire dal secolo scorso, con rotture di equilibri tra insediamenti, attività produttive e sfruttamento delle risorse che erano rimasti immutati per secoli.

Sul piano ambientale l'area di indagine corrisponde alla parte terminale del bacino del fiume Pecora, un corso d'acqua che si genera nell'area di Massa Marittima e che ha rappresentato nei secoli un riferimento centrale nel paesaggio storico locale, sebbene il suo nome oggi non ne conservi più alcun riferimento[12].

A cornice dell'ampia pianura del Pecora si individuano i rilievi di Montioni e del Cornia a nord, a separare la vicina laguna di Piombino, e le Colline Metallifere massetane ad est, altro punto di riferimento fondamentale per ricostruire i paesaggi storici. A sud, infine, si posizionano i monti di Scarlino, che costituiscono il limite meridionale della pianura lagunare.

Tra gli elementi ambientali di maggior rilievo vi è senz'altro la rete idrografica, fortemente attiva nella formazione dei paesaggi antichi della pianura, sia come contributo alle acque stagnanti di origine lagunare, sia per i nocivi apporti di detriti che contribuirono all'impaludamento. Una rete idrografica che seppur modificata nel suo stato attuale, proprio per le operazioni di riconquista delle paludi, risulta ancora ben leggibile sia attraverso l'osservazione della cartografia storica, che nelle tracce individuabili sul terreno. Significativa su tutti è la ricostruzione dell'originario corso del fiume Pecora, che presenta oggi un andamento rettificato, ma che in antico attraversava la pianura a breve distanza dall'area di Vetricella, andando poi a spagliare nell'area lagunare cartografata in età ottocentesca come *Palude di Scarlino*[13] (*fig.* 2).

Qui doveva localizzarsi, in forme più o meno estese, quello che nella più antica documentazione scritta e cartografica è ricordato come *Lago* di Scarlino (Cucini 1985, p. 161; Cardarelli 1932, pp. 178-179), che con la sua natura salmastra testimoniava l'origine stessa della pianura costiera (come ricostruito, attraverso studi specifici, per le analoghe aree lagunari del grossetano e di Piombino[14]). Contesti pianeggianti tra loro simili, formatisi con il progressivo ritiro dei livelli del mare fino alla formazione, a partire da epoca pleistocenica, di un ampio bacino interno di acqua salmastra, separato dal mare per mezzo di un basso cordolo sabbioso. Un'ampia superficie di acque interne che nell'area scarlinese veniva alimentata con acqua dolce dal Pecora (e dai fiumi minori) e con l'acqua salata che penetrava attraverso l'ampia imboccatura a mare, all'altezza dell'attuale località Puntone (sede dell'antico *Portus Scabris* di età romana)[15].

[9] Sulle problematiche connesse alla denominazione dei resti materiali delle fortificazioni in materiale deperibile si veda, oltre al citato Convegno di Scarlino, il quadro europeo proposto in Creighton 2012 e, più di recente, in Christie, Herold 2016.

[10] Si vedano anche, in questo stesso volume, l'inquadramento ricostruttivo e la lettura storica proposti negli interventi conclusivi di Giovanna Bianchi e Simone Collavini.

[11] Alla stesura dei successivi paragrafi partecipano, oltre a chi scrive, i colleghi che con la campagna 2006 si sono affiancati nella gestione del cantiere di scavo e dell'indagine archeologica, condotta sotto la direzione scientifica della Prof.ssa Giovanna Bianchi. Insieme a loro, tuttavia, è più ampio il gruppo di lavoro grazie al quale è stato possibile, sia nelle precedenti stagioni che con il nuovo progetto nEU-Med, portare avanti la ricerca che viene presentata: Mauro Buonincontri, Giulio Poggi, Stefania Fineschi, Marta Rossi, Elie Essa Kas Hanna, Elisabetta Ponta, Anna Romano, Roberta Ruotolo, Luisa Russo, Davide Susini.

[12] Il nome del fiume in età altomedievale è in realtà *Teupascio*, come attestato per la prima volta in un atto del 746 (CDL n. 87; MDL IV/1 n. 6; MDL V/2 n. 35). Per l'etimologia del toponimo e per il suo diretto riferimento a beni del re (*Teutpascio* da Þeudo-bakiz = rio demaniale) si vedano le considerazioni proposte in Francovich Onesti 2002 e Francovich Onesti 2000).

[13] Per una sua raffigurazione si rimanda, ad esempio, alla *Pianta Geometrica del Territorio adiacente alle Dogane del Puntone di Scarlino e Follonica*, del 1835 (ASF, Miscellanea di Piante, 286r. Per un più complesso studio geomorfologico del corso del fiume Pecora si rimanda ai contributi in Pieruccini *et al.*, in questo stesso volume.

[14] Per l'area grossetana dell'antico *Lago Prile* si rimanda ad Arnoldus-Huyzendveld 2007, pp. 51-55 e ss; per l'area di Populonia e Piombino si vedano i contributi di Bardi 2002; Isola 2005 e Giroldini 2012, meglio analizzati in Dallai *et al.* in questo volume.

[15] La prima attestazione dell'antico approdo di *Portus Scabris* si rintraccia nell'*Itinerarium Maritimum*, dove risulta posizionato tra l'approdo di *Alma positio* (localizzabile alla foce dell'attuale Fiume Alma, a sud dei Monti di Scarlino) ed il porto di *Falesia* (nell'attuale costa di Piombino). Per la localizzazione dell'antico *Portus Scabris* nell'area dell'odierno Puntone, corrispondente poi al *Portichale*/Portiglioni di età medievale, si rimanda a Pasquinucci 2004 e

Per ricostruire quale fosse il paesaggio in cui visse il sito di Vetricella risulta, quindi, determinante fissare dei punti di riferimento nei processi di trasformazione degli elementi descritti, per tentare di leggerli in una visione diacronica. Primo fra tutti si deve considerare proprio quel *lago* di Scarlino, affiancato da uno *stagno* già nel corso del Medioevo[16], che ha avuto certamente il peso maggiore nel condizionare gli assetti insediativi e le attività economiche di ogni epoca. Del resto, la novità del quadro ricostruttivo proposto per l'alto Medioevo dai recenti studi è determinata proprio dalla precedente visione di questo paesaggio lagunare, dove, sotto il condizionamento di un'immagine propria dei secoli successivi, si trasferiva al Medioevo un'eccessiva presenza di paludi nocive e pianure poco vivibili. L'esigenza di definire correttamente questo paesaggio non è connessa tanto alla comprensione del contesto naturalistico, quanto alla definizione in chiave storica dei potenziali caratteri di attrattiva (per le locali risorse economico-produttive) e dei fattori ambientali negativi (come la progressiva formazione dei ristagni palustri).

Proprio con queste finalità è stato avviato un nuovo studio a carattere multidisciplinare anche nell'ambito di nEU-Med, per ricostruire la reale estensione dell'area lagunare di Scarlino e le caratteristiche morfologiche del contesto di Vetricella[17].

Alcuni primi dati per definire il paesaggio di età medievale, tuttavia, sono stati analizzati anche nel precedente studio territoriale e permettono già di elaborare alcune proposte ricostruttive preliminari, da implementare con i lavori in corso.

Una prima fase dello studio già effettuato ha riguardato l'analisi delle fonti cartografiche disponibili, riferibili a differenti tipologie di rappresentazioni, non prettamente finalizzate a documentare il paesaggio e, soprattutto, di inquadramento cronologico più tardo rispetto all'ambito di studio[18]. Un buon valore documentario è riconoscibile nella produzione cartografica dei primi decenni del XIX secolo, collegata in particolare alle raffigurazioni del Catasto Particellare del Granducato (il cosiddetto *Leopoldino*) e ai successivi strumenti di progettazione degli interventi di bonifica di epoca granducale, entrambi strumenti che raffigurano un territorio rimasto congelato dall'epoca tardo medievale. L'osservazione di queste carte ha consentito, ad esempio, di definire le forme di fossi e di acque stagnanti, utili per una ricostruzione a ritroso delle morfologie originarie (*fig.* 2a).

Si tratta di raffigurazioni in cui, peraltro, appaiono ancora visibili intorno alla palude elementi di divisioni agrarie e viabilità campestri che oggi risultano fossilizzati in anonimi fossi o canali di scolo, a testimoniare un paesaggio precedente e senza più alcun rapporto con il contesto attuale. Risulta, ad esempio, interessante per il nostro obiettivo la raffigurazione nei pressi di Vetricella di una viabilità con tracciato arcuato che attraversa i campi a nord dell'area paludosa, ad indicare verosimilmente un percorso posto sul limite di un'antica area lagunare (o quantomeno acquitrinosa) (*supra*, *fig.* 2).

Se i dati cartografici consentono di identificare gli elementi ancora attivi, o le tracce di generici assetti più antichi, risulta più difficile assegnare a queste possibili linee di paesaggio una cronologia assoluta. In alcuni casi l'integrazione dei dati cartografici con l'osservazione delle tracce tele-rilevate (da foto aerea e analisi LiDAR[19]) ha permesso di escludere l'antichità di alcuni elementi o, viceversa, di avvalorare un'anteriorità all'età moderna per alcuni paleoalvei.

Indicazioni cronologiche utili possono essere ricavate dalla distribuzione dei ritrovamenti archeologici, che in parte contribuiscono a definire un quadro diacronico delle presenze antropiche e, quindi, delle potenziali aree asciutte.

Le ricognizioni di superficie hanno individuato per l'area dell'antico lago un'intensa frequentazione per tutta l'epoca antica, collegata alle risorse naturali della fascia costiera, sia attraverso occupazioni di carattere insediativo che a carattere produttivo. In particolare, sono attestate archeologicamente significative attività di produzione del sale in epoca protostorica ed intense attività di lavorazione metallurgica in età etrusca e romana (Cucini 1985, pp. 272-299; Aranguren, Castelli 2006). La particolare vitalità produttiva dell'area, del resto, è determinata non solo dalla naturale conformazione morfologica, con un'estesa fascia costiera, un golfo facilmente navigabile ed un ampio lago interno, ma anche dalla vicinanza con le aree minerarie del Massetano e dell'Isola d'Elba.

Su questa base territoriale, inoltre, si sviluppa nei secoli un'importante rete di collegamenti, quali le viabilità principali sviluppate sulla costa o alle spalle del lago, e le rotte marittime del *Portus Scabris*[20].

Per l'età classica, quindi, i dati archeologici delineano un paesaggio di pianura vivibile ed economicamente attivo, la cui salubrità si deve immaginare garantita proprio dall'intenso e organizzato sfruttamento agricolo, con un necessario controllo della rete idrica. Nonostante alcuni primi segni di destrutturazione già a partire dal II-III secolo d.C., l'età tardoantica restituisce un quadro di relativa sopravvivenza per alcuni siti principali (ville e fattorie) e per limitati nuclei agricoli minori (Marasco 2013b, pp. 137-150). Considerando anche la continuità di attestazioni nell'area siderurgica sul tombolo retrodunale e la vitalità registrabile nello scalo di *Portus Scabris* (Vaccaro 2011) e nella vicina villa del Puntone (Cucini 1985, pp. 175-176), si può delineare ancora entro il V secolo un quadro di discreta tenuta del tessuto socio-economico (seppur in forme mutate).

Il dato che tuttavia interessa maggiormente questa ricerca è quello relativo all'assetto del territorio nel passaggio alla fase altomedievale e ai secoli successivi, quando le precedenti ricerche proponevano una sostanziale assenza di indicatori materiali, con un ultimo contesto frequentato fino agli inizi del VII secolo (nel sito de La Pieve, presso Scarlino Scalo) ed alcune sporadiche frequentazioni di piena età medievale (Cucini 1985, pp. 300-302). I nuovi indicatori, raccolti tra il 2007 e il 2009, non evidenziano nella pianura significative contrazioni del territorio antropizzato rispetto ai possibili acquitrini, riconoscendo un complesso di circa venti unità topografiche comprese tra VIII/IX secolo e XII secolo.

alle ricerche subacquee illustrate in Bargagliotti, Cibecchini 2003. Per una recente lettura degli indicatori archeologici delle attività portuali si veda *infra* il contributo di Emanuele Vaccaro.

[16] Così, ad esempio, dai riferimenti territoriali presenti in un privilegio di papa Clemente III a favore del vescovo di Grosseto Gualfredo, datato 12 aprile 1188 (Ceccarelli Lemut 1985, p. 45 nt. 130).

[17] Studio in corso a cura di Pierluigi Pieruccini e Davide Susini, membri del team nEU-Med.

[18] Nel corso dello studio condotto durante il già citato dottorato di ricerca, sono state consultati sia documenti cartografici estesi a raffigurare l'intera fascia costiera (di carattere più amministrativo che geografico), sia documenti legati ad esigenze di rappresentazione a scala più ridotta, perlopiù connesse alla gestione locale delle terre e ai primi interventi di bonifica. Per un quadro di dettaglio dello studio cartografico effettuato si rimanda a Marasco 2013b, pp. 69-80.

[19] L'analisi è stata effettuata utilizzando il rilievo LiDAR realizzato dal Ministero dell'Ambiente e della Tutela del Territorio e del Mare nell'ambito del Piano Straordinario di Telerilevamento Ambientale. Nuove e più dettagliate acquisizioni potranno essere raggiunte con la nuova fase di studio promossa nell'ambito del progetto nEU-Med.

[20] Per la ricostruzione delle principali arterie viarie di età romana, collocate alternativamente dai differenti autori sulla linea di costa o nella pianura interna, si rimanda alle analisi proposte in Cambi 2004 e Celuzza *et al.* 2007.

Dopo un'evidente diminuzione di indicazioni materiali tra VI e VII secolo, quando si registra oggettivamente una tendenza alla contrazione di attestazioni, a partire dal IX secolo si riconosce una maggiore visibilità di frequentazioni strutturate. Sia nella pianura a nord dell'area lagunare (cioè, l'area di Vetricella) sia nella porzione verso i monti di Scarlino, sono stati individuati diversi contesti di piccole o medie dimensioni databili tra IX e X secolo.

L'analisi spaziale di queste attestazioni mostra, almeno nelle aree meglio analizzate come Vetricella, una distribuzione coerente e organizzata, sia rispetto all'elemento antropico che al paesaggio naturale. Lo stesso contesto di Vetricella, posto a breve distanza dall'antico alveo del fiume Pecora e dalla possibile area lagunare, manifesta nel suo posizionamento una relazione consapevole e volontaria con l'elemento "acqua" (nelle sue diverse forme), lasciando ipotizzare anche una precisa strategia di sfruttamento di quel territorio.

Intorno al sito, inoltre, si struttura una rete di contesti coevi, differenziati per entità materiali e con relazioni topografiche ben evidenti, anch'essi distribuiti in modo coerente rispetto ai microrilievi asciutti e alle piccole depressioni allagabili evidenziate nei rilievi tridimensionali del terreno (Marasco 2013a, pp. 62-63) (*fig.* 3).

L'osservazione dei caratteri materiali di questi contesti evidenzia la presenza di una prima fascia di unità più piccole ad una distanza di 150-200 m dal sito di Vetricella, con restituzione oltre che di reperti ceramici anche di indicatori di attività metallurgica (perlopiù scorie di forgia), e di una seconda fascia di siti maggiori posta a circa 700-800 m di distanza (Marasco 2013b, pp. 266-274; Marasco 2012, pp. 715-716). In questa seconda fascia, nello specifico, si registrano sia unità topografiche identificabili come nuclei abitativi/produttivi singoli, sia complessi insediativi di apparente natura aggregata, potenzialmente ancora inseriti nell'areale di influenza del sito di Vetricella. Tra queste, in particolare, si devono segnalare due aree di materiali (UT24/25 e UT17/18) che sono state sottoposte ad ulteriori affondi di indagine per tentare di definire l'entità e la tipologia delle frequentazioni testimoniate dagli indicatori di superficie[21]. In entrambi i casi, infatti, la ricognizione ha evidenziato non solo la presenza di materiale ceramico comune e pietrame, ma anche indicatori di attività metallurgica (scorie di forge e frammenti di minerale), e nel caso delle UUTT17/18 anche la presenza di ossa umane[22]. Si tratta in quest'ultimo caso di un contesto particolarmente interessante, che per la sua caratterizzazione materiale potrebbe essere associato ad un nucleo insediativo medio-grande, posto inevitabilmente in relazione diretta con la fortificazione di Vetricella. Anche per questo sito, inoltre, la sua localizzazione trova corrispondenza con la micromorfologia originaria del terreno, che lo vede posizionato su un modesto micro-rilievo circondato da una depressione di paleoalveo.

Per la maggior parte di questi contesti, pur nei limiti di un inquadramento cronologico basato sull'analisi della ceramica comune, si registra una sostanziale assenza di produzioni ceramiche connesse con il pieno XII secolo. La conseguente lettura di una diminuzione dei nuclei insediativi di pianura, oltre a suggerire l'affermarsi di nuovi sistemi di gestione del territorio e delle sue risorse, troverebbe corrispondenza anche con il coevo sviluppo dei più vicini centri incastellati, tra cui lo stesso castello di Scarlino.

Questo assetto della rete insediativa e di paesaggio proposto su base archeologica per l'alto Medioevo, troverebbe in qualche modo corrispondenza anche con i riferimenti ricavabili dalla documentazione scritta di piena età medievale[23]. Sebbene, infatti, si tratti di documenti non finalizzati alla descrizione del paesaggio contemporaneo, i riferimenti alle attività economiche e produttive connesse con il lago e l'area lagunare, sono testimonianza indiretta di una pianura percepita come risorsa positiva.

Attestazioni del lago di Scarlino e del suo valore per le attività economiche del territorio sono ricavabili, ad esempio, in due atti, di metà XI e di fine XII secolo, dove insieme alla presenza dello specchio d'acqua interno, si menziona anche un'ampia serie di diritti connessi al suo sfruttamento (Ceccarelli Lemut 1985, p. 36 nt. 72 e p. 71 nt. 53).

Ancora in documenti di inizio XIII secolo, pur in presenza di riferimenti alla comparsa di *paludi nuove*, traspare l'immagine di una pianura attiva sul piano agricolo-produttivo, con un lago navigabile e specchi d'acqua indicati come preziose risorse economiche ed alimentari (*Ibidem* p. 7 e p. 71 nt. 49).

La navigabilità del *Lago* di Scarlino è attestata ancora nella seconda metà del XIV secolo, in relazione al riparo fortunoso trovato da una galea al seguito di Papa Gregorio XI durante una tempesta (*Ibidem* p. 71 nt. 54), mentre mancano attestazioni più specifiche su una possibile navigazione lagunare di piccolo cabotaggio.

Solo estendendo l'analisi alla documentazione più tarda sembra di poter cogliere tracce più consistenti di quel processo irreversibile che avrebbe consolidato la distinzione tra un'area occupata dallo stagno (residuo del lago originario) e un'area paludosa. In una serie di atti datati tra il 1491 e il 1530 per l'affitto del *padule*, ad esempio, si menziona l'obbligo manutenere le arginature e le immissioni dei fossi nel padule, per garantire un buon livello d'acqua (Azzarri, Rombai 1985).

È proprio nella documentazione di fine XV-XVI secolo che compaiono sempre più riferimenti ad una pianura divisa tra terra e acqua, ad un paesaggio fatto di fossi e canali, di guadi e sistemi di attraversamento, ma soprattutto di acquitrini, di 'paduli' e delle attività necessarie per tenere bonificata la terra (Pinto 1985). Anche sul piano delle restituzioni archeologiche, del resto, dopo la contrazione registrata con il XII secolo, i fondi agricoli di pianura restituiscono materiale ceramico attestante frequentazioni tardomedievali solo fino al XV secolo.

L.M.

3. SCAVO DELLA VETRICELLA: STRATEGIA DELLA NUOVA CAMPAGNA 2016

L'avvio del progetto ERC nEU-Med ha segnato una svolta fondamentale nella prosecuzione delle ricerche sul sito di Vetricella e sul paesaggio circostante, con un ampliamento significativo sia dell'estensione spaziale che dei metodi di inda-

[21] Le indagini, che rientrano nelle attività del nuovo progetto nEU-Med, prevedono l'utilizzo sia di prospezioni geofisiche che di analisi geochimiche, oltre alla ripetizione di nuove ricognizioni di superficie (con il coordinamento rispettivamente del Dott. Lorenzo Marasco e delle Dott.sse Luisa Dallai e Vanessa Volpi).

[22] Resta da chiarire la lettura del rapporto tra questi spargimenti ed un altro esteso spargimento di materiale ceramico e laterizio di età romana, posto a soli 105 m di distanza e databile tra II e V secolo d.C. (Marasco 2013b, pp. 151-152, 266-270). Dobbiamo inoltre segnalare la vicina presenza di una necropoli di età romana, parzialmente indagata in passato e localizzata a poche centinaia di metri di distanza, risultata in uso fino al III secolo d.C. (Cucini 1985, p. 222 n. 139).

[23] Qui si offre una sintetica presentazione delle indicazioni ricavabili dalla documentazione scritta edita. Si rimanda invece agli specifici studi previsti nell'ambito del progetto nEU-Med per una più approfondita analisi di carattere storico-documentario di tutto il materiale disponibile, in particolare per la fase altomedievale. Come primo approfondimento di analisi generale si veda il contributo di Simone Collavini in questo stesso volume.

gine a nostra disposizione[24]. Il sito archeologico di Vetricella è sempre più emerso come uno dei contesti principali dell'intera fascia costiera, almeno nella ricostruzione degli assetti socio-economici di età altomedievale. I suoi caratteri generali erano già stati riconosciuti nei primi anni di indagine, ma solo ora è possibile comprenderne nel dettaglio la complessità stratigrafica e analizzarne il significato storico. Dopo aver delineato il paesaggio storico in cui dobbiamo immaginare il sito di Vetricella (*supra* Par. 1 e 2; Marasco 2013, pp. 60-61; Marasco 2009, pp. 326-328), possiamo adesso esporre i principali dati stratigrafici raccolti con lo scavo e la strategia adottata per recuperarli[25].

Si tratta di una strategia che ovviamente ha tenuto conto sia delle domande storiche che animano il progetto nEU-Med, sia dei conseguenti aspetti pratici, non solo come maggiore disponibilità di risorse, ma anche come tempistiche di indagine necessariamente definite e "limitate" (rispetto all'estensione totale del sito).

La nuova campagna di scavo 2016 ha avuto come prima finalità la ripresa delle ricerche precedenti, con un allargamento delle aree di indagine, nel tentativo di comprendere entro i termini temporali del progetto la diacronia di frequentazione del sito e le sue trasformazioni sia materiali che funzionali. Partendo dalla solida base dei dati pregressi, l'indagine è stata avviata con una prima riapertura nel mese di maggio ed un'indagine estensiva nei successivi mesi di settembre ed ottobre. Con l'utilizzo del mezzo meccanico è stato realizzato l'allargamento dei vecchi settori di scavo e la predisposizione di un'unica grande area (oltre 1500 m^2), corrispondente alla superficie racchiusa dall'elemento circolare più interno (*fig.* 4).

In continuità stratigrafica con quest'area centrale sono stati poi estesi due settori speculari ad est e ad ovest, arrivando in quest'ultimo ad intercettare il grande fossato intermedio. Ancora in direzione ovest, poi, è stata aperta una trincea esplorativa che ha consentito di estendere l'indagine anche verso l'ultimo elemento difensivo circolare, ben individuato dalle prospezioni geofisiche. Questa impostazione ha quindi consentito di ottenere una prima visione continua (sebbene limitata all'estensione di una trincea) del deposito stratigrafico su quasi tutta la superficie del sito, per una lunghezza di quasi 110 m. Grazie alla sezione così ricavata è stato possibile riconoscere sul terreno il profilo originario del sito (sebbene parzialmente alterato dalle moderne attività agricole) ed il rilievo originale che doveva far emergere la zona centrale sul terreno circostante.

Nella grande area si è proceduto inizialmente alla rimozione dei livelli di coltivo con uso di mezzo meccanico, per ottenere un allineamento con i livelli raggiunti nelle prime indagini e decidere poi dove procedere con gli affondi di scavo. Per tutte le attività è stato fatto riferimento alla griglia di suddivisione del sito impostata nel 2009 (quadrettatura di 10 m per lato), ritenuta fondamentale non solo per la documentazione del dato stratigrafico, ma anche per una corretta sovrapposizione con le prospezioni geofisiche e per lo scavo dei livelli di arativo. Come già ricordato, infatti, il sito di Vetricella ha subito fortemente l'impatto delle moderne attività agricole, con la perdita di ampie porzioni delle stratigrafie orizzontali (il dato è ben impresso nei profondi solchi di aratura che segnano il deposito fino alla quota di terreno sterile). Questa situazione ha imposto fin dall'inizio di attribuire un valore, seppur filtrato, anche ai dati materiali recuperabili nei livelli di coltivo, particolarmente significativi soprattutto per gli ultimi, e più alti, strati di frequentazione. La quadrettatura di base, quindi, si è rivelata fondamentale proprio per un tentativo di riattribuzione topografica e potenzialmente funzionale dei materiali raccolti, sia in superficie che durante la rimozione meccanica dei livelli di arativo.

La successiva strategia di scavo ha seguito l'impostazione multidisciplinare dell'intero progetto, adattandosi ad una commistione di tecniche di scavo diverse basate su metodologie differenti e finalizzate ad ottenere differenti tipologie di informazioni. Nell'impostazione generale sono state combinate le tecniche di scavo che privilegiano la dimensione verticale con quelle che danno più importanza alla dimensione orizzontale, nel tentativo di conciliare comprensione dell'ampio deposito stratigrafico con gestione entro tempi relativamente ristretti di una mole considerevole di dati. Tale combinazione ha consentito di integrare i dati ricavati dalla creazione di trincee esplorative (step-trenching), finalizzate all'analisi della stratificazione di depositi profondi, con le relazioni spaziali tra i manufatti e gli elementi strutturali ottenute applicando i metodi tradizionali di scavo stratigrafico in estensione (Renfrew, Bahn 2006, pp. 96-100). Le necessità di analisi verticale e orizzontale sono state così soddisfatte conservando anche una serie di risparmi di terreno non scavato (testimoni), affinché i diversi strati potessero essere individuati e correlati tra loro anche nei rispettivi profili verticali. In secondo luogo, tale impostazione ha consentito di conservare alcune sezioni esposte che hanno permesso agli specialisti di altri ambiti (archeobotanici, geologi, etc.) di effettuare i prelievi e i campionamenti necessari alle proprie indagini specifiche.

Anche sul piano delle tecniche di documentazione archeologica sono state adottate metodologie che consentissero la registrazione della più ampia mole di informazioni già in formato digitale, con utilizzo di rilievo tridimensionale su base fotogrammetrica e registrazione della dimensione verticale della stratificazione[26].

A livello di dettaglio operativo, gli interventi di scavo 2016 hanno previsto il completamento delle indagini archeologiche iniziate nelle campagne precedenti, anche per verificare in estensione le ipotesi di ricostruzione planimetrica già proposte. Si è proceduto, quindi, a completare l'indagine delle stratigrafie più tarde nell'area precedentemente denominata Settore III (limite est), in cui era stata individuata una struttura con probabile canaletta di fondazione per trave dormiente, e nella zona centrale del sito (denominata in precedenza Settore I). In questo settore erano stati individuati la fossa di spoliazione del grande edificio centrale e alcuni piani pavimentali pertinenti alla vita di quest'ultimo.

La prosecuzione dello scavo nell'area centrale, intorno alla quale sembra sia stato impostato l'intero sito, ha permesso di mettere in luce il perimetro del grande edificio turriforme nella sua interezza, individuandone con più precisione la planimetria quadrangolare. La superficie interna dell'edificio è stata suddivisa in quattro parti ed è stata scavata in maniera alternata, ad "ali di farfalla", per consentirne una immediata, e statisticamente valida, conoscenza delle fasi più antiche.

Le indagini sono proseguite anche nell'area immediatamente esterna alla torre, in particolare nella porzione ovest e sud, dove

[24] Ad oggi sul sito di Vetricella sono state effettuate otto campagne di scavo (compresa la campagna 2017 appena conclusa) raggiungendo un'estensione totale dell'area di scavo di quasi 2000 m^2.

[25] Riteniamo opportuno specificare che si tratta di una ricerca archeologica ancora in corso e di un contesto che è risultato più complesso di quanto inizialmente preventivato. Quindi, mentre la sequenza basata sui rapporti stratigrafici è da ritenersi un dato oggettivo, la lettura ricostruttiva che ne viene proposta dovrà certamente essere riletta e arricchita con il proseguimento delle indagini.

[26] L'attività di documentazione fotogrammetrica e restituzione in formato tridimensionale dei risultati è stato condotta dal Dott. Giulio Poggi e dal Dott. Mirko Buono, membri del team del progetto nEU-Med.

sono stati individuati livelli orizzontali collegati alla costruzione di una cinta muraria e sui quali l'indagine 2016 si è fermata (da questi livelli è poi ripresa la campagna di indagine 2017 appena conclusa). In corrispondenza di questa fase della sequenza stratigrafica si è deciso proseguire l'indagine anche attraverso due grandi trincee esplorative (trincee 2 e 3), finalizzate proprio a comprendere il rapporto dell'ipotetico basamento di cinta con il fossato difensivo precedente e con le stratigrafie circostanti. Le due trincee sono state poste in corrispondenza dei limiti nord e sud del precedente Settore III (con andamento sud-ovest/nord-est per la trincea 2 e nord-ovest/sud-est per la trincea 3), a cavallo dell'elemento circolare più interno e con dimensioni rispettivamente di 11,5×2 m e 19×2,7 m. Le sezioni verticali esposte durante tali escavazioni sono state ottimi indicatori per meglio comprendere la tipologia e la potenza del deposito sepolto, del quale lo scavo in estensione ha successivamente aiutato a ricollegare e a precisare l'estensione e la lettura ricostruttiva.

Rispetto a quanto esposto, possiamo qui anticipare come la campagna di scavi 2017 ha visto la prosecuzione di indagine in profondità per i depositi lasciati esposti nella grande area centrale (per comprendere l'intera sequenza stratigrafica nella sua diacronia), nonché l'apertura di nuove porzioni del sito, sia all'interno degli elementi circolari difensivi che nell'area più esterna.

Un'ultima indicazione di questa premessa riguarda l'impostazione delle procedure per la fase di ricostruzione interpretativa del deposito stratigrafico e soprattutto per una definizione delle cronologie di riferimento. Una parte consistente delle attività di indagine ha riguardato la raccolta ed il trattamento dell'ingente mole di reperti mobili rinvenuti nel corso dell'indagine, estremamente ricca ed articolata per differenti tipologie di materiali[27]. Sebbene importanti e significativi riferimenti di cronologia assoluta potranno essere ricavati dagli studi specialistici delle diverse classi di oggetti, il ristretto arco cronologico entro cui sembra essersi sviluppato il sito di Vetricella (non facilmente declinabile sulla sola base dei reperti) e le frequenti porzioni di stratigrafie in giacitura secondaria, hanno imposto il ricorso ad un elevato utilizzo di datazioni radiocarboniche. Operando in collaborazione con gli specialisti di settore si è proceduto durante le stesse attività di scavo ad un costante prelevamento di campioni organici, da sottoporre a successiva selezione in base ai principali nodi stratigrafici individuati nella sequenza (*fig.* 5)[28]. Come verrà illustrato meglio nel successivo paragrafo, siamo in grado ad oggi di poter fare riferimento a nove campioni analizzati con relativa datazione radiocarbonica e di poter ancorare, quindi, la sequenza stratigrafica ad una serie oggettivamente considerevole di riferimenti cronologici assoluti.

A.B., S.G., S.L., C.L., P.R.

4. SCAVO DELLA VETRICELLA: LA LETTURA DEL DEPOSITO STRATIGRAFICO (STAGIONI 2007-2016)

Sebbene l'indagine archeologica a Vetricella sia ancora aperta e, ad oggi, sia stata studiata una porzione limitata dell'area potenzialmente occupata in età altomedievale, si ritiene possibile, e doveroso, condividere in questa sede una prima lettura ricostruttiva del deposito stratigrafico finora messo in luce, integrando quanto emerso nelle prime campagne con i più ricchi dati della stagione 2016.

Data la complessità del quadro stratigrafico finora emerso e la natura necessariamente provvisoria di alcune letture deduttive della sequenza (là dove le relazioni stratigrafiche dirette non consentono di affinare la ricostruzione), cercheremo di separare nei prossimi due paragrafi il quadro stratigrafico oggettivo dalla successiva analisi interpretativa. Il primo, in particolare, verrà affrontato in forma per quanto possibile sintetica, richiamando gli elementi principali della sequenza e le macro-scansioni cronologiche che ad oggi risultano riconoscibili. A questo proposito è opportuno richiamare alcuni aspetti già evidenziati come premessa nel precedente paragrafo, in particolare rispetto alla leggibilità solo parziale delle ultime fasi di vita del sito (che presentano le stratigrafie più compromesse) ed alla difficoltà di relazionare elementi stratigrafici che presentano ancora soluzioni di continuità.

La sequenza stratigrafica che viene proposta si struttura sull'individuazione di quattro Periodi di frequentazione (più un quinto Periodo per l'età contemporanea), distinti in base alle relazioni dirette interne al deposito e agli elementi materiali ritenuti più significativi (sia in termini di complessità materiale che di significato storico) (*fig.* 6).

Tuttavia, si evidenzia come in più circostanze la distinzione tra i singoli Periodi non sia risultata sempre evidente sul piano materiale, tanto da poter quasi considerare l'intera sequenza entro un unico processo di vita, seppur con frequenti aggiunte e variazioni. Questa valutazione è collegata in parte anche al ridotto arco cronologico entro il quale sembra di poter distribuire il contesto stratigrafico indagato, caratterizzato sul piano materiale da una serie piuttosto serrata di interventi in un lasso temporale relativamente ristretto[29].

Anche sul piano della lettura interpretativa, i dati raccolti fino ad oggi non sembrano indicare particolari trasformazioni funzionali del contesto indagato, dove, pur attraverso modifiche strutturali ben documentabili, i caratteri principali espressi dal dato materiale sembrano sostanzialmente immutati nel tempo.

Il primo dato che è risultato ben riconoscibile con la recente campagna di indagini è quello relativo alla conformazione del sito di Vetricella, analizzata con uno studio geomorfologico condotto in parallelo alle attività di scavo. Questa è risultata composta da alcuni interventi di riporti e accumuli artificiali, ben identificati nella sequenza, ma impostati su un modesto dosso di formazione naturale, generato da un'originaria conoide di ghiaie compattate e sviluppato a sud verso la depressione lagunare[30]. Proprio la conformazione naturale del sito, insieme al suo posizionamento rispetto al contesto territoriale circostan-

[27] Fin dai primi anni di scavo il sito di Vetricella ha restituito un'abbondante quantità di reperti materiali, in particolar modo di natura ceramica e metallica, con caratteristiche tali da aver fatto ipotizzare da subito una possibile funzione di gestione/raccolta di beni. Si vedano adesso i dati riportati nel successivo Par. 5 e, per i prodotti ceramici, quanto esposto in forma preliminare nel contributo della Dott.ssa Luisa Russo in questo stesso volume.

[28] Le analisi radiocarboniche, con attività di preparazione e successive operazioni di datazione dei campioni, sono state coordinate dal Prof. Carmine Lubritto, e realizzate dalla Dott.ssa Paola Ricci presso il laboratorio preparazione campioni del Dipartimento di Scienze e Tecnologie Ambientali, Biologiche e Farmaceutiche dell'Università degli Studi della Campania "Luigi Vanvitelli e dalle Dott.sse Maria Elena Fedi e Lucia Liccioli presso la facility AMS del laboratorio INFN – LABEC (Laboratorio di tecniche nucleari per l'Ambiente e i Beni Culturali) di Firenze.

[29] Come esposto meglio in seguito, i riferimenti di cronologia assoluta forniti dalla cultura materiale recuperata, e consolidati dalle datazioni radiocarboniche, definiscono per le stratigrafie più significative una durata di vita di meno di due secoli (al momento, inquadrabile tra metà IX e metà XI secolo). Ancora poco è possibile dire per i contesti più antichi (Periodo 1), finora individuati in porzioni molto ridotte.

[30] Si vedano le considerazioni proposte nel precedente Par. 2 ed il quadro ambientale proposto nel contributo sul quadro geomorfologico del territorio in questo stesso volume.

te, si devono considerare i primi elementi determinanti per la ricostruzione storica del contesto.

Tenendo come riferimento questa particolare morfologia ed il paesaggio naturale ricostruito nelle pagine precedenti, la prima frequentazione riconoscibile nella stratigrafia è al momento attestata solo da pochi indicatori, attribuibili in via ipotetica ai primi secoli altomedievali (Periodo 1)[31].

Si tratta di una fase di vita di cui riusciamo a vedere solo alcune porzioni ridotte e che viene identificata soprattutto per la sovrapposizione con il terreno naturale del rilievo (non è possibile al momento ipotizzare eventuali operazioni di livellamento) e per il rapporto di anteriorità con le stratigrafie successive.

Nel dettaglio questa frequentazione è rappresentata da almeno due differenti fasi sovrapposte, la prima testimoniata da alcuni tagli circolari e zone di forte combustione, la seconda da una prima attività di rialzamenti artificiali e piani di calpestio. Si tratta perlopiù di elementi concentrati nella parte centrale del sito, asportati in parte da interventi successivi e che per ora mostrano ridotte stratigrafie di vita (*fig.* 6). Purtroppo, la scarsa presenza di stratigrafie orizzontali e la diretta sovrapposizione con il livello sterile naturale non consentono al momento né un preciso inquadramento cronologico, né ipotesi interpretative sulla natura del contesto.

È interessante evidenziare come il passaggio tra le due differenti fasi sembra collegabile ad un possibile riassetto del sito, con il riempimento delle buche e l'accumulo di un esteso ed omogeneo livellamento, a cui si associa una modesta sopraelevazione delle quote. Questi strati, di colore grigio-nero, presentano uno spessore limitato ma una notevole estensione, e si caratterizzano per una composizione fortemente organica ed una consistenza plastica (UUSS 495, 669, 672, 817). Non è ancora possibile ipotizzare se questi caratteri siano riferibili ad una profonda antropizzazione o ad un'origine organica di tipo naturale, né definire il giusto rapporto di sequenza con il periodo di vita successivo. Non è ancora chiaro, infatti, se questo livellamento sia svincolato oppure, in qualche modo, propedeutico rispetto alle modifiche strutturali del Periodo 2.

Anche la sua lettura funzionale è ostacolata dal fatto che questo deposito costituirà il piano di calpestio anche per le successive frequentazioni, con una conseguente commistione dei differenti utilizzi e dei relativi indicatori materiali. Pur in questa difficoltà di decifrare la corretta associazione tra questi elementi, possiamo individuare su questo nuovo piano di vita una serie di reiterate tracce di frequentazione, con zone di rubefazione e annerimento, livelli di pietrame incoerenti ed almeno un livello di calpestio composto da malta di calce sul limite est del rilievo centrale (US 536 nella trincea 3).

Il quadro così delineato sembra riferibile certamente ad un qualche impianto di strutture in materiale deperibile, senza che tuttavia se ne possa al momento cogliere né la natura né l'entità, anche rispetto alle successive strutture di delimitazione del sito.

La presenza di almeno un piano di calpestio in malta potrebbe già indicare una forma di frequentazione di profilo elevato, sebbene ancora da definire, ma non è ancora possibile stabilirne il rapporto con eventuali strutture nella parte centrale (le prime indicazioni sulla presenza di un possibile edificio al centro del rilievo si devono riferire al Periodo 2).

Pur nella scarsità di indicatori materiali e di eventuali riferimenti cronologici, un interessante ancoraggio di cronologia assoluta potrebbe essere ricavato da uno strato riferibile alla fase di passaggio al periodo successivo, quando un nuovo riporto di terra argillosa (US 535), associato ad uno strato carbonioso di combustione (US 506), sigilla il precedente piano di malta. L'analisi radiocarbonica di un campione prelevato da questa attività ha fornito un range compreso tra il 760 e l'890 AD (58,8%)[32], che può essere letto come significativo riferimento per l'allestimento della nuova frequentazione, a cui queste stesse stratigrafie potrebbero anche essere associate.

La declinazione della sequenza stratigrafica evidenzia come sul contesto appena descritto si impostino significativi interventi di risistemazione del sito, che per complessità strutturale vengono appunto identificati con la fase di avvio di un nuovo periodo interpretativo (Periodo 2). È opportuno ribadire come l'associazione delle singole stratigrafie in periodi distinti non può basarsi sempre su rapporti diretti, e pertanto anche la scansione della loro sequenza e delle rispettive fasi di vita è talvolta il risultato di considerazioni ancora ipotetiche, che necessitano di verifiche e future integrazioni. Il dato materiale che marca in modo significativo questa ipotetica fase "costruttiva" è quello relativo all'allestimento dei tre fossati difensivi concentrici, testimoniato da profondi interventi di escavazione e accumuli di terreno naturale.

La realizzazione dei tre fossati rappresenta un esempio di singoli avvenimenti privi di relazione diretta (in considerazione anche dell'ampiezza dell'intervento e dello stato attuale dell'indagine), ma che sul piano interpretativo vengono letti necessariamente in associazione, per l'evidente corrispondenza topografica e planimetrica che li caratterizza.

L'impostazione planimetrica di ciascun fossato, infatti, aldilà delle relazioni stratigrafiche conservate nel terreno (sopravvissute solo per il fossato minore), sembra esprimere nella sua regolare concentricità topografica un'evidente unitarietà progettuale, anche aldilà di un'eventuale (e non riscontrabile) sequenzialità realizzativa. I due fossati più interni presentano una larghezza di circa 6,5 m ed una profondità di quasi 2,5 m, con un diametro stimabile rispettivamente in circa 39 e 77 m, mentre il terzo fossato più esterno ha restituito una larghezza di circa 4,5 m ed una profondità riscontrata di solo 0,8 m, con diametro di circa 116 m[33] (si veda *infra fig.* 10).

Sul piano dei rapporti stratigrafici è possibile registrare una valida sequenza solo per il fossato difensivo più interno (US 417-706), che taglia il deposito del periodo precedente, mentre i tagli dei due fossati più esterni restituiscono rapporti solo con il piano naturale e con lo strato di arativo. Anche la procedura di allestimento è risultata documentabile solo nel caso del fossato interno, ma possiamo proporla come ipotesi anche per i due fossati più ampi, pur non essendosi conservate le relative stratigrafie. Il taglio del fossato, infatti, ha comportato l'accumulo su entrambi i suoi bordi della terra di risulta (un potente strato a composizione limo-ghiaiosa), con la conseguente formazione di cordoli rilevati con funzione di piccolo aggere.

[31] Allo stato attuale della ricerca, si preferisce sospendere l'eventuale definizione di possibili presenze antropiche più antiche sul sito di Vetricella, in particolare per quanto riguarda il rinvenimento in giacitura residuale, e quindi potenzialmente fuori contesto, di materiale riferibile ad età etrusca e romana. Si tratta di reperti fittili e metallici che, seppur in alcuni casi di considerevole interesse, al momento non possono essere analizzati in modo attendibile.

[32] Si riportano di seguito i riferimenti completi della datazione: campione Fi 3453, 1210±55 BP con calibrazione 1 sigma 760-890 AD (58,8%); 2 sigma 670-900 AD (87.8%). Per i dettagli relativi a questa e alle successive datazioni radiocarboniche si rimanda alla tabella riassuntiva proposta in *fig.* 5.

[33] Si specifica come tali misurazioni siano state registrate per il momento solo all'interno delle trincee esplorative aperte nella porzione est dello scavo. Lo sviluppo di tali dimensioni anche nelle porzioni non ancora indagate si basa su una stima approssimativa ancorata ai primi dati materiali e alle misurazioni effettuate sulle tracce individuate con remote sensing.

Proprio dai rapporti stratigrafici del fossato interno è possibile ricavare alcune indicazioni di cronologia assoluta per questa fase, poiché risulta avere una relazione di posteriorità sia con la già citata US 506 (vedi *supra*) sia con un nuovo livello di carboni (US 670), connesso all'accumulo del dossetto esterno e datato con analisi radiocarbonica tra l'890 ed il 990 AD (68,2%)[34].

Se per i tre fossati sembra possibile proporre l'appartenenza ad un'unica struttura di delimitazione che doveva circondare la porzione rilevata di Vetricella, e che almeno nei due fossati più profondi esprimeva anche una chiara funzione difensiva, più difficile risulta identificare quale carattere materiale avesse l'ipotetica struttura che dobbiamo immaginare al centro di questo sistema di 'recinti' (*fig.* 7a).

Nel centro rilevato del sito, infatti, le stratigrafie riferibili a questo periodo sono identificabili solo in alcuni lacerti di strati che attestano la vita di un possibile ambiente interno, fortemente alterati dai moderni lavori agricoli e non associabili con chiarezza ad eventuali strutture perimetrali. Qui, le sole tracce materiali rinvenute, riferibili a possibili strutture, testimoniano in realtà un'"assenza" di materiale, essendo collegate ai resti di una spoliazione più tarda (Periodo 4) che interesserà l'edificio in pietra e legno che ipotizziamo allestito nel Periodo 3, con forma di torre. Data l'assenza di tracce preesistenti, quindi, è al momento solo un'ipotesi che la struttura turriforme, che sul piano stratigrafico viene collocata più avanti, testimoni la continuazione topografica e planimetrica di un analogo edificio posto, fin dall'inizio, al centro dei tre fossati.

Questo avrebbe avuto, quindi, una simile pianta quadrangolare, con spazio interno di dimensioni non inferiori a circa 6,8 m di lato e superficie totale di circa 46 m² (non si può escludere la presenza, già in questo periodo, di un'articolazione su più di un piano)[35].

Anche rispetto alla possibile fase di vita dell'ambiente centrale, purtroppo, il particolare carattere del deposito stratigrafico, caratterizzato da un ridotto accumulo di stratigrafie, dal reiterato utilizzo di pochi piani di calpestio e, da ultimo, dalle massicce asportazioni per le moderne attività di aratura, non consente di distinguere agilmente i livelli di frequentazione dei singoli periodi[36]. Solo in via ipotetica, quindi, vengono associati alla frequentazione di questa fase l'apprestamento di una grande fossa ellittica vicino al lato ovest dell'ambiente, forse con funzione di alloggiamento per contenitori, ed il rinvenimento sul piano di frequentazione US 215 di due denari della Zecca Pavia a nome di Berengario I[37].

Anche nella porzione del sito corrispondente all'esterno dell'edificio centrale non sono state rinvenute per ora consistenti tracce di frequentazione, sicuramente in parte per successivi interventi di rimozione o livellamento del deposito. Attività di formazione di stratigrafie, infatti, sono state registrate solo all'interno dei due fossati più interni, dove si verifica una progressiva sovrapposizione di strati di dilavamento e di accumuli intenzionali (*fig.* 7b). Si tratta perlopiù di livelli di terreno a matrice limoso-sabbiosa, con una considerevole presenza di reperti (perlopiù materiale ceramico ed ossi animali) e che mostrano caratteri deposizionali e granulometrici differenti tra il fossato interno e quello intermedio[38]. Sembra, infatti, che sia riconoscibile un accumulo progressivo e a lenta formazione di dilavamento per il primo fossato, con indicazione anche di possibili frequentazioni e ripuliture (UUSS 529, 530, 531, 532, 611, 752), mentre nel fossato intermedio si individuano strati a matrice limo-argillosa collegabili a presenza di acqua, sia stagnante che a lieve scorrimento (US 399).

In sovrapposizione a questi depositi, soprattutto in corrispondenza del fossato interno e della parte centrale, è stata documentata una serie di interventi "costruttivi" che per l'impatto materiale registrato dallo scavo sono stati letti in relazione ad un nuovo periodo di vita (Periodo 3), seppure in una continuità strutturale con la fase precedente.

Le prime stratigrafie di questo periodo risultano collegabili chiaramente ad attività di risistemazione sia delle strutture già presenti, che degli spazi utilizzabili, e sono accumunate a livello materiale dalla presenza di abbondante malta. La lettura del dato stratigrafico individua una nuova e più strutturata politica gestionale del sito, facilitata anche dalla conservazione di una serie quantitativamente maggiore di indicatori archeologici. Il dato che può forse riassumere la fase iniziale del nuovo periodo è l'allestimento di un grande miscelatore da malta di fronte all'ipotetico edificio centrale (US 581) e dall'apprestamento tutt'intorno di un'ampia superficie calpestabile rivestita in malta di calce (UUSS 633 e 700) (*fig.* 8a).

In assenza di una visione complessiva, non risulta ancora possibile definire nel dettaglio quali interventi siano assegnabili a questa fase costruttiva, sebbene la presenza del miscelatore e la conseguente disponibilità di malta da costruzione possa essere un indicatore di contemporaneità per alcuni degli elementi riconosciuti[39]. Come ipotesi, suggerita anche da un'eventuale coerenza costruttiva, possiamo assegnare a questa fase l'inserimento di un basamento in malta e pietre nel perimetro dell'edificio turriforme centrale (US 466), sopravvissuto solo in un piccolo lacerto nell'angolo nord-est e forse andato ad integrare soluzioni costruttive già esistenti.

Lacerti di una superficie realizzata con malta di calce con apparente funzione di rivestimento, analoga a quella che riveste lo spazio praticabile di fronte alla torre, sono stati identificati anche vicino al taglio del fossato interno, dove gli ultimi accumuli di riempimento sembrano essere tappati da uno strato di malta, steso sia sul fondo che sulle pareti del fossato (UUSS 447 e 455). Nel caso della trincea 3, inoltre, si è visto come un'analoga superficie in malta sembri proseguire anche all'esterno del bordo

[34] Si riportano di seguito i riferimenti completi della datazione: campione Fi 3436, 1103±46 BP con calibrazione 1 sigma 890-990 AD (68,2%); 2 sigma 810-1030 AD (95,4%).

[35] Come esposto in seguito (in riferimento al Periodo 3), nell'ambiente dell'edificio turriforme sono stati individuati quattro alloggi per sostegni lignei, poco profondi, disposti negli angoli interni della struttura. In assenza di indicazioni stratigrafiche più precise, questi elementi non vengono riferiti a possibili strutture lignee precedenti, ma ad elementi integrati con il successivo basamento in muratura.

[36] Non si può escludere, per alcuni momenti di vita dell'edificio, l'utilizzo di piani pavimentali asportabili o costituiti da materiale deperibile, come assiti lignei. Per un migliore studio della natura e dei processi deposizionali dei depositi interni, sono in corso analisi micro-morfologiche e micro-stratigrafiche sugli strati di vita (a cura del Pierluigi Pieruccini, Dipartimento di Scienze della Terra, Università di Torino, e del Dott. Davide Susini, Dipartimento di Scienze Fisiche, della Terra e dell'Ambiente, Università di Siena).

[37] Nonostante la corrispondenza di quest'indicazione cronologica con la sequenza relativa ancorata alle datazioni radiocarboniche, si specifica che in questo caso si tratta di uno strato fortemente alterato dai successivi lavori agricoli, con un livello di affidabilità necessariamente ridotto. Si segnala come, nella stessa area dell'edificio turriforme, in stratigrafie posteriori o come residui nei livelli di arativo, siano stati recuperati altri quattro denari riferibili alla stessa tipologia, oltre a due denari a nome di Ugo e Lotario (931-947) ed un denaro a nome di Ugo marchese di Toscana (951-967). Per i reperti numismatici in questione si rimanda ad una prima presentazione inserita in Benvenuti *et al.* in questo stesso volume.

[38] Al momento, date le ridotte dimensioni della porzione indagata con trincea esplorativa, non è risultato ugualmente leggibile il deposito del fossato più esterno, dove la ridotta profondità ha consentito la formazione di un deposito meno articolato.

[39] Dopo un primo studio preliminare sulla composizione delle malte, finalizzato ad individuare possibili strumenti di associazione tra i differenti elementi strutturali, è adesso in corso un ulteriore studio più approfondito, per verificare una prima apparente omogeneità minero-petrografica.

orientale del taglio, venendo a formare un piano leggermente inclinato verso est (US 542a).

A completamento dell'intervento costruttivo, su almeno tre dei quattro lati della torre centrale (il lato nord non è stato ancora indagato), vengono realizzati tre allineamenti di grosse buche (diametro medio 0,6 m), interpretabili come sostegni per pali di grandi dimensioni (*fig.* 8b). Il posizionamento di questi interventi nella sequenza è supportato dalla sovrapposizione diretta dei tagli con il miscelatore da malta, decretandone la dismissione, e con il piano rivestito circostante. Proprio il rapporto di contemporaneità registrato tra uno di questi tagli (US 589) e l'ultima stesura della superficie di malta sembra indicare un 'passaggio di testimone' tra i due interventi. Il nuovo aspetto strutturale di Vetricella, seppur impostato su un impianto pre-esistente, vedrebbe nel corso del Periodo 3 la compresenza dell'edificio turriforme centrale, già dotato di un possibile basamento in muratura (non sappiamo se tutto allestito adesso, o solo in parte), serie di piani rivestiti in malta estesi anche al fossato interno ed una serie di grandi elementi lignei intorno all'edificio[40].

In questo quadro ricostruttivo possiamo inserire anche gli indicatori raccolti nei pressi del fossato intermedio, che presenta strati di tombatura contenenti malta disgregata, ed una possibile sostituzione funzionale ad opera di un nuovo elemento difensivo. Si tratta di un'altra serie di grandi tagli circolari, dotati di consistente profondità (0,7-0,8 m) e distribuiti con andamento anulare, forse in relazione ad una possibile palizzata.

Volendo ancorare la sequenza appena descritta a riferimenti di cronologia assoluta, possiamo fare riferimento ad un carbone inglobato nella malta che riveste lo spazio di fronte alla torre (US 633) e che ha fornito una possibile datazione tra il 940 ed il 1020 AD – 1σ (51%)[41].

Anche per questo Periodo 3 le stratigrafie direttamente riferibili a frequentazione dell'area e ad accumuli di vita risultano poco consistenti, sia per l'impatto delle recenti arature che per interventi di livellamento operati nel periodo successivo, e di fatto quindi rimangono poco utili per ipotizzare che tipo di attività si svolgesse nel sito. È stato tuttavia possibile recuperare diversi contesti funzionali ad un primo inquadramento cronologico, che collocherebbe la fase di vita di questo periodo nella seconda metà del X secolo. All'interno della torre, ad esempio, è stato individuato un focolare interrato posto a ridosso dell'angolo sud-ovest (US 450), che ha restituito una datazione radiocarbonica collocabile tra il 960 ed il 1020 AD – 1σ (54%)[42].

Ulteriori indicatori di vita si collocano sui piani di malta esterni alla torre e al fossato (UUSS 526, 554, 572), in particolare con l'allestimento di alcune fosse di notevole diametro (1,2-1,4 m) e profondità limitata (0,30-0,40 m), di cui deve essere ancora definita la possibile funzione.

Proprio dal piano di malta esterno al fossato (US 542b=1349) proviene un residuo carbonioso prelevato nella superficie di calpestio e sottoposto ad analisi radiocarbonica, recuperando un ulteriore appiglio cronologico compreso tra il 980 ed il 1040 AD – 1σ (68,2%)[43].

Sebbene le datazioni indicate offrano una finestra temporale che si apre anche sui primi decenni dell'XI secolo, un inquadramento di questa fase entro il X secolo è suggerito anche dal rapporto di anteriorità con un successivo contesto stratigrafico, individuato nella metà est dell'area di scavo. Si tratta della comparsa di una serie di sepolture terragne, distribuite tra una fascia interna a ridosso del fossato e la fascia esterna sopra il piano di malta US 542a. Questi elementi indicano una forma di utilizzo che data la loro distribuzione non sembra occasionale, sebbene al momento non presenti sufficienti indizi per comprenderne la lettura storica, soprattutto in relazione alla natura generale di Vetricella e alla convivenza con altre possibili funzioni del sito. In attesa della rielaborazione della nuova campagna 2017[44], per il momento, registriamo la presenza di otto sepolture, di cui due con allineamento nord-sud parallele al bordo interno del fossato (UUSS 608 e 710) e sei con allineamento est-ovest posizionate sui livelli esterni (UUSS 413, 773, 774, 775)[45].

I rapporti diretti di alcune sepolture consentono di scandire in modo piuttosto chiaro la sequenza stratigrafica, collocandosi in una sorta di passaggio tra le stratigrafie sopra indicate e quelle successive del Periodo 4. L'analisi radiocarbonica effettuata sulle due sepolture più interne (UUSS 608 e 710), ha restituito significativamente un riferimento cronologico piuttosto coerente, compreso rispettivamente tra 960 ed il 1040 AD – 1σ (61,6%) e tra il 950 ed il 1015 AD – 1σ (52,2%)[46].

Non è ancora chiaro se possano avere una qualche relazione con quest'uso cimiteriale i resti di una struttura allestita nei pressi delle sepolture, all'esterno del fossato, ed attestata solo da una fossa di spoliazione che ne ha lasciato percepibile il perimetro rettangolare (UUSS 135 e 136). Si tratta di un edificio, forse in materiale deperibile e con pareti probabilmente poste su travi dormienti, che viene riutilizzato anche nel periodo successivo e che pertanto al momento non risulta facilmente interpretabile.

Proprio il passaggio al seguente Periodo 4 viene testimoniato da una serie di elementi stratigrafici che nel loro insieme sono riferibili ad una nuova trasformazione del sito. I caratteri salienti di questa serie di attività sembrano rimandare anche in questo caso ad un preciso progetto di risistemazione dell'area centrale, realizzato attraverso interventi piuttosto consistenti e ben strutturati. A seguito di un'ipotizzabile rimozione delle stratigrafie precedenti si realizza una complessa attività di riporti con terreno di recupero su tutta la parte centrale del contesto, con un accumulo ordinato di nuovi strati a formare una specie di rialzamento anulare intorno alla torre (UUSS 112, 131, 181, 425, 426). Il dato materiale di questi diversi strati, la composizione del terreno ed i materiali contenuti, confermano in alcuni casi la rimozione di precedenti stratigrafie di vita da qualche area del sito[47], in altri casi il prelevamento di terra naturale sterile dal terreno circostante. Questo terreno, caratterizzato da colorazione gialla e da una matrice limosa con abbondante presenza di ghiaie, consente di associare a

[40] Nel caso di questi ultimi elementi, manca ad oggi una visione complessiva della loro struttura e del loro andamento. Al momento, quindi, una loro ipotesi ricostruttiva deve considerarne sia un andamento lineare, ipoteticamente connesso ad una struttura appoggiata al corpo della torre, sia un andamento anulare con eventuale funzione di palizzata difensiva.

[41] Campione Fi 3372, 1080±40 BP con calibrazione 1 sigma 940-1020 AD (51%), 890-920 AD (17,2%); 2 sigma 880-1030 AD (95,4%)

[42] Campione Fi 3367, 1065±40 BP con calibrazione 1 sigma 960-1020 AD (54%), 890-920 AD (14,2%); 2 sigma 890-1030 AD (95,4%)

[43] Campione Fi 3369, 1010±35 BP con calibrazione 1 sigma 980-1040 AD (65,4%), 1100-1120 AD (2,8%); 2 sigma 960-1060 AD (73,8%), 1070-1160 (20,2%), 900-920 (1,4%).

[44] Anticipiamo come nel corso dell'ultima campagna di scavo, conclusa nel mese di novembre, è stato indagato un numero molto più consistente di nuove sepolture, ad ulteriore conferma di una destinazione d'uso dell'area a carattere non occasionale.

[45] Tra queste segnaliamo la presenza di tre sepolture infantili (UUSS 773, 774, 775) disposte in una porzione separata, a ridosso del limite nord dell'area di scavo. Tutte le sepolture sono già state oggetto di un primo intervento di schedatura e studio preliminare nell'ambito di una tesi di Laurea Magistrale in Archeologia presso l'Università di Siena (Dott. Alessio Grazzi).

[46] Campione Fi 3378, 1035±45 BP con calibrazione 1 sigma 960-1040 AD (61,6%), 900-920 AD (6,6%); 2 sigma 890-1050 AD (87,4%), 1080-1150 (8%); Campione Fi 3498, 1077±44 BP con calibrazione 1 sigma 950-1015 AD (52,2%), 901-921 AD (16%); 2 sigma 875-1031 AD (94,9%), 780-788 (0,5%).

[47] In questi casi, si tratta, di residui mescolati di stratigrafie antropizzate, fortemente annerite, con carboni, abbondante pietrame ed elevata presenza di reperti (frammenti ceramici, ossi animali e reperti metallici).

questo stesso intervento di riporti anche lo smantellamento delle strutture lignee del periodo precedente (sia la possibile palizzata esterna, che l'allineamento di buche intorno alla torre), realizzato tramite asportazione dei pali e riempimento delle buche di risulta.

Rientra nel nuovo riassetto generale di Vetricella anche l'allestimento di un secondo miscelatore da malta (US 247) e l'occultamento definitivo del fossato interno con la costruzione di un massiccio basamento murario in pietre e malta (US 175). Si tratta di un elemento costituito da linee parallele di elementi litici disposti di taglio (con spessore ipotizzabile di circa 2 m) e che, sebbene sottoposto a parziale rasatura orizzontale, non sembra aver avuto un consistente sviluppo in alzato (*fig.* 9a). In attesa di nuove stratigrafie, non è ancora definibile il reale aspetto o la funzione di questa struttura (se avesse un alzato materiale deperibile e se fosse presente su tutto lo sviluppo circolare del precedente fossato), mentre sembra evidente un suo valore di delimitazione della torre centrale. Ad ulteriore definizione dell'area, inoltre, potrebbero essere assegnati a questa fase anche alcuni primi livelli di pietrame disposti in modo strutturato intorno al basamento murario e con l'apparente funzione di massicciata regolarizzante.

Si tratta di un intervento che sembra raggiungere dimensioni ancora più consistenti nella fase successiva, quando addirittura si verifica una sorta di spoliazione del basamento murario e di riutilizzo del materiale di risulta per ampliare la massicciata circostante (UUSS 404, 559-725, 378, 652, 697, 792). Sulla rasatura della muratura precedente vengono accumulati pietrame e malta disgregata, a creare un ulteriore livello calpestabile con carattere drenante. L'allestimento di questo piano appare funzionale ad un nuovo impianto generale, attestato da lacerti di allineamenti di pietre o piccole strutture in muratura a secco e terra.

La natura di livellamento di queste stratigrafie non consente di leggere correttamente il materiale contenuto, che in alcuni punti risulta particolarmente ricco di reperti ceramici e metallici. Per questi ultimi in particolare si registra l'abbondante presenza oltre che di oggetti finiti e semilavorati, anche di tracce collegabili ad attività metallurgica, quali scorie di forgiatura e terra rubefatta, non distinguibili al momento tra reperti in giacitura primaria e reperti residuali dei periodi precedenti.

In alcune aree è possibile collegare questa nuova sistemazione ad un preciso intervento di rifunzionalizzazione, forse in continuità con attività già presenti, come avviene ad esempio nel settore occidentale dello scavo, dove sulla nuova massicciata sono stati riconosciuti alcuni punti di fuoco ben strutturati, collegabili in un caso ad una piccola forgia (US 644). La datazione radiocarbonica di un legno carbonizzato rinvenuto al suo interno fornisce un valido inquadramento cronologico compreso tra il 970 ed il 1050 AD – 1σ (55,8%)[48].

In tutta questa serie di avvenimenti, la continuità di vita della torre centrale, che mostra ancora di essere l'edificio di riferimento intorno alla quale si strutturano i vari interventi, è attestata dalla presenza di un nuovo focolare interrato sul limite nord dell'ambiente interno (US 755) (*fig.* 9b). Si tratta di un elemento forse già presente in precedenza (come attesterebbe una sequenza di più livelli di carboni), ma che nella sua fase finale restituisce una buona datazione radiocarbonica al 1030-1170 AD – 1σ 68,2%)[49].

Proprio quest'ultimo elemento, tagliato dalla fossa di spoliazione della torre (UUSS 118 e 150), fornisce un buon punto di riferimento per inserire nella sequenza le ultime fasi di vita di Vetricella, che sono caratterizzate da un vero e proprio progetto di smantellamento. Mentre in tutta l'area si verifica il riempimento delle buche e dei tagli connessi agli ultimi elementi lignei, nel caso della torre e della struttura esterna, vicina all'area cimiteriale, si assiste ad una vera destrutturazione programmata.

In particolare, nell'edificio centrale si evidenzia un intervento di spoliazione estremamente accurato, con la rimozione di tutti gli elementi strutturali, sia dei perimetrali che dei pali angolari, con il recupero di tutto il pietrame e l'accumulo del materiale di risulta (frammisto a resti di stratigrafie) all'interno della fossa di spoliazione. Sulla base delle indicazioni stratigrafiche raccolte, questa fase finale non sembra aver comportato ulteriori attività registrabili e che, nel resto del sito, si sia realizzata semplicemente attraverso una progressiva rarefazione delle frequentazioni. Lo scavo, infatti, non ha documentato ulteriori interventi significativi o consistenti depositi di stratigrafie fino ai segni di aratro lasciati dalle moderne attività agricole (Periodo 5).

5. CONSIDERAZIONI E ANALISI

Questo paragrafo conclusivo vuole essere l'occasione per fornire un quadro riepilogativo dei più significativi dati archeologici esposti sopra, senza l'obiettivo di raggiungere conclusioni analitiche definitive, quanto, piuttosto, di condividere alcune considerazioni generate dalla qualità stessa delle informazioni su cui stiamo lavorando e di offrire spunti analitici proiettati sul proseguimento della ricerca.

Si è più volte evidenziato nelle pagine precedenti il carattere preliminare di molti dei dati che sono stati esposti, frutto perlopiù di indagini ancora in corso, o tuttora oggetto di analisi più approfondite. Pur in presenza di un contesto di indagine già studiato in maniera complessa da precedenti ricerche, in particolar modo nella dimensione del territorio e dei quadri insediativi, il nuovo corso del progetto nEu-Med sta stimolando la produzione di una mole ben maggiore di informazioni, così come di nuove letture dei dati precedenti.

Nel testo si è voluto presentare il quadro attuale della ricerca nel complesso territoriale della Val di Pecora, con una proposta di ricostruzione storica già piuttosto articolata per quanto riguarda il paesaggio archeologico di età altomedievale e con una dettagliata schematizzazione degli indicatori da scavo recuperati nel sito di Vetricella.

Il primo elemento che credo emerga chiaramente dal contributo (anche in relazione a quanto viene presentato dai colleghi nei contributi successivi) è la forte relazione che viene evidenziata dall'archeologia tra il sito di Vetricella ed il paesaggio circostante. Intesa non solo come ovvia relazione tra l'area insediata ed il particolare contesto di 'laguna' costiera in cui si inserisce, ma anche come determinazione da parte del sito stesso di una specifica rete insediativa da esso dipendente (*supra fig.* 3). Si tratta al momento di una rete di relazioni che può essere ipotizzata solo sulla base di indagini di superficie e di analisi telerilevate, ma che appare oggettivamente desumibile dal rapporto topografico tra i singoli contesti archeologici e dalla contemporaneità cronologica indicata dalla cultura materiale.

Questa lettura sollecita ulteriormente l'interrogativo su quale debba essere la natura e la funzione che possiamo riconoscere per il sito di Vetricella in base al dato stratigrafico, tanto più alla luce di un sostanziale silenzio per questa porzione di territorio da parte delle fonti documentarie[50]. La vicinanza del sito ad un'area

[48] Campione Fi 3437, 1015±47 BP con calibrazione 1 sigma 970-1050 AD (55,8%), 1090-1120 (10,1%), 1140-1150 (2,3%); 2 sigma 940-1160 AD (90,2%), 890-920 AD (5,2%).

[49] Campione Fi 3447, 918±50 BP con calibrazione 1 sigma 1030-1170 AD (68,2%); 2 sigma 1020-1220 AD (95,4%).

[50] Si rimanda ancora una volta al quadro di sintesi offerto in questo stesso volume da Simone Collavini e Giovanna Bianchi. Per una conferma della difficoltà a identificare possibili riferimenti d'archivio per l'area di Vetricella si

inserita negli interessi patrimoniali fiscali dall'età longobarda ed in cui si localizza la *curtis* regia di Valli citata nel dotario di re Ugo a Berta ed Adelaide del 937, sono dati che troverebbero una significativa corrispondenza con la lettura degli indicatori archeologici che viene proposta[51].

Infatti, nonostante la sequenza stratigrafica proposta sia ancora parziale rispetto alla complessità potenziale del sito, alcuni dei suoi caratteri materiali possono essere già delineati in forme piuttosto precise, in ipotetica connessione con una manifestazione di autorità/potere. Tralasciando per ora il suo aspetto iniziale, non analizzabile nelle ridotte stratigrafie indagate, è più che evidente che il significato storico di Vetricella si esprima nella realizzazione del primo impianto difensivo con fossati concentrici, il cui impatto visivo originale dev'essere immaginato molto superiore a quello, già di per sé evocativo, delle immagini aeree del 2005. Un carattere materiale, quindi, in cui dobbiamo leggere anche un valore comunicativo ed un significato che possiamo proporre di "rappresentanza", inteso come espressione di un preciso messaggio attraverso una forma ben definita e progettata.

Uno scopo ulteriore, oltre a quelli puramente funzionali di fortificazione, che sembrerebbe esprimersi in particolare nell'aspetto materiale del fossato più esterno, che racchiude una superficie di oltre un ettaro, ma con una profondità così ridotta da suggerirne un valore non propriamente difensivo.

La distribuzione planimetrica dei tre fossati, realizzati con eccezionale regolarità progettuale intorno ad un centro ben delineato, richiamerebbe quindi un disegno strutturale predefinito. Sebbene l'indagine di scavo abbia potuto posizionare e misurare solo alcune porzioni dei tre fossati, le analisi in corso per la misurazione dei diametri sembrano richiamare l'interessante utilizzo, come unità di misura, del *piede* di Liutprando (44 cm), rintracciabile in una corrispondenza dimensionale per "multipli" fra i tre elementi concentrici (*fig.* 10)[52]. Un aspetto non secondario, inoltre, è quello relativo alla realizzazione sul terreno di un tale progetto, che come oggettivamente ipotizzabile deve aver rappresentato un'operazione di notevole complessità tecnica e pratica. Sono valutazioni di questo tipo che spingono, pur in assenza di indicatori stratigrafici diretti, ad ipotizzare la presenza, già nel momento della realizzazione dei fossati nel Periodo 2, di una struttura di riferimento posta al centro del rilievo (si veda *supra* per ulteriori considerazioni). Si tratterebbe di una struttura, forse, già a pianta quadrata, dal possibile aspetto turriforme, solo in parte leggibile tra le forme dei suoi rifacimenti successivi e che testimonierebbe sul piano archeologico un antenato di quelle *torri* già attestate in area maremmana negli ultimi decenni del X secolo[53].

Nei primi anni di indagine, una prima analisi della particolare morfologia di Vetricella e della sua cultura materiale aveva già evidenziato questa eccezionalità del contesto, sebbene, come detto in premessa, inserendolo nel tradizionale schema interpretativo di una prima manifestazione signorile di età altomedievale[54]. La stessa suggestiva vicinanza con il toponimo locale di *Castellina* (rimasto ad identificare ora il cantiere di scavo) aveva in parte influito in questa lettura storica, così come nell'identificazione di un possibile richiamo strutturale alle *motte* signorili di oltralpe. Tuttavia, la cronologia espressa dall'abbondante cultura materiale raccolta e da subito collegata a funzionalità diverse dalla semplice realtà insediativa (come, ad esempio, l'esercizio di controllo), ha sempre indicato un orizzonte di IX secolo anteriore a quello comunemente attestato per simili fortificazioni, non solo di area italiana[55]. Anche rispetto alle numerose e più studiate attestazioni di area francese, dove è ben noto il valore storico inizialmente assegnato al fenomeno delle *motte* feudali (Noyé 2013; Bourgeois 2013, pp. 463-464), il caso di Vetricella sembra piuttosto allinearsi alle forme e alle cronologie di IX secolo delle fortificazioni circolari del Basso Reno e dei Paesi Bassi (Christie, Herold 2016; Tys, Deckers, Wouters 2016)[56], con riferimento non tanto ai grandi insediamenti circolari (Tys, Deckers, Wouters 2016, pp. 179-183; Bourgeois 2013, p. 468) quanto alle fortificazioni circolari più piccole, spesso associate a singoli siti di controllo e di difesa territoriale (Tys, Deckers, Wouters 2016, pp. 175-176, pp. 185-186).

Da alcuni primi elementi di confronto si recupera anche, come ipotesi per il prosieguo della ricerca, la possibile relazione tra l'allestimento, verso la metà del IX secolo, di fortificazioni simili al nostro contesto (*torri*) e l'esercizio di un controllo pubblico di aree costiere e vie d'acqua, in alcuni casi in rapporto a specifiche strategie difensive (come ipotizzato, ad esempio, per gli incarichi di difesa costiera assegnati al Marchese di Tuscia, Adalberto I) o a possibili funzioni di riscossione fiscale e residenza di ufficiali pubblici[57].

vedano anche le interessanti proposte avanzate in passato da Roberto Farinelli (Farinelli 2013, pp. 103-105), sebbene oggi superate in parte dal proseguimento della ricerca.

[51] Alla luce dei nuovi dati archeologici del sito di Vetricella non è da escludere che il riferimento toponomastico che identifica la curtis regia (*Valli* o Valle), possa essere relazionato alla grande depressione lagunare in cui si trova il nostro sito (*valle*, appunto), piuttosto che all'area collinare dell'omonimo castello successivo, traendone un interessante spunto interpretativo. Sul 'castello di Valle' e la sua origine curtense si vedano anche le analisi in Farinelli 2007 repertorio n. 17.01 e Ceccarelli Lemut 1985, p. 37 nt. 67. Per l'analisi delle attestazioni documentarie rispetto all'ampia presenza di beni fiscali in quest'area, soprattutto compresa tra l'area del Pecora e le Colline metallifere si veda *infra* lo studio di Simone Collavini, ed il precedente quadro fornito già in Ceccarelli Lemut 1985, p. 31 e Farinelli 2007, pp. 76-85. Sulla donazione del re si veda l'approfondita analisi presentata in Vignodelli 2012.

[52] Per l'analisi si è fatto riferimento alla corrispondenza metrica dell'unità di misura proposta in Brogiolo 2013, in relazione allo studio delle tecniche costruttive altomedievali. Nonostante la mancata conservazione degli elementi strutturali, lo stesso riferimento metrico sembra che possa essere individuato anche nei caratteri dimensionali dell'edificio centrale, sebbene sia possibile basarsi solo sui resti individuati nella sua fossa di spoliazione.

[53] Si tratta di alcune ben note attestazioni documentarie che riferiscono della presenza di torri in relazione ad alcuni centri curtensi dell'area costiera maremmana. In particolare, in un atto del 973 risulta attestata una «turris» in rapporto alla *curtis* incastellata di Lattaia (presso il castello di Montemassi) ed a quella di Caliano, lungo il basso corso dell'Ombrone. Un terzo edificio turriforme è ricordato in un atto del 996 in relazione alla curtis di proprietà del vescovo di Lucca presso San Vito in Cornino, nei pressi della laguna di Piombino. Per i rispettivi riferimenti documentari si rimanda all'analisi storico-archeologica fornita in Marasco 2013a, pp. 57-59.

[54] Si riportano qui i riferimenti a Marasco 2009; Bianchi 2010; Creighton 2012, pp. 94-45 e a quanto espresso *supra* alle pp. 57-58.

[55] Per un tentativo di delineare un quadro di sintesi del contesto italiano si vedano i risultati del Convegno tenutosi a Scarlino nel 2011, dal titolo *Fortificazioni di terra in Italia. Motte, tumuli, tumbe e recinti* (Settia, Marasco, Saggioro 2013), con un interessante panoramica aggiornata anche su alcune aree europee (contributi di G. Noyé, C.H. Kelland e T. Baranowski).

[56] Una prima attività di studio di contesti con caratteri formali e cronologie di IX secolo simili al caso di Vetricella aveva già individuato alcuni possibili riferimenti in area nord-europea, con particolare riguardo ad area francese nord-orientale e all'area renana (Marasco 2013a, p. 66; Marasco 2009, p. 327). Si tratta tuttavia di linee di analisi che necessitano di ulteriori approfondimenti, anche alla luce delle successive campagne di indagine.

[57] La relazione tra la comparsa delle fortificazioni circolari con torre e la difesa da possibili minacce via mare caratterizza, ad esempio, la prima lettura interpretativa per l'origine di molti siti 'a motta' o 'ad anello' delle Fiandre e dell'area Renana (si vedano, *supra*, i riferimenti a Tys, Deckers, Wouters 2016 per una rilettura aggiornata). Un'analoga funzione come elementi strutturali per la difesa ed il controllo di beni e risorse pubbliche, in particolare nelle aree fluviali e costiere, è stata proposta anche per alcune *torri* di area veneta attestate attorno alla metà del IX secolo, in un caso con espresso collegamento alle iniziative di

Si tratta di chiavi di lettura che, seppur in forma di analisi preliminare, sembrano offrire linee interpretative anche per la ricostruzione storica del nostro sito.

Rimandiamo tuttavia allo studio in corso il doveroso approfondimento per definire la nascita e l'evoluzione, anche funzionale, del sito di Vetricella, di cui ci limitiamo ad evidenziare le particolarità formali e la loro sostanziale estraneità rispetto alle consuete strutture conosciute per la nostra area geografica (non solo in riferimento ai più tradizionali insediamenti fortificati di altura, ma anche rispetto alle altre fortificazioni altomedievali note nelle pianure toscane) (Marasco 2013a, pp. 63-66).

Al momento, per l'immagine di Vetricella tra IX e X secolo, non possiamo affiancare dati di scavo più consistenti a queste valutazioni sul significato del primo impianto difensivo, che solo indirettamente possiamo leggere come manifestazione tangibile di un potere.

Si è visto come non manchino possibili indicatori di qualche attività e di gestione delle strutture presenti, e come i reperti recuperati possano già suggerire in questa fase una possibile funzione di raccolta di beni generici (già a questo periodo, ad esempio, rimanda una parte dei reperti numismatici). La stessa collocazione topografica di Vetricella del resto, in relazione ad un'area lagunare più o meno vicina, ma con un elevato potenziale in termini economici e produttivi (a metà strada tra la costa e le colline, e nei pressi di un'ipotizzabile rete viaria ancora attiva), manifesta una precisa strategia gestionale. Sappiamo da dati storici e archeologici come il territorio costiero intorno a Vetricella abbia posseduto potenzialità per lo sfruttamento delle risorse locali, intese sia come tradizionali attività di lavorazione metallurgica (per la vicinanza alle fonti dell'Isola d'Elba e delle Colline Metallifere), che come sfruttamento delle aree coltivabili e lagunari, tra le cui risorse certamente doveva esserci la produzione di sale.

Rispetto a questo elemento, a differenza di quanto avviene per la vicina Laguna di Piombino (si veda *supra* il precedente contributo sul sito di Carlappiano), non si registrano nel nostro caso chiare attestazioni di un'attrattiva sul piano economico produttivo, nonostante le caratteristiche morfologiche ed ambientali presentassero lo stesso potenziale delle altre aree lagunari della costa (quella già citata di Piombino, o quella grossetana del *Lago Prile*). Indicazioni documentarie sul commercio del sale, più che sulla sua specifica produzione, si ritrovano nell'area di Scarlino solo in età bassomedievale[58], mentre rimane a livello di ipotesi la localizzazione in questa parte di costa di possibili saline attestate in un atto del 772, in relazione a proprietà fondiarie dell'area interna (Kurze 1974, I, nn. 19-20; Ceccarelli Lemut 1985, p. 26 nt. 3). Le indicazioni che per il momento provengono dallo scavo sembrerebbero, quindi, evidenziare una differente vocazione strategica, connessa al controllo e alla gestione di un sistema di produzioni. È possibile che a questa stessa vocazione debba fare riferimento anche lo strutturarsi tra il IX ed il X secolo di quella rete di siti che è stata individuata nell'area intorno allo scavo, e per i quali si propone una dipendenza diretta con il sito.

Questa prospettiva di Vetricella come impianto di un'autorità forte e come sito con caratteristiche di rilievo rimane valida anche per quello che è stato identificato con il Periodo 3 della sequenza stratigrafica, inquadrabile dalla metà circa del X secolo. Qui le stratigrafie messe in luce stanno delineando l'allestimento di un vero e proprio cantiere costruttivo, con l'apprestamento di un macchinario ad elevata tecnologia come il miscelatore da malta individuato di fronte alla torre centrale. Si tratta anche in questo caso di un elemento archeologico che oltre agli aspetti materiali della forma e della funzione, esprime anche un valore di indicatore di specifici contesti socio-economici e culturali, collegabili a maestranze altamente specializzate e probabilmente non locali (Bianchi 2011; Cagnana 2011). Significativo, in questo senso, che il secondo miscelatore da malta, che viene allestito a Vetricella nel periodo successivo, presenti un impianto sostanzialmente simile, ma realizzato con evidenti minori competenze e con qualità tecniche inferiori, manifestando forse l'impiego di operatori di differente formazione.

Certamente, l'impatto visivo di Vetricella in questa fase non doveva essere inferiore al precedente, se consideriamo non solo la presenza dell'edificio turriforme centrale, ma anche delle superfici interne rivestite in malta e delle grandi strutture in legno individuate sia intorno alla torre che vicino al fossato intermedio (in questo caso, con possibile funzione di palizzata). Non è azzardato ipotizzare che, forse, proprio in questo Periodo 3 il sito di Vetricella abbia espresso la sua manifestazione materiale più incisiva, verosimilmente in rapporto anche ad un effettivo momento di importanza storica.

Ancora una volta, i ridotti dati stratigrafici non permettono di ricostruire bene quali tipi di attività si svolgessero all'interno di un contesto così complesso e strutturato, e quale funzione il sito avesse, anche rispetto ai nuclei insediativi/produttivi circostanti.

Già in questo periodo si collocano alcuni indicatori che potrebbero suggerire una particolare vocazione produttiva del sito, connessa a quelle attività di lavorazione metallurgica che quasi in ogni secolo hanno rappresentato una sorta di vocazione naturale per questo territorio[59].

Alla luce di ciò, diventa ancora più probabile la lettura di residualità proposta per l'ingente quantità di materiali metallici rivenuti soprattutto nelle stratigrafie del Periodo 4 e costituiti da una notevole varietà di reperti, prodotti finiti, semilavorati e scorie di lavorazione (forgiatura). Si tratta in generale di un complesso di reperti che al termine della campagna 2016 ha raggiunto il numero totale di oltre 750 pezzi, distribuiti nei vari periodi, ma con una maggiore concentrazione nei Periodi 4 e 5 a causa delle operazioni di asportazione e livellamento che si registrano in quelle stratigrafie. Le strategie operative impostate per le prossime campagne di indagine mirano proprio ad individuare le eventuali stratigrafie originali di provenienza di questi reperti.

Una considerevole ricchezza di rinvenimenti che, del resto, si riscontra anche per le altre classi di materiali, in particolare per i reperti ceramici (più di 20.000 frammenti) e quelli osteologici animali (circa 10.000 frammenti), che a fronte dell'assenza di indicatori riferibili ad un insediamento, non possono che avvalorare l'ipotesi di un centro con valenza di riferimento per le attività economico-produttive del territorio. Anche la presenza, in questo stesso periodo, di un'area cimiteriale ordinata e strutturata (ipotizzabile sul finire del X secolo), pur non avendo ancora identificato un eventuale edificio cultuale, potrebbe confermare il ruolo di rilievo posseduto da Vetricella rispetto al tessuto insediativo circostante.

Adalberto I di Tuscia (Brogiolo 2016, pp. 468-470; Castagnetti 1991, pp. 48-49). Nel caso di una *torre* presso Badia Polesine, di cui si ipotizza una datazione altomedievale, viene evidenziata anche la relazione con la riscossione delle tasse per il transito fluviale sull'Adige e più in generale la gestione del passaggio delle barche (Brogiolo 2016, p. 470).

[58] Si veda quanto riportato in Ceccarelli Lemut 1985, p. 71 n. 54 in riferimento ad un atto del 1336, in cui si attesta l'attracco di navi cariche di sale presso nel porto di Portiglione, presso il *Lago* di Scarlino.

[59] Sulla vocazione del territorio di Scarlino e del golfo di Follonica per le attività metallurgiche, fin dall'epoca etrusca, si veda tra i contributi più recenti Cambi, Cavari, Mascione 2009, con particolare riferimento all'area scarlinese in Aranguren, Giachi, Pallecchi 2009.

Gli eventi indicati sopra, la nuova strutturazione del sito, le stratigrafie di vita, l'impianto dell'area cimiteriale, sono tutti eventi che si realizzarono in una sequenza temporale piuttosto serrata con le trasformazioni del periodo successivo, segno di un contesto di elevato valore ripetutamente al centro di nuove iniziative. Anche le attività di riporti e livellamenti del Periodo 4, così come l'allestimento del nuovo miscelatore o lo smantellamento sistematico delle precedenti strutture lignee, esprimono ancora un rifacimento ben progettato e coordinato, sebbene di breve durata. La costruzione della struttura muraria in pietre e malta, con probabile funzione di basamento, viene seguita dopo poco tempo dalla sua stessa spoliazione e dallo spargimento del materiale a formare una nuova massicciata calpestabile. Tutti interventi piuttosto significativi, che per il momento sembrano reiterare l'interesse per queste strutture e la loro continua risistemazione. L'allestimento di modeste e precarie strutture di forgia su questo nuovo livello di pietrame drenante, se messo in relazione alla presenza di materiale residuale, potrebbe indicare la continuazione, con forme e consistenze diverse, di precedenti attività produttive[60].

Di fronte ai rifacimenti risulta significativa la costante sopravvivenza dell'edificio 'a torre' centrale, che rimane un solido punto di riferimento intorno al quale si collocano, con distribuzione anulare, tutte le attività sopradescritte (almeno fino alla metà circa dell'XI secolo). Una conferma ulteriore di questo valore può essere letta anche nella fase finale di abbandono, dove le principali stratigrafie documentate corrispondono proprio allo smantellamento sistematico della torre. Sia gli elementi in muratura dei perimetrali che i grandi sostegni lignei angolari vengono completamente asportati, mentre nessun intervento di spoliazione a fini di recupero si registra sui resti del basamento o nella massicciata in pietra. Anche nella fase di destrutturazione del sito, quindi, sarebbe leggibile un'indicazione del particolare valore (anche simbolico) assunto dall'edificio centrale, che evidentemente doveva finire nel momento in cui tutto il sito perde la sua funzione.

Se inseriamo questo evento nel paesaggio circostante, non è secondario che anche i contesti individuati in ricognizione nella pianura del Pecora non restituiscano molti reperti databili oltre la seconda metà dell'XI secolo, ad ulteriore conferma che il dato archeologico testimonia non tanto la fine di un singolo sito, quanto di un intero sistema socio-economico. Come per le altre considerazioni, anche la verifica di queste proposte di lettura è affidata tuttavia al proseguimento della ricerca e al necessario confronto con le nuove raccolte di dati.

Al termine del quadro interpretativo possiamo evidenziare alcune delle principali problematiche ancora aperte (in vero, numerose) che costituiranno i punti salienti della nostra agenda della ricerca.

Dal punto di vista del dato stratigrafico, e della possibilità di ricavarne una ricostruzione storica, rimane certamente ancora da chiarire la consistenza e la tipologia della prima frequentazione di Vetricella. Si tratta di una parte del deposito archeologico che finora è stata messa in luce solo in quantità limitata e perlopiù alterata dalle attività successive. Rimane al momento da precisare la cronologia assoluta di questa prima vera occupazione (si ipotizza ad oggi una datazione tra VIII e IX secolo) e la sua caratterizzazione funzionale, se da riferirsi già ad un nucleo destinato al controllo e alla gestione o se piuttosto collegabile ad un contesto a maggior carattere insediativo.

Più chiara appare invece la lettura della sequenza stratigrafica dei Periodi 2 e 3, per i quali riteniamo già ipotizzabile per Vetricella la natura di centro gestionale e amministrativo delle risorse di un territorio, più o meno vasto. In questo caso, ci auguriamo di poter verificare a livello archeologico se in quest'ambito di gestione e controllo rientrino, già tra IX e X secolo, anche specifiche attività produttive, quali in particolare quelle connesse allo sfruttamento delle risorse minero-metallurgiche. La sorprendente quantità di reperti e di indicatori materiali riferibili a quest'ambito produttivo possono essere letti, benché residuali, come prime possibili testimonianze di un contesto che necessita di maggiori approfondimenti stratigrafici.

Analogamente, le stesse stratigrafie inserite all'interno del Periodo 4 necessiteranno di una comprensione ed una declinazione temporale più precisa, da ottenere attraverso un ampliamento dello scavo e nuovi ancoraggi a riferimenti di cronologia assoluta. Appare evidente, infatti, come la serrata sequenza di attività che compongono quest'ultimo periodo potrebbe essere meglio articolata alla luce di nuove indicazioni stratigrafiche, forse anche con l'individuazione di una periodizzazione più ampia.

È da ritenersi necessaria, infine, l'estensione dell'indagine archeologica di dettaglio anche al contesto territoriale circostante il nostro sito, sia immediatamente a ridosso dell'area fortificata, che nei contesti più distanti. Una ricostruzione su base archeologica sia del contesto ambientale (con una più precisa localizzazione delle aree lagunari) che della rete insediativa coeva, sono da ritenersi determinanti per una più solida comprensione del ruolo storico di Vetricella e del "sistema" che è stato ipotizzato.

L.M.

[60] Solo il proseguimento dell'indagine potrà chiarire il corretto significato dei reperti e delle stratigrafie riferibili a questo periodo, così come della loro relazione con i numerosi indicatori di attività metallurgica che provengono anche dai terreni esterni posti a sud del sito.

Emanuele Vaccaro

CERAMICA E COMMERCI DI LUNGA DISTANZA: *PORTUS SCABRIS* (PORTIGLIONI-GR), LA TOSCANA COSTIERA ED IL MAR TIRRENO

L'approdo di *Portus Scabris*, situato presso la località di Portiglioni (Scarlino, GR) e menzionato nell'*Itinerarium Maritimum*, costituisce un contesto privilegiato per l'analisi diacronica dei flussi di merci marittime che toccarono la Toscana meridionale ed in particolare i territori della valle del Pecora, dove si concentra il progetto nEU-Med. Tra il 2000 ed il 2001, le attività archeologiche di emergenza, dirette dalla Soprintendenza Archeologia della Toscana e svolte in concomitanza con i lavori di costruzione del nuovo porto turistico, hanno portato al recupero di un ingente quantitativo di ceramiche dalla rada portuale. Il materiale recuperato copre un ampio arco cronologico compreso essenzialmente tra la tarda età repubblicana e l'Età Moderna. Questo contributo si focalizza sul lungo periodo compreso tra il IV ed il XII secolo d.C. ed utilizza un totale di 491 Forme Minime che ricadono in questo arco cronologico. Il materiale esaminato comprende ceramiche fini da mensa, anfore e ceramiche comuni da mensa/dispensa. Attraverso l'analisi delle ceramiche, supportata anche dall'utilizzo del metodo statistico delle medie ponderate individuali, si intende collegare questo contesto alla macro-scala dei traffici marittimi tirrenici, cercando di mostrare fasi di crescita, di declino e di stagnazione nei flussi di merci che toccarono *Portus Scabris*. Il sito mostra elevati livelli di connessione commerciale, sia pure con qualche fluttuazione, fino al tardo V secolo, mentre a partire dal VI si assiste alla progressiva decrescita delle merci in entrata. I prodotti che raggiunsero il sito tra tardo VI e VII secolo non sembrano essere più oggetto di redistribuzione verso i siti dell'entroterra. Pertanto la loro presenza nei depositi subacquei di *Portus Scabris* si spiega, piuttosto, come il risultato di operazioni di ripulitura delle stive di imbarcazioni che utilizzavano il sito come approdo intermedio nelle rotte del cabotaggio costiero, ma che erano dirette verso altri centri di consumo. Il periodo compreso tra VIII e metà X secolo mostra i livelli più bassi di integrazione del sito nei traffici tirrenici, nonostante ciò la presenza di pochi ma significativi materiali, tra cui una forma minima di Forum Ware con decorazione a petali applicati, ne attesta l'uso almeno intermittente anche in questo periodo. Soltanto a partire dal tardo XI secolo d.C., in concomitanza con la progressiva espansione di Pisa in Maremma, si registra un lieve incremento dei materiali di provenienza pisana nei depositi subacquei della rada portuale.

Arianna Briano, Cristina Fornacelli,
Elisabetta Ponta, Luisa Russo

CIRCOLAZIONE E PRODUZIONI CERAMICHE NELLE CAMPAGNE: LE COLLINE METALLIFERE E L'AREA GROSSETANA NELL'ALTO MEDIOEVO

STRUTTURA DEL CONTRIBUTO

La ricerca prende in considerazione l'areale delle Colline Metallifere grossetane e la relativa fascia costiera, con il fine di comprendere quali siano le ceramiche circolanti nel territorio e la presenza di eventuali centri di produzione durante il periodo altomedievale.

In questa sede presentiamo le linee di ricerca all'interno delle quali si svolge il lavoro e i dati preliminari emersi fino ad ora.

La prima parte dell'intervento riguarda una panoramica introduttiva sul quadro storico e territoriale di riferimento nella Toscana meridionale.

Successivamente si presentano i dati più rilevanti emersi dalle ultime campagne dello scavo di Vetricella in relazione alla cultura materiale ceramica, ed in particolare:

– l'analogia tecnica e formale osservata tra le produzioni ceramiche acrome rinvenute nei principali poli insediativi del territorio attivi durante l'alto Medioevo
– l'attestazione di una particolare forma chiusa ansata, definita in letteratura "anforetta"
– l'ipotesi che si possa identificare una produzione di ceramiche acrome a scala sub-regionale
– le analisi archeometriche (al momento solo petrografiche) su un campione di ceramiche selezionate.

La seconda parte dell'intervento si concentra invece sulle produzioni di vetrina sparsa, analizzandone nello specifico alcuni aspetti:

– la circolazione a scala sub-regionale
– il *focus* sul sito di Donoratico (LI), da cui proviene il quantitativo maggiore di reperti ad oggi noto per questo territorio
– l'ipotesi di una possibile produzione di vetrina sparsa a Donoratico.

Infine, viene proposto un parallelismo tra la circolazione di questa classe e le colature rosse, coeve ma indubbiamente meno attestate nel campione territoriale preso in esame.

A conclusione del contributo proponiamo alcune considerazioni su quanto analizzato, concentrandoci in particolare sulla diversa attestazione di ceramiche acrome di produzione locale a larga diffusione, tra cui le "anforette", e della vetrina sparsa, anch'essa prodotta localmente, ma circoscritta a pochi siti della fascia costiera.

1. INTRODUZIONE

Il nostro studio prende in considerazione l'areale delle Colline Metallifere grossetane e la relativa fascia costiera (*fig.* 1), e ha come obiettivo quello di fornire il quadro delle linee di ricerca ad ora in atto, focalizzandosi però sulle analisi preliminari effettuate su specifici tipi di ceramiche. Questi, infatti, per caratteristiche produttive e circolazione, acquisiscono un particolare significato nelle più generali ricostruzioni storiche del territorio indagato con il progetto nEU-Med.

Il lavoro si inserisce all'interno di un filone ampiamente battuto nel corso degli anni che ha visto tra le tematiche principali l'individuazione e l'analisi delle cosiddette produzioni locali, caratteristiche dell'orizzonte altomedievale su scala subregionale, e non solo. I dati relativi alle ultime ricerche ben sintetizzati durante il convegno tenutosi a Spoleto-Campello sul Clitunno nel 2012 (Cirelli, Diosono, Patterson 2015) testimoniano infatti, ancora una volta, come tra VII e VIII secolo il panorama ceramico subisca, su scala peninsulare, un progressivo cambiamento leggibile sia nelle forme e che nelle tecniche produttive, oltre che nel volume di merci circolanti, secondo una tendenza già nota per diversi contesti territoriali (Panella 1998, pp. 818-819; Valenti 1994, pp. 196-197). Tra questi si inserisce pienamente la Toscana meridionale come dimostrano i lavori di sintesi effettuati da Silvia Guideri per il territorio di Roccastrada (Guideri 2000, pp. 11-18, Ead. 2001, pp. 18-19), di Emanuele Vaccaro per il grossetano (Vaccaro 2011), e Francesca Grassi per le Colline Metallifere (Grassi 2010). Già alla metà degli anni '80 del XX secolo, Silvia Guideri aveva infatti individuato alcuni *ateliers* preposti alla produzione di ceramiche acrome, realizzate con le argille locali, e attivi tra VII e X secolo. Successivamente Emanuele Vaccaro nel suo lavoro di sintesi sul paesaggio grossetano altomedievale evidenziava, a partire dal V secolo, una progressiva diminuzione di ceramiche di importazione sostituite da produzioni locali (in molti casi imitazione delle stesse), divenuta definitiva nel corso della seconda metà del VI secolo (Vaccaro 2005, pp. 179-182; Id. 2015, pp. 212-220).

Analogamente Francesca Grassi individuava tra VIII e X secolo il momento di sviluppo delle produzioni locali accompagnato dall'attestazione di specifiche tecniche produttive (Grassi 2010, pp. 12-15).

Tale tendenza troverebbe un valido supporto nell'ampia disponibilità di materie prime necessarie a questo tipo di produzione; la geomorfologia della Toscana meridionale, come del resto una rilevante parte della regione, è caratterizzata infatti da affioramenti significativi di argille di buona qualità (Cita *et al.* 2007), abbondanza di legname e risorse idriche sfruttate, in diversi casi, fin dall'epoca antica. Le ricerche condotte negli ultimi anni nel comprensorio oggetto del progetto nEU-Med, hanno portato ad una maggiore definizione del modello basato sullo rapporto esistente tra risorse minerarie ed insediamenti (Dallai, Francovich 2005, pp. 126-142), includendo con maggior certezza altri tipi di materie prime, tra queste l'argilla. A questo riguardo il caso studio di Monterotondo Marittimo, territorio collinare dell'entroterra follonichese ricco di preziose risorse, ha restituito dati molto utili. Dalle ricerche di superficie[1] è emerso come il giacimento di argilla affiorante per una significativa estensione in prossimità del centro abitato abbia conosciuto un prolungato sfruttamento perdurato fino all'epoca contemporanea (Ponta 2009, pp. 37-38; Ead. 2016, p. 499). Tracce di regolarizzazione sono state osservate sull'imponente fronte di cava posto nei pressi della località La Fornace e nel vicino Poggio alle Travi dove resti di allineamenti murari situati in prossimità di cumuli di argilla molto pura, associati a materiale ceramico di epoca imperiale e tardoantica, hanno indotto ad ipotizzare la presenza di strutture vocate alla lavorazione di questa materia prima; un'ulteriore prova è costituita dalla presenza di fornaci da laterizi, databili all'età moderna, poste nelle immediate vicinanza del giacimento e nei pressi di Paterno, dove sorge uno dei principali poli insediativi di riferimento territoriale per la tarda Antichità e il primo alto Medioevo (Collavini 2007, pp. 330-334; Dallai 2009, pp. 41-43; Ponta 2016, p. 499).

[1] Le indagini sono state condotte dall'Insegnamento di Archeologia Medievale dell'Università di Siena tra il 2004 e il 2007, sotto la direzione scientifica di Riccardo Francovich e il coordinamento di Luisa Dallai.

Nel quadro ricostruttivo del paesaggio monterotondino l'argilla avrebbe dunque giocato, al pari delle atre risorse del territorio[2], un ruolo significativo nella riorganizzazione socio-economica avvenuta tra Tardoantico e alto Medioevo, favorendo il perdurare dei siti posti nelle vicinanze delle stesse.

In quest'ottica, la rilettura di alcuni dati già noti e le ultime acquisizioni fatte per la bassa Val di Cornia hanno riscontrato interessanti analogie; l'abbondanza di giacimenti di argille di buona qualità suggerisce che insieme al sale e il pesce, risorse chiave dei territori costieri[3], l'argilla possa avere avuto un ruolo rilevante nel sistema economico del territorio anche durante i secoli altomedievali. La stretta vicinanza degli affioramenti con i siti di lunga occupazione individuati nel comprensorio indagato[4], sopravvissuti alla crisi tardoantica e alla relativa contrazione dei centri insediativi, costituisce un elemento molto significativo; tale tendenza ci induce infatti ad ipotizzare che la stessa stretta relazione tra risorsa ed insediamento ben conosciuta per l'epoca romana, caratterizzi anche la tarda Antichità e acquisti un ruolo rilevante nella riorganizzazione economica intercorsa con i cambiamenti socio-politici succedutosi tra VIII e X secolo[5].

In quest'ottica il caso di Roccastrada, precedentemente menzionato, rafforzerebbe quanto ipotizzato; la maggiore perifericità di questo territorio, leggibile già per l'epoca romana (Cambi 1994, p. 185), si intensifica durante il Tardoantico, come testimonia il progressivo calo di merci di importazione (già numericamente esigue), indice di una sempre più crescente estraneità ai circuiti commerciali mediterranei in cui gravita ancora l'area costiera[6].

A partire dal VII secolo tuttavia nel territorio sembra impostarsi un sistema produttivo organizzato sullo sfruttamento delle argille locali che gioca un ruolo attivo nella distribuzione dei proprio prodotti ceramici[7].

La presenza di questa importante materia prima, unita all'ampia disponibilità di legname offerto dalle colline boscose che caratterizzano il territorio roccastradino, costituisce un elemento fondamentale per ottenere il quantitativo di oggetti necessario a sopperire le esigenze della cucina e delle mensa di uso quotidiano, ma non solo; come si vedrà nel paragrafo successivo, l'attestazione nella Toscana meridionale, ed in particolare nell'area oggetto di questo contributo, di un particolare tipo di contenitore chiuso, ansato e simile ad un anfora, definita appunto 'anforetta', consente di formulare alcune ipotesi che solo l'avanzare delle ricerche potrà meglio definire. Nello specifico, la diffusione di queste ultime all'interno di un areale definito e non molto esteso[8], unito alle caratteristiche tecniche (di impasto in particolare), suggerisce che possa trattarsi di una produzione locale preposta alla conservazione e, forse, anche al trasporto di merci che circolano all'interno di una stessa proprietà che a tutti gli effetti sembra definirsi ancora di carattere pubblico[9]. La stessa provenienza locale potrebbe infine essere attribuita ad un'altra classe ceramica analizzata in questo contributo, ovvero la vetrina sparsa, che seppure ancora in fase di analisi e definizione cronologica offre interessanti spunti nel delineare il panorama ceramico altomedievale del nostro territorio.

E.P.

2. LA PRODUZIONE E CIRCOLAZIONE DI SPECIFICI CONTENITORI CERAMICI

Lo studio dei contesti oggetto del progetto nEU-Med ha consentito di esaminare un significativo campione di materiale ceramico proveniente sia da scavi, con particolare riferimento alla Vetricella (Scarlino, GR), che da ricognizioni di superficie. In tal modo, è oggi possibile fare una più puntuale comparazione tra le caratteristiche del materiale ceramico proveniente dal sito di Vetricella e dal territorio limitrofo con quelle già evidenziate in studi pregressi, effettuati in particolare su reperti provenienti da siti fortificati di altura dell'interno (Grassi 2010).

In base a queste precedenti ricerche sappiamo che in questo comprensorio si riscontrano produzioni da cucina sia tornite che fatte a mano, con poche forme multifunzionali per la cottura degli alimenti: le olle presentano orli brevi, estroflessi e talvolta insellati, corpi globulari e fondi piani; i testi per la panificazione sono le uniche forme aperte. Per la preparazione dei cibi, sono abbastanza diffusi catini con orlo rientrante, talvolta decorati con dei motivi sinusoidali incisi, mentre per la dispensa si affiancano orcioli e brocche di varie dimensioni, con anse dalla sezione insellata o molto squadrata.

Per alcune tipologie di olle e catini è inoltre possibile trovare uno sporadico confronto anche tra i reperti provenienti dal territorio delle Colline Metallifere, in particolare dalle località circostanti il centro abitato di Monterotondo Marittimo (GR). Seppur in percentuale minore e limitatamente alle cronologie più antiche (VIII secolo d.C.), questa omogeneità morfologica trova un corrispettivo nella distribuzione anche per quanto riguarda alcuni corpi ceramici[10] (Ponta 2011/2012).

Per effettuare una prima comparazione con il quadro appena delineato e per verificare analogie o discordanze dal punto di vista morfologico, per questo preliminare contributo è stata

[2] Per l'epoca storica si fa riferimento ai ricchi giacimenti di solfuri misti e alunite associati a fenomeni di idrotermalismo e abbondanza di legname, a cui si aggiungono le risorse litiche per la Preistoria; per una sintesi relativa al loro sfruttamento si veda Dallai, Fineschi, Ponta, Travaglini 2009, pp. 29-56.

[3] Si vedano i contributi di Luisa Dallai e Paolo Tomei all'interno di questo stesso volume.

[4] Nella fascia costiera e del primo entroterra compresa tra Gavorrano Scalo (GR) e Riotorto (LI) sono noti affioramenti di argille FAA e FAAb, caratterizzate dalla presenza di elementi che le rendono adatte alla produzione ceramica e laterizia (Gliozzo, Iacovello, Foresi 2014, pp. 105-116), le cui mappatura ed analisi chimico-petrografica sono attualmente in corso. All'interno del medesimo territorio, si localizzano alcuni siti di rilevo caratterizzati da una lunga diacronia, afferenti, con ogni probabilità, alle grandi proprietà senatorie ed imperiali dislocate nel territorio populoniense. Una lettura ormai consolidata pone in relazione queste stesse grandi proprietà con attività di sfruttamento delle risorse locali (Manacorda 2005, pp. 308-312), e tra queste rientrerebbe a pieno titolo la produzione ceramica e laterizia (in ultimo Maiuro 2012, pp. 381-397); si pensi come caso esemplificativo al sito di Vignale, ad ora considerato il centro insediativo di lunga occupazione più importante tra quelli noti per la bassa Val di Cornia, per il quale è attestato un impianto di produzione laterizia (Cucini 1985, scheda n. 235, pp. 262-265; Shepherd 2003, pp. 287-296). Analogalmente una stretta correlazione tra proprietà senatoria e produzione laterizia è stata ipotizzata per il sito del Sontrone (Follonica, GR), posto nell'entroterra follonichese ed interpretato come possibile *fundus* della famiglia *Cotta* (Dallai, Ponta, Shepherd 2005, pp. 179-190).

[5] Con l'acquisizione delle proprietà imperiali, o di parte di esse, da parte dei nuovi poteri centrali si assistette con ogni probabilità al perdurare delle attività produttive considerate particolarmente redditizie e convenienti (Vera 1993, p. 141). A questo proposito si consideri che il più noto latifondista di tipo romano dell'età di Teodorico fu suo nipote *Theodhad,* proprietario di un enorme *fundus* nella Tuscia costituito da *massae fundorum* amministrate da *actores* le cui rendite pervenivano al proprietario in forma aurea (Vera 1993, pp. 137-138).

[6] *Infra* Vaccaro con bibliografia di riferimento.

[7] Le analisi attualmente in corso serviranno anche a meglio definire l'areale di distribuzione dei suddetti prodotti.

[8] Si intende l'areale delimitato a nord dalla bassa Val di Cornia e, a sud, dalla Val di Pecora con i relativi entroterra.

[9] A questo proposito si veda il contributo di Giovanna Bianchi in questo stesso volume.

[10] Il riferimento è al momento espressamente basato su un'osservazione autoptica degli impasti, in attesa di un più sicuro riscontro dato dalle analisi archeometriche attualmente in corso presso il Dipartimento di Scienze fisiche, della Terra e dell'ambiente dell'Università di Siena. Si tratta di corpi ceramici semidepurati, caratterizzati da un'anima interna di colore grigio chiaro e superfici esterne tra il rosato ed il salmone, con una frequente incidenza di inclusi di calcite bianca di dimensioni variabili.

effettuata, nel sito della Vetricella, una selezione di reperti che riguarda:

1. contenitori da dispensa: brocche monoansate in acroma depurata, con bocca circolare o trilobata, e catini in acroma semidepurata, con orlo più o meno introflesso e variamente sagomato
2. ceramica da cucina: olle in acroma grezza con orlo estroflesso, collo strozzato e, in taluni casi, gola accentuata.

Le superfici esterne di questi frammenti presentano spesso segni di lisciatura e motivi decorativi incisi, costituiti perlopiù da filettature per le olle, e sinusoidi, singole o doppie, per i catini e le brocche (*tav.* 1).

I caratteri sopra elencati, sia nel caso di forme da dispensa, che da cucina, confermano, quindi, che le caratteristiche di questi manufatti provenienti dalla Vetricella non si discostano molto dal quadro desunto dalle ricerche pregresse. Ciò che invece sembra classificarsi come elemento divergente rispetto alla tendenza diffusa a livello territoriale è soprattutto il numero di frammenti[11]relativi alla ceramica da dispensa, per un totale di 11051 frammenti, rinvenuti nel sito oggetto di studio nel corso della campagna di scavo dell'autunno 2016 (dove 2780 sono attribuibili all'acroma depurata e 8271 all'acroma semidepurata, contro 3204 frammenti in acroma grezza). Tale dato risulta essere decisamente caratterizzante per la natura del sito, e contribuirebbe, allo stadio attuale delle ricerche, ad indirizzare le ipotesi sulla sua vocazione verso un eventuale centro di stoccaggio.

Simili analogie sono state riscontrate anche dal punto di vista tecnologico, dal momento che una prima selezione di campioni di impasti riferibili ad acroma grezza e semidepurata proveniente dal sito qui analizzato presenta inclusi della stessa natura e caratteristiche cromatiche pressoché analoghe alle ceramiche provenienti dai territori più interni; tale corrispondenza porterebbe ad ipotizzare similitudini anche nella modalità di cottura[12].

2.1 *Contenitori chiusi ansati: le 'anforette', classificazione e tipologia*

Il preliminare studio dei reperti ceramici provenienti dal sito di Vetricella a Scarlino ha evidenziato come le tipologie sopra descritte siano affiancate da contenitori chiusi di medie dimensioni, dal corpo ovoide o globulare, collo distinto, variamente sviluppato, dotati di una o più anse tendenzialmente a nastro, impostate sulla spalla, e fondo presumibilmente piano.

È esattamente il paragone morfologico e tecnologico con esemplari già noti grazie alle precedenti ricerche che consente di attribuire questi manufatti alle cosiddette 'anforette', definizione utilizzata non infrequentemente nell'edito[13] per alcuni materiali provenienti da contesti della Toscana meridionale sud-occidentale (*tav.* 2).

Per l'ambito territoriale delle Colline Metallifere e per l'area grossetana, infatti, si contano in totale 50 individui minimi afferenti a tali forme, che sono state individuate in passato da Lorenzo Marasco nella Rocca di Scarlino (GR), da Francesca Grassi nei castelli di Rocchette Pannocchieschi e Montemassi (GR), da Carlo Citter negli scavi urbani di Grosseto, ed in ultimo da Emanuele Vaccaro, che ha tentato una sintesi per il territorio grossetano[14] (*fig.* 2). Nei pressi di Podere Serratone, Vaccaro ha inoltre individuato un'area produttiva, interpretata come fornace, per la grande quantità di scarti ceramici riconducibili a questa tipologia. I risultati prodotti dalle analisi alla termoluminescenza, effettuata sui campioni rinvenuti nel sito di Casa Andreoni, hanno indicato la metà del IX secolo come cronologia di riferimento.

La revisione della cultura materiale effettuata per alcuni siti inediti quali Rocca degli Alberti (Monterotondo Marittimo, GR), ed il castello di Donoratico (Castagneto Carducci, LI) in parallelo allo studio dei reperti provenienti dalla stessa Vetricella durante le ultime campagne di scavo, ha permesso di implementare il campione aggiungendo nuovi ritrovamenti.

Sono stati riconosciuti, infatti, ulteriori 17 esemplari di 'anforette': 13 frammenti in totale per Vetricella, 2 per Rocca degli Alberti e 2 per Donoratico (*fig.* 3).

I frammenti sono riconoscibili nella sola porzione della spalla su cui si imposta l'ansa che, negli esemplari meglio conservati ha una sezione tendenzialmente a nastro o leggermente sagomata, e raggiunge una larghezza massima di circa 6 cm, per uno spessore di 1 cm.

L'estrema frammentarietà dei reperti non consente di risalire alla forma nella sua interezza e, di conseguenza, di calcolarne altezza e capacità, così come di determinare se sia dotata effettivamente di una sola o più anse. In merito a questo ultimo aspetto, ricollegandoci anche alla questione terminologica, è difficile stabilire se siamo in presenza di semplici contenitori chiusi ansati da dispensa, oppure di forme finalizzate anche al trasporto, come indicherebbe in modo intrinseco, secondo l'accezione più classica, il termine stesso di "anfora".

Aspetto peculiare di questi manufatti è anche il corpo ceramico, che si presenta generalmente semidepurato e con le medesime caratteristiche dei contenitori in ceramica da cucina e soprattutto da dispensa con cui sono in associazione negli stessi contesti e cronologie. Ciò è ben visibile nel caso di Vetricella, dove i manufatti sono contraddistinti da impasti piuttosto duri, caratterizzati da una frattura netta e regolare. Ad un'analisi macroscopica, si notano inclusi di dimensione medio-piccola, tra cui hanno una maggiore incidenza i quarzi, bianchi e trasparenti, le miche, gli ossidi di ferro e i feldspati. Le superfici variano dal color camoscio nelle più depurate al bruno delle più grezze, e non è infrequente la presenza di un'anima interna grigia[15].

Per gli esemplari meglio conservati e che con certezza si possono definire biansati si conta un numero estremamente esiguo di frammenti, provenienti dall'area di Grosseto, città e relativo territorio (Citter 2007; Vaccaro 2011). La stretta analogia dell'orlo e dell'impostazione dell'ansa riscontrata nelle nuove ac-

[11] Il numero riportato in questa sede fa riferimento al conteggio dei singoli frammenti, effettuato nell'ambito di un preliminare inventario dei reperti dopo la campagna di scavo di settembre-ottobre 2016, prescindendo però dalla quantificazione del numero minimo di esemplari (NME). Quest'ultimo dato, infatti, è attualmente in elaborazione nell'ambito del progetto di dottorato portato avanti dalla scrivente e dal titolo: *"Ceramica grezza, depurata e semidepurata: produzione, funzione e circolazione in un territorio della Toscana sud-occidentale. Colline Metallifere e territori limitrofi tra VIII e XI secolo*".

[12] Analisi chimiche e petrografiche dei corpi ceramici campionati per il sito di Vetricella sono in corso presso i laboratori del Dipartimento di Scienze fisiche, della Terra e dell'ambiente dell'Università di Siena.

[13] Il termine 'anforetta' in riferimento a specifici contenitori è stato impiegato in passato, come sarà esplicitato di seguito nel testo, da Carlo Citter (Citter 2007), Francesca Grassi (Grassi 2010), Emanuele Vaccaro (Vaccaro 2011). A questa bibliografia edita si aggiunge il lavoro di tesi di dottorato di Lorenzo Marasco (Marasco 2013), attualmente inedito.

[14] Gli esemplari noti sono stati individuati da L. Marasco (Marasco 2013) a Scarlino in numero di 12 (di cui 1 fr. VIII/IX s., 4 frr. IX/X s., 2 frr. X/XI s., 5 frr. XII/XIII s.); 3 da F. Grassi (Grassi 2010, pp. 84-85, Tipi 1-2 Rocchette Pannocchieschi, IX/Xs. e X s., Tipo 3 Montemassi, VIII s.); 1 da C. Citter (Citter 2007, p. 150, con datazione ante XI s. – olla acquaria); 34 da E. Vaccaro (Vaccaro 2011, plate CVII, Type 2, EMed Small amphora, da Casa Andreoni – datato con termoluminescenza al 850±65).

[15] Per un maggior grado di approfondimento sui dati archeometrici e su tutte le analisi citate in questo contributo si veda il paragrafo di Fornacelli qui di seguito.

quisizioni suggerisce, tuttavia, che si possa parlare della medesima forma, preposta non solo alla dispensa, ma anche al trasporto, circoscritto da un raggio di diffusione non molto ampio.

Per riuscire a determinare l'areale di provenienza di questa specifica produzione, sono state condotte analisi di tipo chimico e petrografico su un campione di 11 esemplari provenienti dai siti sopra citati di Vetricella, Rocca degli Alberti, Rocchette Pannocchieschi, Donoratico, ed altri della Maremma meridionale quali Capalbiaccio, Colle Massari, San Martino in Piano, Casa Andreoni, oltre che su un campione di argilla raccolto nella cava situata nei pressi di Monterotondo Marittimo.

Da tali analisi è emersa una buona corrispondenza tra gli impasti delle 'anforette', con particolare riferimento ai campioni provenienti dai siti di Vetricella, Rocca degli Alberti e Rocchette Pannocchieschi, e le argille locali monterotondine, ed in questo caso specifico, ciò andrebbe a rafforzare l'ipotesi che la suddetta cava fosse sfruttata anche durante l'alto Medioevo, oltre che in epoca romana e tardoantica, come ha messo in luce il *survey*.

É esattamente questa analogia, quindi, che consente di ricondurre i manufatti presi in esame ad un areale comune di scala sub-regionale, che tuttavia solo l'avanzare delle analisi potrà definire con maggiore precisione.

2.2 *Considerazioni conclusive*

Le caratteristiche, soprattutto tecnologiche, descritte per le 'anforette' ricorrono, come meglio dimostrato poi nel successivo paragrafo dedicato alle analisi archeometriche, anche nel resto del vasellame di uso comune associato, e questo induce a ritenere ancora valida l'ipotesi dell'esistenza di *ateliers* locali, attivi durante l'altomedievo, seppur ancora non identificati e localizzati, che provvedevano a far fronte alle richieste di manufatti avanzate dai nuclei abitativi del territorio (Grassi 2010).

La distribuzione delle 'anforette', anche se con una diffusione relativamente circoscritta come riproposto in questa sede, assumerebbe un valore diverso rispetto al restante panorama ceramico, suggerendo che i diversi siti di rinvenimento siano inseriti all'interno di uno stesso circuito commerciale. È in questo ambito che tali recipienti potevano servire a veicolare specifici prodotti oppure essere loro stessi merci di scambio. Allo stesso tempo però, trattandosi di uno studio ancora in corso, non è possibile escludere come funzione primaria un loro impiego in ambienti di stoccaggio.

L.R.

3. LE 'ANFORETTE': PRIME INDAGINI ARCHEOMETRICHE

Uno studio archeometrico è stato condotto su undici frammenti ceramici provenienti da diversi siti archeologici situati nella Toscana sud-occidentale, nell'area delle Colline Metallifere e del Mar Tirreno: Donoratico, Rocca degli Alberti, Rocchette Pannocchieschi, Vetricella, Casa Andreoni, San Martino al Piano, Colle Massari e Capalbiaccio. Lo scopo è quello di caratterizzare dal punto di vista petrografico questi frammenti di piccole anfore per iniziare a definirne l'areale di produzione e diffusione.

Le indagini petrografiche, mineralogiche e chimiche dei corpi ceramici sono focalizzate a determinare il processo di fabbricazione dei manufatti, con particolare interesse riguardo alla natura delle materie prime impiegate e all'identificazione di marker geochimici che possano fornire indicazioni più dettagliate sulla loro provenienza, all'eventuale aggiunta di smagranti, alle condizioni e alle temperature di cottura.

Le indagini petrografiche hanno fornito indicazioni sulla microstruttura dei corpi ceramici, come le dimensioni, l'orientamento e l'abbondanza di pori e inclusi. Sono inoltre state studiate le caratteristiche dell'impasto con particolare attenzione alla natura e alla distribuzione degli inclusi. L'analisi chimica dei corpi ceramici, inoltre, ha contribuito a raccogliere maggiori informazioni sulla composizione dei campioni e l'interpretazione geochimica dei dati (in particolare per quanto riguarda gli elementi in traccia e le terre rare) ha rappresentato un utile approccio alla risoluzione di alcuni problemi archeologici (provenienza, riciclo, etc.).

Una profonda conoscenza del contesto geologico della Toscana meridionale risulta fondamentale per una migliore comprensione dei risultati ottenuti attraverso le indagini archeometriche sulle "anforette". La Toscana Meridionale è caratterizzata da un'intensa attività tettonica, queste diverse unità subirono quindi complessi fenomeni di sovrapposizione fra il Cretaceo superiore e il Miocene medio. Un'ampia attività magmatica durante il tardo Miocene, inoltre, innescò un'intensa circolazione idrotermale, portando alla formazione di numerosi depositi minerali (Innocenti *et al.* 1992; Costagliola *et al.* 2010), mentre bacini post-nappe furono riempiti da sedimenti clastici (Costagliola *et al.* 2008).

La successione Neogenico-Quaternaria, in particolare, riflette un'articolata evoluzione morfologica e deposizionale dell'area (Costantini *et al.* 2004; Benvenuti *et al.* 2009; Costagliola *et al.* 2010) e comprende sedimenti che non hanno subito traslazioni orizzontali, ma solo dislocazioni a prevalente componente verticale. Il complesso Neoautoctono consiste in cinture che si estendono radialmente dal distretto minerario delle Colline Metallifere fino alla costa tirrenica (Martini, Sagri, Colella 2001). Strettamente legate alle formazioni geologiche appartenenti al Complesso Neoautoctono sono le argille neogenico-quaternarie, che si depositarono durante il regime di estensione (Bossio *et al.* 1998) alla base della genesi e dell'evoluzione del Mar Tirreno (Gliozzo, Iacoviello, Foresi 2014).

Le proprietà chimiche, mineralogiche e fisiche di questi sedimenti (che hanno subito un basso carico litostatico e sollecitazioni tettoniche moderate) hanno generato argille molto adatte alla produzione di ceramica (Trevisan 1952; Gliozzo, Iacovello, Foresi 2014). La maggior parte degli affioramenti argillosi documentati nella Toscana meridionale si trova nelle vicinanze di uno o più siti archeologici dove è stata documentata la produzione di ceramiche durante l'alto Medioevo; ulteriori indagini sono quindi in corso per delineare i collegamenti tra centri di produzione e depositi di argilla sfruttabile limitrofi.

I principali affioramenti argillosi della Toscana meridionale sono riportati in (*fig.* 4) La maggior parte dei depositi è costituita da argille blu o simili, anche se sono presenti depositi con caratteristiche mineralogiche e chimiche diverse. Sono in corso ulteriori studi per la caratterizzazione di argille provenienti da diversi depositi al fine di redigere un catalogo delle risorse della Toscana meridionale utile per archeologi e studiosi che mirano a definire la produzione e il commercio della ceramica in quest'area.

Le *Argille Azzurre* sono largamente diffuse nella Toscana meridionale e sono state ampiamente sfruttate per scopi produttivi. Questi sedimenti si sono depositati in bacini marini tra il Pliocene inferiore e il Pleistocene inferiore e sono caratterizzati da una composizione mineralogica e chimica abbastanza uniforme. Le *Argille Azzurre* possono essere definite come sedimenti carbonatici (carbonati compresi tra il 15-25% in peso, caratterizzati principalmente da calcite e rara dolomite) con quantità consistenti di quarzo (25-35% di massa), feldspati (6-10% di massa) e fillosilicati (40-50% di massa). I minerali argillosi sono abbondanti e principalmente rappresentati da

illite, con piccole quantità di clorite e caolinite (Dondi *et al.* 1999). Fossili di bivalvi e gasteropodi sono frequenti (Cita *et al.* 2007).

L'area costiera del fiume Cornia è costituita da sedimenti alluvionali e paludosi lagunari (Olocene), caratterizzati da ghiaia, sabbia, limo e argilla in varie proporzioni (Barazzuoli *et al.* 1999). In questa zona sono stati documentati depositi di argille siltose caratterizzate da abbondanti fossili, come ad esempio nella zone di Ornellaia (Castagneto Carducci, Livorno), in una zona limitrofa al sito archeologico di Donoratico (vedi sezione 294160 in www502.regione.toscana.it/geoscopio/cartoteca.html).

A monte, nella zona alluvionale del fiume Cornia, depositi ricchi di aluniti e caoliniti caratterizzano la Pianura di Frassine (vicino Massa Marittima) dove sono state osservate tracce di antiche coltivazioni (Lazzarotto 1967). Le mineralizzazioni di Frassine consistono in venature all'interno della formazione del "Calcare Cavernoso" strettamente legate all'attività di fluidi idrotermali che trasportavano e depositavano i prodotti di alterazione dei sottostanti scisti del "Verrucano" nei calcari fortemente brecciati (Leoni, Sartori 1988). Affioramenti neoautoctoni discontinui di argille azzurre sono inoltre presenti anche nelle zone più alte del versante orientale del bacino di Frassine (vicino a Monterotondo Marittimo e al sito di Rocca degli Alberti).

Le argille associate alle sabbie quarzose nei pressi di Paganico (Valle dell'Ombrone), infine, sono caratterizzate da sedimenti derivati dall'erosione delle rocce del Verrucano. Come nel caso di Frassine, le mineralizzazioni di alunite-caolinite sono derivate dall'alterazione idrotermale e dalla lisciviazione delle rocce di Verrucano e sono, qui, caratterizzate da un estensivo deterioramento delle miche e ad una parziale mobilizzazione della silice (Sartori, Tamponi 1991). In alcuni casi, una moderata attività idrotermale ha prodotto argille povere in ferro a causa dell'alterazione delle sabbie del Verrucano (Heckroodt, Bühmann 1987). La composizione minerale media di queste argille è quindi caratterizzata da maggiori quantità di quarzo (30-50% in peso) e bassi contenuti di calcite (2-15% in peso%) e feldspati (<5% in peso). I minerali argillosi sono caratterizzati da un'abbondante illite, insieme alla caolinite (legata allo smantellamento delle miche) e al clorite (Sartori, Tamponi 1991).

Lo studio petrografico, mineralogico e strutturale dei corpi ceramici è stato condotto mediante indagini con microscopia ottica su sezioni sottili, men tre le analisi chimiche con ICP-MS (*Spettrometria di Massa al Plasma Accoppiato Induttivamente*) e ICP-OES (*Spettrometria di Emissione Ottica al Plasma Accoppiato Induttivamente*) sono state eseguite su quantità molto ridotte (<5 mg) di campioni in polvere.

L'indagine petrografica è stata effettuata con microscopio a luce polarizzata (Whitbread 1989) e le caratteristiche strutturali sono state valutate mediante opportune tabelle comparative (Maritan *et al.* 2005; Cuomo di Caprio 2007).

Le indagini chimiche hanno invece permesso di definire la concentrazione degli elementi maggiori, minori e in traccia tramite uno spettrometro Perkin-Elmer-Sciex e uno Pelkin Elmer Optima 2000DV, rispettivamente per ICP-MS e ICP-OES. Per la calibrazione sono stati utilizzati standard geologici (AGV-1 e SDC-1). L'errore analitico è inferiore all'1% per gli elementi principali e la maggior parte degli elementi minori e di traccia (eccetto per V, Sr e Rb, errore <5%).

Gli elementi principali, minori e in tracce (MgO, SiO2, K2O, CaO, Al2O3, TiO2, Fe2O3, Na2O, Ba, Cr, Zn, Cu, Co, Mn, Ni e Sr) e le terre rare (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Ho, Er, Yb, Lu) sono stati utilizzati al fine di individuare eventuali differenze nelle materie prime impiegate e per studi di provenienza (Kilikoglou, Maniatis, Grimanis 1988; Maritan *et al.* 2005; De Francesco, Crisci, Bocci 2008). In particolare, al fine di ottenere indicazioni sulla variabilità tecnologica e composizionale all'interno del repertorio di campioni analizzato, i dati relativi alle indagini chimiche sono stati trattati statisticamente attraverso l'analisi delle componenti principali (PCA), eseguita tramite il plug in statistico di Origin Pro 9.1.

La normalizzazione dei contenuti delle terre rare per ciascun campione a quelli delle condriti (Henderson 2013) e la Crosta Superiore (Mclennan 2001; Taylor, Mclennan 2009) è stato anche utilizzato per ottenere indicazioni preliminari sulla provenienza delle materie prime.

Dato l'elevato numero di campioni provenienti dai siti menzionati nel presente contributo l'indagine archeometrica è stata eseguita su una selezione di dodici campioni (undici frammenti ceramici ed uno di argilla, *tab.* 1). Dopo un'osservazione preliminare sotto lo stereomicroscopio, la maggior parte dei campioni risulta caratterizzato da un impasto a grana fine di colore rossastro tipica di matrici ricche di ferro cotte in condizioni ossidanti. In particolare, alcuni campioni (6, 12, 15 e 18) sono caratterizzati da un impasto più grossolano con inclusi di grandi dimensioni.

I campioni provenienti dal sito di Rocchette Pannocchieschi (7 e 8) si discostano leggermente per le caratteristiche dell'impasto caratterizzato da un colore più verdastro **e** inclusi di grandi dimensioni.

Dall'indagine petrografica dei campioni è stato possibile discriminare in maniera più approfondita i tre gruppi in base alla struttura dei corpi ceramici e alla natura delle inclusioni.

Il gruppo principale è costituito da frammenti caratterizzati da una densa pasta di fondo di colore dal marrone scuro al rosso (*fig.* 5a) e inclusi di natura e abbondanza (<20% del volume all'interno della massa) molto simili. La maggior parte dei campioni di questo gruppo rivela una buona classazione e una granulometria molto fine (30-80 μm) con inclusi con forme da sub-angolari a sub-arrotondate. Le specie mineralogiche più abbondanti sono rappresentate da quarzo e feldspati monocristallini, insieme a inclusioni opache e miche.

Tutti i campioni appartenenti a questo gruppo sono caratterizzati da una bassa porosità costituita da pori principalmente non orientati e rari pori allungati di dimensioni medie tra 50 e 200 μm. I campioni 9 e 19 mostrano una maggiore porosità caratterizzata da grandi pori sub-arrotondati e orientati parallelamente alla superficie (da 300 a 800 μm).

Alcuni campioni dello stesso gruppo (5, 12, 15 e 18) presentano una scarsa classazione e una granulometria più grossolana (*fig.* 5b) Tutti questi campioni hanno mostrato due serie principali con dimensioni comprese tra 30-80 μm e 300-600 μm, rappresentate principalmente da quarzo (sia mono, che policristallino), feldspati e quantità minori di miche.

Il secondo gruppo di campioni (7 e 8) è caratterizzato da una matrice più verdastra e una minore classazione degli inclusi. I clasti, di forma da angolare a sub-angolare e con media classazione, sono principalmente rappresentati da quarzo mono e policristallino, feldspati e inclusioni opache, insieme ad abbondanti miche nel campione 7 (*fig.* 5c) e frammenti di roccia (chert) nel campione 8.

Per quanto riguarda l'intero repertorio, l'orientamento dei clasti e dei pori, che per alcuni esemplari risulta orizzontale alla superficie, esclude una lavorazione a torni veloce dei campioni. Fossili di bivalvi e gasteropodi sono stati osservati nei campioni 5 e 7 (*fig.* 5d).

I risultati ottenuti da ICP-MS e OES sono riportati nella Tabella 2 (*tab.* 2). La composizione chimica dei campioni è indicata come % in peso per gli ossidi di tutti gli elementi mag-

giori e alcuni minori (MgO, SiO2, K2O, CaO, Al2O3, TiO2, Fe2O3, Na2O e P2O5), mentre i restanti elementi minori (Ba, Cr, Zn, Cu, Co, Mn, Ni e Sr), quelli in traccia (V, Rb, Y, Zr e Pb) e le terre rare (La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Ho, Er, Yb, Lu) sono riportati in ppm.

Gli elementi principali e secondari riflettono principalmente la composizione chimica delle materie prime utilizzate per produrre le terraglie (Dominguez, Zuluaga, Ortega 2001) e sono state studiate approfonditamente utilizzando bi-plot e analisi statistiche.

La scarsità della fase secondaria depositata all'interno dei pori (osservata solo nei campioni 7), insieme a basse concentrazioni di P2O5 (<0,1%) hanno permesso di escludere una estesa contaminazione dal suolo durante la sepoltura (Lemoine, Picon 1982; Maritan *et al.* 2005).

L'analisi preliminare degli elementi maggiori e minori suggerisce l'impiego di argille ricche in ferro (3% <Fe2O3 <7%, vedi Tabella 1) con un diverso tenore carbonatico (*fig.* 6a), dove i campioni 1, 2, 4, 6, 7 e 9 hanno mostrato quantità più elevate di calcio (Ca> 6% in peso).

Le correlazioni degli elementi maggiori hanno fornito importanti indicazioni sulla composizione delle componenti silicee e argillose dei campioni, ottenute rispettivamente dai diagrammi SiO_2/Al_2O_3 e Fe_2O_3/Al_2O_3. Se la correlazione fra silice e allumina (*fig.* 6b) non è abbastanza buona da poter confermare l'impiego di risorse simili, le differenze osservate per i campioni provenienti da Colle Massari (3 e 4) mostrano caratteristiche che si discostano dalla serie principale. Il basso rapporto SiO_2/Al_2O_3 (≤3) osservato per i campioni di Capalbiaccio, Colle Massari e San Martino, inoltre, suggerisce la predominanza di minerali argillosi sulla frazione silicea ed è inoltre indice di una granulometria fine (Trinidad *et al.* 2009). D'altra parte, l'aggiunta intenzionale di quarzo in campioni provenienti da altri siti è indicata da valori superiori del rapporto (3.3-3.8), come suggerito anche dalla scarsa classazione e dalla forma angolare delle inclusioni osservate per i campioni da questi siti. L'uso di argille scarsamente purificate, tuttavia, non è stato escluso.

Le indicazioni ottenute dal rapporto Fe_2O_3/Al_2O_3 sulla composizione della frazione argillosa (*fig.* 6c), hanno mostrato una buona correlazione tra la maggior parte dei campioni, ad eccezione di quelli provenienti dai siti della Vetricella (12) e da Rocca degli Alberti (18) dove sono state riscontrate concentrazioni inferiori di Fe_2O_3.

Infine, la buona correlazione tra TiO_2 e Al_2O_3 ha suggerito che il contenuto di titanio fosse correlato principalmente alla presenza di abbondanti quantità di muscovite in quasi tutti i campioni.

Dall'analisi statistica (Principal Components Statistics Analysis, PCA) degli elementi maggiori e di alcuni degli elementi minori e in traccia (SiO_2, K_2O, CaO, Al_2O_3, TiO_2, Fe_2O_3, Na_2O, Rb, Ba, Cr e Ni) sono stati identificati 4 autovalori che rappresentano il 93,48% della varianza totale.

La componente principale 1 (PC1) rappresenta il 44,4% della varianza totale e risulta correlata ad impasti con un'abbondante frazione argillosa argilla arricchita in calcio, mentre la componente principale 2 (PC2, 18,9%) indica le specie minerali più abbondanti fra gli smagranti (quarzo, feldspato o miche). Infine, le componenti principali 3 (PC3, 16,0%) e 4 (PC, 9,9%) risultano rispettivamente associate con gli ossidi di ferro e la natura delle inclusioni di feldspato (riguardanti i membri finali di Na o K).

Il grafico PC2/PC1 (che rappresenta il 63,3% della varianza totale, *fig.* 7a) consente di discriminare 4 gruppi caratterizzati da campioni con un diverso rapporto frazione/degrassante negli impasti e dalla predominanza di inclusioni di natura micacea o quarzoso/feldspatica. Il *set* di dati ha confermato che i campioni sono rappresentati principalmente da frammenti con una frazione argillosa predominante caratterizzata da abbondanti miche, mentre pochi campioni (5, 8, 12 e 18) presentano una percentuale di degrassante più abbondante costituita da inclusi di quarzo e/o feldspati.

Il grafico PC3/PC1 (*fig.* 7b) consente, invece, di correlare la maggior parte del contenuto di ferro rivelato a abbondanti ossidi di ferro presenti nella maggior parte dei campioni, ad eccezione dei campioni 6 e 8 dove il contenuto di Fe_2O_3 è probabilmente correlato ai fillosilicati, mentre i campioni 12 e 18 non mostravano alcuna correlazione.

Se si considerano infine gli elementi in traccia e le terre rare, l'analisi PCA fornisce indicazioni utili sulla natura della frazione argillosa. Sono state considerate tre componenti principali che rappresentano il 93,3% della varianza totale. Il componente principale 1 (PC1b, 53,5%) è correlato positivamente con le terre rare, o REE, e in particolare con quelle più pesanti (definite anche HREE), suggerendo un *weathering* (alterazione) non trascurabile delle argille utilizzate per produrre la ceramica. Ugualmente, la componente principale 2 (PC2b, 23,1%) rappresenta argille che hanno subito un *weathering* di un certo grado (rappresentato da un arricchimento in Rb), probabilmente correlato allo smantellamento della caolinite (come suggerito anche dalla correlazione con Pb). Al contrario, la componente principale 3 (PC3b, 16,7%) risulta associata alle terre rare leggere (definite anche LREE come La) e al vanadio (un elemento traccia fortemente correlato agli ossidi di ferro e ai minerali argillosi), suggerendo un grado di alterazione inferiore. Tuttavia, la presenza di monazite (con formula generica (Ce, La) PO4), documentata nei sedimenti della Toscana meridionale (Fortina, Memmi Turbanti, Grassi 2008) deve essere presa in considerazione quando si considera questo insieme di dati.

Pertanto, da un'indagine sulla correlazione tra PC1b e PC2b (*fig.* 7c), sono stati identificati tre gruppi distinti. Il gruppo principale è fortemente correlato con il vanadio (V), suggerendo di essere popolato da ceramiche ottenute a partire da argille soggette a bassa esposizione agli agenti atmosferici. Nessuna correlazione è presente con Ce e La, suggerendo che questi elementi siano fortemente legati alla presenza di monazite. Tre campioni (3, 4, 8 e 20) hanno mostrato una correlazione positiva con le terre rare pesanti (HREE), suggerendo l'uso di argille sottoposte ad un alto grado di alterazione, mentre i campioni 12 e 18 sono risultati essere prodotto da materie prime con caratteristiche diverse.

È stato quindi effettuato uno studio più dettagliato delle terre rare (REE) al fine di ottenere ulteriori informazioni sulla provenienza delle materie prime.

Gli elementi di terre rare sono un gruppo di 17 elementi inclusi i lantanidi (Z = 57-71), insieme a Sc (non rilevati nel presente studio) e Y, ampiamente utilizzati per studi di provenienza. Tuttavia, devono essere considerati diversi fattori che influenzano la concentrazione di REE in un campione di ceramica. Se è possibile discriminare diversi materiali secondo schemi di distribuzione normalizzati, variazioni significative del contenuto di REE possono verificarsi all'interno dello stesso tipo di argilla a seconda del grado di invecchiamento della roccia madre. La grande varietà di processi che influenzano le composizioni chimiche e mineralogiche di argille durante l'articolato processo di produzione (purificazione, aggiunta di temperi, cottura), insieme alle interazioni chimiche con l'ambiente circostante (conservazione, uso e seppellimento), potrebbero inoltre svolgere un ruolo significativo sulla concentrazione e la distribuzione delle REE (Kilikoglou, Maniatis, Grimanis 1988).

Modelli di distribuzione di REE normalizzati alla composizione chimica delle condriti e della Crosta superiore (Taylor, Mclennan 2009; Henderson 2013) sono mostrati nelle (*fig.* 8a-b), rispettivamente. Le similitudini negli andamenti delle curve ottenute per ogni campione, eccetto il numero 8, suggeriscono lo sfruttamento di fonti simili. Analogamente, le limitate variazioni dei rapporti di distribuzione normalizzati delle terre rare leggere e pesanti $(La/Lu)_N$ (9.5-12.5) osservate per la maggior parte dei campioni portano alla medesima conclusione. D'altra parte, un arricchimento in HREE osservato per il campione 8 ($La/Lu_{sample8}$=6,8) potrebbe essere correlato all'uso di argille soggette a fenomeni di alterazione più estesi.

Il contenuto relativamente minore nelle REE per i campioni con una maggiore percentuale di inclusi quarzoso/feldspatici di grandi dimensioni potrebbe essere inoltre correlato all'impiego di argille meno purificate o all'aggiunta intenzionale di una frazione consistente di smagrante che, con il duo ridotto contenuto di terre rare, porta a una diluizione della loro concentrazione all'interno dell'impasto ceramico (Prudencio, Figueiredo, Cabral 1989).

In conclusione l'indagine archeometrica preliminare ha fornito indicazioni utili sulle principali caratteristiche dei frammenti oggetto di studio. Il numero limitato di campioni esaminati, tuttavia, non ha permesso di ottenere un modello da applicare correttamente all'intero repertorio e rappresentato dall'individuazione di marker chimici e petrografici che permettano di discriminare fonti di approvvigionamento diverse per le materie prime (come l'argilla).

Ulteriori analisi sono quindi attualmente in corso per ottenere una caratterizzazione approfondita di un numero maggiore di campioni provenienti da siti diversi, unitamente al campionamento e alla caratterizzazione di argille da un elevato numero di depositi (circa 14) diffusi in tutta la Toscana meridionale per fornire nuovi parametri da utilizzare negli studi di provenienza.

Finora, i campioni analizzati hanno mostrato caratteristiche molto simili e i risultati suggeriscono lo sfruttamento di fonti simili per la produzione della maggior parte dei frammenti. Eccezioni sono rappresentate dai campioni 8 (Rocchette Pannocchieschi), 12 (Vetricella) e 18 (Rocca degli Alberti), le cui caratteristiche non sono in accordo con il resto dei campioni. Ulteriori studi sono, tuttavia, necessari per confermare una diversa provenienza delle materie prime.

C.F.

4. PRODUZIONE E CIRCOLAZIONE DI VETRINA SPARSA[16]

4.1 *Il contesto*

Nel panorama ceramico di tipo locale (Grassi 2010) articolato in un sistema più ampio che vede centri artigianali dislocati su scala sub-regionale, proponiamo in questa sede la classe ceramica della "vetrina sparsa" come possibile produzione puntuale del sito di Donoratico (Bianchi 2004). Il castello di Donoratico, si trova nel Comune di Castagneto Carducci (LI), è situato in una fascia intermedia tra l'entroterra e la costa (*fig.* 9), in un'area di grande interesse storico e ambientale caratterizzata da una continuità geografica e storica estremamente significativa[17]. L'insediamento di Donoratico è ritenuto interno ai domini del monastero di S. Pietro in Palazzuolo, posto sulle pendici del colle dove, in seguito, è attestato il castello di Monteverdi (Bianchi 2015a, pp. 11-15).

Il sito del castello di Donoratico è stato indagato archeologicamente dal 2000 al 2009 e ha restituito una eccezionale continuità insediativa dal periodo ellenistico al basso Medioevo, di cui conservano tutt'oggi tracce monumentali ben visibili, come le due torri affiancate (Bianchi 2015a, pp. 301-335; Bianchi 2015b, pp. 9-26). In questa sede faremo riferimento ad un'unica fase di cantiere del castello, individuata nella porzione sud-orientale del sito ed inquadrata cronologicamente tra IX ed XI secolo per contestualizzare un importante ritrovamento, oggetto di questo contributo, relativo al rinvenimento di "vetrina sparsa".

In questa sede prenderemo però in considerazione un altro aspetto significativo del sito: la quantità veramente eccezionale di ceramica a "vetrina sparsa" rinvenuta durante le passate indagini archeologiche.

4.2 *Le invetriate in monocottura: stato dell'arte e problematiche di studio*

La ceramica a "vetrina sparsa" fa parte delle ceramiche invetriate in monocottura databili all'alto Medioevo (Cuomo di Caprio 2007, pp. 397-400); le invetriate altomedievali trovate in Italia appartengono a due gruppi ben distinguibili non tanto sulla base di una diversità tecnologica, quanto formale e decorativa. Il primo gruppo, le cosiddette "Forum Ware", è caratterizzato da un rivestimento vetroso a base di piombo totale e coprente, di colore verde o giallo-marrone, con decori applicati (Whitehouse 1981, pp. 583-587; Mazzuccato 1972)[18]. Il secondo gruppo, le "Vetrine Sparse", è invece caratterizzato dall'assenza di decorazioni applicate e da una vetrina più sottile e non totalmente coprente, di colore verde o giallo-marrone come le precedenti (Molinari 2003, pp. 519-528; Molinari 2014, pp. 95-109)[19].

Gli studi sulle ceramiche invetriate altomedievali in monocottura[20] si sono concentrati sin dall'inizio sia sugli aspetti tipologici che su quelli tecnologici (Blake 1981, pp. 20-52). Infatti, in occasione del primo progetto di studio sistematico, conclusosi con un convegno svoltosi a Siena nel 1990, furono eseguite molte analisi archeometriche poi pubblicate nell'edizione dello stesso convegno che rimane ad oggi lo studio più aggiornato (Paroli 1992). Vi sono poi state ricerche puntiformi (Sannazaro 1994, pp. 229-261) e altre a carattere regionale, come per il Lazio[21] e la Toscana: nel quadro delle ricerche svolte in Toscana dalla fine degli anni Settanta del secolo scorso dirette da Riccardo Francovich, assunsero particolare rilievo le indagini di scavo che fornirono contesti stratigrafici sicuri in cui poter analizzare la presenza di ceramica invetriata altomedievale (De Marinis 1978, pp. 504-512; Grassi 2010, pp. 9-10; pp. 91-104). Un'ulteriore messa a punto si ebbe in occasione di un Congresso Internazionale dell'AIECM2 a Salonicco (Paroli *et al.* 2003, pp. 477-490), a cui va aggiunta una sintesi sulla Sicilia (Cacciaguerra 2009, pp. 285-300) e un recente testo che torna a fare il punto sulla situazione (Gelichi 2016, pp. 297-317). I contributi sull'argomento hanno evidenziato in

[16] I dati presenti all'interno del contributo sono stati elaborati durante i primi sei mesi del progetto di dottorato della scrivente dal titolo: *La ceramica a "vetrina sparsa" nella Toscana altomedievale: produzione, cronologia e distribuzione*.

[17] Si rimanda a Bianchi 2015b, con relativa bibliografia; Benvenuti *et al.* 2014.

[18] La "Forum Ware" fu prodotta a Roma tra VIII e XI secolo. Ricordiamo in proposito i numerosi contributi di D.B. Whitehouse e O. Mazzuccato con bibliografie precedenti.

[19] La "Sparse Glazed" si diffuse nell'Italia centro-settentrionale dall'XI al XIII secolo.

[20] Un quadro di sintesi, con particolare riferimento al nord Italia, è stato già tracciato da Hugo Blake, a seguito di un Seminario di Studi dal titolo *La ceramica invetriata tardoromana e altomedievale*, Museo Civico Archeologico "Giovio", 1985.

[21] Per gli ultimi aggiornamenti sui numerosi studi nel Lazio si rimanda al recente volume a cura di Molinari, Santangeli Valenzani, Spera 2014.

particolare due problemi per lo studio della "vetrina sparsa": i ritrovamenti assai esigui e il fatto che, per la natura stessa del rivestimento non omogeneo, questa ceramica, quando ritrovata frammentaria, può essere scambiata per semplice depurata e pertanto non sempre di facile individuazione. Quindi, ad oggi, non abbiamo una cronologia di diffusione sicura della "vetrina sparsa", né uno studio sulle sue modalità di produzione e sulle sue caratteristiche tecniche.

4.3 *La "vetrina sparsa" di Donoratico*

Il rinvenimento eccezionale di ceramica a "vetrina sparsa" nel sito di Donoratico ammonta a circa 3000 frammenti riconducibili a diverse centinaia di manufatti[22]. La maggior parte dei reperti proviene da stratigrafie pertinenti le fasi di cantiere e di vita corrispondenti ad un momento di profonda ridefinizione del sito (Bianchi *et al.* 2012) che forniscono una dettagliata griglia cronologica di riferimento compresa tra fine IX e X secolo (*ibid.*, pp. 45-48). Dal punto di vista morfologico sono stati individuati solo contenitori chiusi di medie e grandi dimensioni. Si tratta di brocche trilobate o a bocca circolare, con una sola ansa variamente sagomata, corpo ovoide e fondo piano. Le anse si impostano o a metà del collo del recipiente o direttamente sull'orlo e quindi complanari a quest'ultimo. Come trattamento delle superfici risulta evidente una lisciatura a stecca della parte bassa della pancia del vaso e del fondo (*tav.* 3). Dal punto di vista decorativo è caratteristica l'associazione tra le colature di vetrina e i motivi sinusoidali ampi, prevalentemente a registro singolo, sulle spalle dei contenitori. Le sinusoidi appaiono chiaramente incise direttamente sul biscotto crudo prima che la vetrina sia fatta colare sulla superficie esterna del vaso. Le colature di vetrina appaiono sempre irregolari e in molti casi sono presenti gocce e schizzi sia all'interno dei contenitori che sul fondo sulla superficie esterna. Inoltre sono stati riscontrati due principali modalità di spargimento delle colature: verticali e orizzontali (*fig.* 10). La prima modalità prevede che la bocca del vaso capovolto venga intinta nella vetrina e poi, in un secondo momento, rigirato sulla sua base di appoggio e quindi questo consenta la naturale colatura della vetrina dall'alto verso il basso. Nel secondo modo, invece, le colature seguono l'andamento delle linee di tornio del vaso o appaiono oblique rispetto a queste; ciò starebbe ad indicare un procedimento durante il quale la vetrina è stata fatta colare sul vaso tenendolo in posizione orizzontale e successivamente è stato fatto ruotare su se stesso, determinandone quindi andamenti prevalentemente orizzontali rispetto all'asse del manufatto. Per quanto riguarda le caratteristiche delle vetrine si tratta prevalentemente di rivestimenti vetrosi trasparenti o leggermente lattiginosi con una gamma cromatica che varia dai toni del giallo, al verde fino al marrone. Le superfici si presentano con le caratteristiche imperfezioni, quali cavillature e sbollature dovute al collasso della vetrina all'interno del corpo ceramico. Risulta infine importante l'associazione dei manufatti con colature di vetrina sparsa con prodotti acromi depurati assolutamente analoghi per forma e decoro inciso attestati all'interno del sito.

4.4 *Analisi archeometriche: dati preliminari*

I dati archeometrici presentati in questa sede risultano ancora parziali e preliminari in quanto le analisi archeometriche sono ancora in corso e per questo motivo non verranno presentati nel dettaglio così come abbiamo potuto fare nei paragrafi precedenti.

I manufatti, oltre alla tradizionale schedatura, sono stati campionati e sottoposti a specifiche analisi archeometriche sia dei corpi ceramici che delle coperture vetrificate[23]. I risultati delle analisi ancora in corso confermano parzialmente quelli pregressi condotti nel 2008 effettuati su 27 campioni di ceramiche invetriate provenienti da 6 siti tra cui lo stesso Donoratico: in quel caso si trattava di campioni sia a vetrina sparsa che invetriate grezze da cucina (Fortina, Memmi Turbanti, Grassi 2008, pp. 30-47). Le recenti analisi mineralogico-petrografiche[24] effettuate sui corpi ceramici stanno al momento verificando l'abbondanza di quarzo, plagioclasi, K-feldspati e miche in accordo con elevati tenori di silicio, alluminio, ferro, potassio e sodio tipici di questi minerali, mentre tutti gli impasti si sono rivelati caratterizzati da scarse concentrazioni di calcio. L'insieme di queste informazioni unito alla presenza di Monazite, tipica dell'areale di riferimento, è in accordo con quanto già riscontrato in precedenza nei precedenti studi sopra citati. Risulta tuttavia in contrasto con i risultati delle indagini precedenti l'abbondanza di ferro, associato alla presenza di abbondanti miche e ossidi di Fe, ed in alcuni campioni la presenza di probabili aggiunte intenzionali di smagranti nell'impasto. Malgrado ciò il distretto minerario del Campigliese si conferma come l'areale di riferimento per l'approvvigionamento delle materie prime (Fortina, Memmi Turbanti, Grassi 2008, p. 43). Le osservazioni preliminari sulle vetrine analizzate con microscopia ottica (OM) hanno riguardato alcune loro qualità (compattezza, spessore, colore, distribuzione), la tipologia di applicazione e lo stato di conservazione. Lo *step* successivo ha riguardato l'applicazione della microscopia elettronica a scansione (SEM) per ottenere una più approfondita caratterizzazione chimica, mineralogica e tessiturale unita ad una maggiore risoluzione rispetto alla microscopia ottica. Naturalmente si tratta di vetrine ricche di piombo ma, proprio grazie al maggiore numero di informazioni ottenuto a seguito delle indagini microscopiche, è stato possibile evidenziare la struttura complessa delle vetrine presenti su alcuni campioni che mostravano caratteristiche indistinguibili ad occhio nudo. Le nuove analisi permettono al momento di confermare la tecnologia di fabbricazione in monocottura, evidente nei tipici collassi della vetrina nelle cavità del corpo ceramico stesso e nella notevole estensione dell'interfaccia tra corpo ceramico e vetrina, tratti riscontrati in tutti i campioni analizzati. Passando al rivestimento, ciò che già era noto sulle vetrine (Fortina, Memmi Turbanti, Grassi 2008, pp. 45-46) è stato confermato e precisato durante le ultime analisi che hanno definito lo spessore variabile delle vetrine, la grande variabilità composizionale di base, anche se sempre e comunque ricca in Piombo, la rapida miscelazione dei componenti e la presenza di ossidi di ferro che ne determinano colorazioni in alcuni casi ambrate.

4.5 *Ipotesi conclusive*

Per riassumere, come abbiamo scritto poco sopra, i precedenti rinvenimenti di "vetrina sparsa" in Toscana si basano sullo

[22] La schedatura del materiale ceramico è ancora in corso e pertanto suscettibile di modifiche. Il metodo di calcolo della quantità di ceramica effettuato è basato sul calcolo del numero di frammenti (Orton *et al.* 1993) e sul numero minimo di esemplari (NME) (Orton 1975, pp. 30-35), consapevoli dei rispettivi limiti, primo fra tutti la complessità dell'applicazione in contesti con migliaia di frammenti e la soggettività di raggruppamento (Ceci, Santangeli Valenzani 2016, pp. 35-57).

[23] Al momento, presso il Dipartimento di Scienze fisiche, della Terra e dell'ambiente dell'Università degli Studi di Siena, sono in corso le analisi petrografiche e chimiche che permetteranno di individuare gruppi di impasti da comparare con quelli di, da altri siti del comprensorio della Colline Metallifere e del generale contesto toscano, consentendo così di procedere nel riconoscimento delle produzioni guardando non più ai singoli insediamenti, ma a micro-aree di riferimento.

[24] Le analisi, in parte ancora in corso, sono state effettuate dalla Dott.ssa C. Fornacelli e dalla scrivente presso il Dipartimento di Scienze della Terra dell'Università di Siena nell'ambito del progetto di dottorato (vedi nota 1).

studio di una quantità veramente esigua di frammenti. Tra i ritrovamenti effettuati in città e nei siti rurali (Grassi 2010), non si superano le poche decine di forme minime. Abbiamo riassunto i dati disponibili riguardanti le attestazioni di alcune classi ceramiche provenienti da 19 siti indagati archeologicamente situati in 14 comuni delle province di Pisa, Livorno, Siena e Grosseto (*tab.* 3)[25]. Da cui ricaviamo una considerazione sulla presenza della "vetrina sparsa" anche negli altri siti del territorio, che risulta essere, numeri alla mano, veramente molto limitata e geograficamente circoscritta alla fascia costiera.

Se si tiene conto del numero assolutamente fuori scala di manufatti con colature di "vetrina sparsa" rinvenuti nell'insediamento di Donoratico e della presenza di possibili scarti di cottura, si può ipotizzare che il sito possa essere stato un centro produttivo di questa classe ceramica[26]. Donoratico si andrebbe ad inserire, quindi, per la prima volta in modo puntuale, all'interno del sistema di policentrismo produttivo tipico della "vetrina sparsa"[27], rivelandosi anche un importante marcatore della circolazione di saperi specifici. Il proseguimento della ricerca consentirà di approfondire e verificare questa ipotesi.

5. ALCUNE CONSIDERAZIONI SULLE PRODUZIONI AD INGOBBIO ROSSO

Tra le produzioni ceramiche che circolano in Toscana tra tarda Antichità e Medioevo, ci sono quelle decorate con ingobbio rosso o bruno tra le quali si devono distinguere alcune classi caratterizzate da differenti peculiarità tecnologiche e soprattutto da una diversa cronologia. Ai fini di un generale ragionamento in questo territorio sulla diffusione e circolazione a livello subregionale le produzioni da prendere in considerazione sono quelle decorate con colature di ingobbio rosso, ma non quelle databili principalmente tra la fine del IV e il VII secolo che comprendono ancora forme di tradizione tardoantica, bensì quelle successive all'VIII secolo che riguardano ormai tipi morfologici medievali, come le brocche, gli orcioli e i catini (Cantini 2005, p. 179).

Quindi osservazioni analoghe a quelle per la "vetrina sparsa", in Toscana, potrebbero essere fatte anche per le colature, dette anche "bande rosse", attestate nelle forme pienamente medievali di brocche, olle e vasetti, sebbene in numero limitato nei siti esaminati. Le decorazioni prevedono gocciolature e spirali dipinte in associazione a sinusoidi incise sui corpi ceramici e bolli a graticcio impressi sulle anse a partire dal X secolo. Queste ceramiche si datano dall'VIII fino all'XI secolo ed hanno una diffusione abbastanza ampia che spazia dalle città ai villaggi (Cantini 2009, p. 67).

Relativamente ai centri di produzione alcune analisi effettuate in passato sugli impasti di materiali ceramici dal sito di Campiglia (Grassi 2003, pp. 301-303; Fortina, Memmi Turbanti 2003, pp. 337-340) hanno permesso di individuare tra le aree di probabile provenienza, quella delle Colline Metallifere per l'impasto di un'olla grezza a bande rosse, mentre per i tipi in depurata a bande le analisi hanno permesso di definire solo un areale regionale, compatibile sia con aree della Toscana costiera, che con argille dell'Arno. Quindi, tenendo conto delle piccole percentuali di attestazione di questa classe e della presenza di forme con impasti eterogenei si potrebbero preliminarmente ipotizzare produzioni distinte: nel Valdarno, dove l'unico e sicuro centro produttore di ceramiche a colature altomedievali, con scarico di fornace, è stato individuato nel sito di San Genesio (San Miniato, Pisa) quindi in ambito rurale, in prossimità di importanti arterie stradali e aree di approvvigionamento delle materie prime (Cantini 2009, p. 71; Cantini c.s.); in alcuni siti della Toscana meridionale dove possiamo ipotizzare che, a partire dal X-XI secolo, questi manufatti comincino ad essere diffusi e forse prodotti, accanto alla "vetrina sparsa", ispirandosi a modelli che già circolavano nella valle dell'Arno. Per approfondire ulteriormente questo filone di ricerca si prevedono in futuro ulteriori analisi archeometriche specifiche anche su questa classe ceramica.

A.B.

6. CONCLUSIONI GENERALI

In conclusione, il quadro fin qui delineato, seppur preliminare, può essere così riassunto:

1. Per le ceramiche circolanti tra VIII e X secolo si evidenzia una produzione diffusa di ambito locale costituita da prodotti comuni da cucina e dispensa, già evidenziata in passato. Queste ceramiche, provenienti da *ateliers* locali, sfruttano con certezza i giacimenti dislocati in modo capillare ed uniforme sia nell'area costiera che nell'immediato entroterra. Ciò che di nuovo si aggiunge, all'interno del repertorio formale e tecnologico, è costituito dai nuovi rinvenimenti delle sopracitate 'anforette' e ancor più da una maggiore definizione della loro distribuzione, ad ora circoscrivibile al comprensorio delle Colline Metallifere e all'area grossetana.

Ad oggi, infatti, su scala regionale non sono noti altri esemplari con le stesse caratteristiche formali, fattore questo che ci fa propendere per interpretare questa forma come peculiare di questo specifico territorio.

2. Per quanto riguarda le altre possibili produzioni locali, ed in particolare la vetrina sparsa, sulla base del quantitativo eccezionale dei frammenti rinvenuti nell'insediamento di Donoratico, si può ipotizzare che il sito possa identificarsi con un centro produttivo di questa classe ceramica.

3. Riguardo invece alle colature rosse, attestate nel nostro territorio in quantità inferiori ed esclusivamente lungo la fascia costiera, ad ora non siamo in grado di definire se si tratti di una produzione locale o subregionale dal momento che l'unico centro produttivo coevo noto si trova nel Valdarno.

Pertanto la futura agenda di ricerca prevede l'auspicabile implemento quantitativo delle 'anforette' al fine di definire in modo più ancor più puntuale l'areale di attestazione e di distribuzione; la realizzazione di ulteriori analisi archeometriche sugli impasti sia delle produzioni acrome che delle ceramiche rivestite per definirne la provenienza.

Tra gli obiettivi primari, ed in particolare per la vetrina sparsa e le colature rosse, rientra anche la necessità di effettuare indagini comparative con materiali provenienti da altre aree della Toscana. Inoltre il proseguimento della ricerca consentirà di ottenere per le specifiche produzioni sopra citate agganci cronologici più saldi. É in quest'ottica, quindi, che la cultura materiale potrà contribuire a delineare il sistema produttivo caratteristico di questo territorio durante l'alto Medioevo in riferimento a possibili diversi tipi di committenza.

[25] I dati di 11 siti (Rocca di Campiglia; Rocca San Silvestro; Rocca di Suvereto; Populonia; Ricognizione del comune di Radicondoli; Castello di Miranduolo; Castello di Montemassi; Rocchette Pannocchieschi; Castel di Pietra; Castello di Scarlino; Podere Aione) sono stati ripresi dalle pubblicazioni edite e riportati numericamente così come sono stati indicati dagli autori, da qui deriva la difformità tra numeri di frammenti o di forme minime. I dati degli 8 siti inediti (Castello di Donoratico; Carlappiano; Monastero di San Pietro in Palazzuolo; Rocca degli Alberti; Castello di Cugnano; Edificio delle Fonderie; Canonica di San Niccolò; Vetricella) sono ancora in corso di studio e la loro diffusione è stata gentilmente concessa dalla direttrice scientifica, la Prof.ssa Bianchi.

[26] La precisazione doverosa rispettivamente a questa ipotesi è che, al momento a livello archeologico, non è stata individuata la collocazione di una fornace.

[27] Fattore evidenziato da Lidia Paroli fin dalle prime fasi, con segni evidenti di rafforzamento nel X secolo in Paroli 1990, p. 46.

Paolo Tomei

IL POTERE DEL DONO. LUCCA E LA SUA CORTE NELL'ALTO MEDIOEVO

1. PREMESSE E QUESITI

La città di Lucca ospitò dall'età longobarda una delle corti più importanti della Penisola. Fu la sede principale di un organismo politico-territoriale che godette di ampi margini di autonomia rispetto al regno italico e raggiunse scala regionale: il ducato di Lucca, poi marca di Tuscia. Nel territorio toscano, che fu spesso percepito in maniera distinta rispetto al resto della *Langobardia* anche in ragione della sua posizione geografica – cinto e protetto com'è dalla dorsale appenninica –, si verificò un'eccezionale tenuta delle istituzioni pubbliche (Wickham 1996; Ronzani 1998). Dagli anni del trattato di Verdun fino a quelli dello scontro fra Enrico IV e Gregorio VII, fu attiva e universalmente riconosciuta nella regione un'autorità politica, il marchese, che strutturò il tessuto aristocratico e governò la competizione politica secondo regole del gioco 'tradizionali', rapportandosi in forma diretta con il potere imperiale. Allora in Tuscia la giustizia fu, cioè, amministrata mediante lo strumento del placito in maniera 'doppiamente pubblica': in occasione di grandi assemblee tenute sotto i loggiati, nei cortili alberati o entro le vaste sale riscaldate dei palazzi suburbani, anzitutto quello di Lucca, e delle tenute fiscali; consessi, d'altro canto, presieduti in nome del sovrano, vicario di Cristo, da suoi emissari e rappresentanti, dotati di *publica potestas*.

Il potere e la fortuna dei marchesi si fondò sulla loro capacità di redistribuire risorse materiali e simboliche ai segmenti distinti delle società, attratti nell'orbita del *palatium* (Tomei 2017). È questo un sostantivo dalla complessa stratigrafia semantica che indicava a un tempo l'istituzione pubblica; la sua immagine visiva, l'edificio che ospitava l'autorità e dove si manifestava ed era esercitato il suo potere; per estensione, le altre residenze (*curtes*, *salae*) fiscali sparse sul territorio rurale, anch'esse luoghi di riunione per l'amministrazione della giustizia e il rilascio di disposizioni sovrane, e le persone che componevano la corte e ricoprivano funzioni (*officia*) per conto del *publicum* (Brühl 1968, 1972, 1975). Il flusso di redistribuzione di terra e cariche (*honores*) operato dai marchesi, i massimi possessori fondiari della regione, che garantì sopravvivenza e buon funzionamento alle istituzioni marchionali, non è di semplice lettura. Le fonti scritte conservate toccano solo marginalmente questi aspetti, che restano però cruciali per la comprensione delle strutture politiche ed economico-sociali della Tuscia altomedievale (Collavini c.s.).

Anche grazie al decisivo apporto dei dati archeologici, le conoscenze circa composizione, aspetto e modalità di gestione della base fondiaria pubblica si stanno negli ultimi anni assommando. Questa nuova stagione di riflessione sul fisco toscano si sta concentrando, in particolare, sulla porzione più meridionale della regione che, a discapito della distanza da Lucca, fu dall'età longobarda con continuità strettamente controllata dalle autorità insediate nella città del Serchio (Bianchi c.s.). In Maremma sorgevano, infatti, complessi fondiari del fisco tanto estesi da configurarsi come delle vere e proprie *exclaves* lucchesi: comprensori pubblici contraddistinti dalla presenza di vaste lande d'incolto produttivo (tomboli e lagune costiere, rilievi boscosi) e toponomasticamente marcati. Nelle sole valli del Cornia e del Pecora si situano Bagno del re, Gualdo del re, Acqua del re (*Teupascio*), Mulini del re (*Mulinareggi*), *Monteregio*. Alla comune etichetta della Maremma altomedievale come "terra senza città", potrebbe, dunque, a ragione affiancarsi quella di "terra del re" (Collavini 1998; Farinelli 2007; Bianchi 2015).

Con questo intervento mi propongo, invece, di apportare nuovi elementi per riflettere sulla fisionomia e il funzionamento del centro nevralgico delle fortunate istituzioni pubbliche toscane: la residenza palaziale che sorgeva nel suburbio occidentale della città di Lucca. Per far questo mi servirò di un ampio spettro di fonti: scritte e archeologiche, di origine lucchese o provenienti da contesti spazialmente molto distanti. Puntare lo sguardo sul *palatium* nel senso più ristretto del termine, consente di coglierne di riflesso, grazie allo stesso campione di testimonianze, le sfumature più late: proverò, pertanto, anche a ragionare sull'iconografia e la natura del potere marchionale, a ricostruire un'immagine esemplare della vita di corte e dei meccanismi sociali e culturali che la regolavano, a cogliere la trama che connetteva uomini e luoghi posti entro la sfera pubblica, osservando oggetti, tecniche e modelli che su questa rete si muovevano: da Lucca alle terre maremmane, e viceversa[1].

2. I *PALATIA* COME CONCENTRATO DI STORIA DEL POTERE

Il maestoso palazzo suburbano fu, come detto, luogo-simbolo del potere pubblico a Lucca e in Tuscia. Esso era il palcoscenico politico su cui avveniva il circuito di redistribuzione governato dai marchesi e dove si ostentava pubblicamente *potestas*: autorità di comando e una condizione socio-economica privilegiata. Più in generale, esiste un ben evidente nesso fra l'avvicendarsi delle strutture palaziali e le grandi cesure con cui può essere scandita la storia politica lucchese (*fig.* 1). Una proficua stagione storiografica fiorita a seguito dell'incontro fra la scuola di Cinzio Violante e i lavori di Gerd Tellenbach e Carlrichard Brühl, fra la fine degli anni Sessanta e i primi anni Ottanta del secolo scorso, ha studiato in parallelo i due aspetti: la dimensione topografica e iconografica del potere (Belli Barsali 1973; Tirelli 1980) e le grandi scansioni politico-istituzionali (Keller 1973; Nobili 1981) a Lucca e nella marca. Se ne può ricavare, a brevi linee, la seguente parabola storica.

Attestata una prima volta alla metà del secolo IX, negli stessi anni in cui gli Adalberti riuscirono a dinastizzare a Lucca la carica comitale, la fortuna della loro grande residenza suburbana (nelle fonti chiamata *curtis ducalis* o *mansio* di Adalberto) segue dappresso le vicende del potere marchionale che, al tempo di Adalberto II e della moglie Berta, assunse sfumature principesche[2]. Il marchese aveva, infatti, accentrato nelle sue mani tutte le prerogative pubbliche. La destrutturazione del principato adalbertino in Tuscia, più saldamente ricondotto entro la cornice del regno, passò anche per l'appropriazione da parte della corona della *curtis* marchionale suburbana, prima con Ugo di Provenza (*curtis domni Hugoni regis*) poi con Ottone I (*palatium domini imperatoris*)[3]. In questa fase poteva dirsi ormai soppiantata l'antica *curtis* regia inframuranea che, persa ogni funzione residenziale, conservò, tuttavia, il ruolo di principale polo commerciale e artigianale della città: ospitava la zecca, rimessa nuovamente in attività da Ugo dopo uno iato poco più che secolare (Rovelli 2010), manifatture specializzate, mercati e banchi di cambiatori. Su ciò tornerò più avanti.

Il *palatium*, come prese a essere chiamata la magione suburbana dall'età ottoniana, continuò a essere residenza dei marchesi, rappresentanti locali del potere imperiale. Esso fu smantellato

[1] Per una recente panoramica multidisciplinare sul tema cfr. *Le corti nell'alto medioevo*.

[2] ASDL, AAL, *D*, * G 22 (ed. *Chartae Latinae Antiquiores*, v. 79, n. 21), † P 60 (ed. Manaresi 1955-1960, n. 127).

[3] ASDL, AAL, *D*, * H 71 (ed. Manaresi 1955-1960, nn. 141, 152).

intorno al 1080, con la destituzione e cacciata da Lucca della contessa Matilde. Così tramontò con eccezionale ritardo in Tuscia rispetto alle altre aree del regno un sistema di potere ancora pubblico e 'tradizionale'. La fine dell'età della marca coincise con la distruzione del palazzo che Enrico IV, in occasione del diploma ai Lucchesi con cui si aprì la nuova stagione politica, s'impegnò a non ricostruire né dentro le mura, né nel suburbio – come effettivamente accadde (Ronzani 2012). Il 17 novembre 1086 la residenza del vescovo di nomina imperiale Pietro, cui Enrico IV aveva concesso i *regalia*, situata presso la cattedrale di S. Martino vicino l'angolo sud-orientale delle mura, aveva già assunto dignità palaziale (*palatium domni Petri episcopi*)[4]. L'ultima volta che la contessa Matilde si recò a Lucca, nel giugno 1099, si accampò e tenne giustizia nel prato detto del marchese, laddove era sorto il palazzo pubblico, e non entrò in città[5]. Il solo palazzo a Lucca durante tutto il secolo XII restò, dunque, quello vescovile. Solo con la morte di Enrico VI – la prima menzione è del 13 novembre 1197 – gli si affiancò un palazzo comunale (*palatium Sancti Michaelis*), dove risiedevano gli organi maggiori, consoli e/o podestà, di un'istituzione caratterizzata ancora da un alto tasso di sperimentazione[6]. Il nuovo edificio pubblico occupava uno spazio denso di significato: si ergeva entro l'antico foro romano della città, non discosto dalla chiesa di S. Michele.

3. FONTI PER LA STORIA DEL *PALATIUM* MARCHIONALE

3.1 *Fonti documentarie: le* laubiae *come tempio di una giustizia in chiaroscuro*

Dopo questa rapida rassegna dei luoghi di potere che, in successione, segnano le diverse stagioni della storia lucchese, concentro l'attenzione sul palazzo altomedievale dove risiedettero i marchesi nella 'fase aurea' della città: quando Lucca fu uno dei maggiori centri politici del regno italico. Esso è illuminato da diverse tipologie di fonti. Avvio la mia indagine dalle pergamene conservate negli archivi lucchesi, in primo luogo quello arcivescovile: come noto, un bacino documentario eccezionale per consistenza e continuità, che da tempo ha attirato l'interesse della medievistica, non solo italiana (Pagano, Piatti 2010). Delle migliaia di carte conservate per l'arco cronologico considerato, le sole che ci parlano del palazzo sono i resoconti delle assemblee placitarie (*notitiae iudicati* e *brevia*): atti giudiziari che mostrano chiaramente la duratura fortuna delle istituzioni pubbliche a Lucca e in Tuscia. Si tratta di un numero esiguo di testimonianze. Ciò non stupisce: la pressoché totalità degli atti conservati sono transazioni che coinvolsero il vescovato, non direttamente legate all'attività del *palatium*. Limitatissimo è il numero di diplomi sovrani rilasciati in favore di destinatari toscani, se si escludono quelli per le chiese vescovili e le abbazie regie: le concessioni pubbliche furono in genere mediate dai marchesi ed ebbero carattere orale e precario (Bougard 2013a; Collavini, Tomei 2007).

Negli archivi lucchesi e pisani si conservano poco più che una decina di *notitiae* e *brevia* riguardanti sedute giudiziarie svoltesi nella *curtis* ducale, poi palazzo imperiale, fra il 25 giugno 847 e il luglio 1077: i relativi atti costituiscono la prima ed ultima attestazione del complesso residenziale pubblico[7]. I resoconti di placito si aprono con la descrizione della scena su cui si tenne pubblicamente giustizia: luogo, organi giudicanti e convenuti alla riunione. Gli storici hanno osservato con grande attenzione il *Gerichtsort* (Keller 1969; Heil 2016) poiché la scelta della sede, spesso condizionata dall'identità dei presidenti e/o dei contendenti, poté anche riflettere i rapporti di forza vigenti nella *civitas*, costituendo una buona spia per seguire i cambiamenti politici. D'altro canto, la platea degli astanti fornisce un ottimo spaccato per osservare in azione i segmenti eminenti della società lucchese, e più latamente toscana (Castagnetti 2017). Queste testimonianze, tuttavia, non intendevano offrire una descrizione globale delle strutture palaziali e si rivelano di relativa utilità per la ricostruzione della forma e articolazione della residenza di rappresentanza pubblica: forniscono una sequenza di scatti parziali che con difficoltà possono essere ricomposti in un quadro coerente. Il palazzo appare dotato di una grande stanza al pian terreno (*sala terrestile*) corredata di portico; di un ampio ambiente riscaldato (*caminata*); di un loggiato solariato (*laubia longanea*) che ospitava la cappella di S. Stefano *in Palatio*. Non sono chiari i rapporti, o la possibile corrispondenza, fra questi edifici. Nei pressi di S. Stefano era, infine, situata la vera e propria cappella palaziale, S. Benedetto *in Palatio*, oggi chiesa del Crocifisso dei Bianchi, posta di fronte alla via già detta della Rotonda in ragione del suo particolare andamento curvilineo.

Se le tracce documentarie sono troppo frammentarie perché si possa avanzare una proposta di ricostruzione complessiva non impressionistica, le strutture illuminate dagli atti giudiziari quale luogo pubblico di riunione e di esercizio del potere sono, comunque, riconducibili al generale modello messo in luce da François Bougard. I *palatia* pubblici altomedievali del regno italico erano di norma composti di un'aula absidata su due piani, preceduta da torri e impreziosita da una o più strutture a portico (*laubiae*). Archetipo eminente è il *palatium* di Teoderico a Ravenna, raffigurato nel mosaico di S. Apollinare Nuovo, il cui schema fu ripreso in forma semplificata da Carlo Magno per Aquisgrana (Bougard 1996). Gli elementi architettonici succitati potevano essere variamente combinati, dando vita a un comune e connotato linguaggio palaziale. Struttura caratteristica era la torre, manifestazione di potenza visibile da lontano, dalla funzione propagandistica e difensiva. Si davano tre soluzioni: torri potevano, come a Ravenna, monumentalizzare la facciata ed essere poste simmetricamente in associazione con la galleria porticata dotata di timpano; essere, invece, connesse all'aula di rappresentanza, garantendone l'accesso al piano superiore; o, infine, stagliarsi da sole, spesso in prossimità di una cappella, e ospitare al primo piano la camera riservata all'autorità (Noyé 2012). Ancora più distintivo è il portico/loggiato (*laubia*) delimitato con colonne o pali allineati che, alla luce del suo sistematico utilizzo quale luogo di riunione nelle notizie di placito, può a buon titolo essere visto come una sorta di 'tempio della *iustitia*': dove si manifestò e amministrò pubblicamente il potere almeno dall'età carolingia (Bougard 1995, pp. 209-218). Si tratta, infatti, di un ambiente aperto almeno su un lato, capace di garantire visibilità e notorietà a eventi collettivi che potevano svolgersi al suo interno o nello spazio immediatamente antistante: dunque, in tutte le stagioni dell'anno. Talvolta ospitò assemblee anche nella sua versione più minimale e stilizzata: la pergola di un frutteto.

[4] ASDL, ACL, *D*, E 29 (ed. Guidi, Parenti 1910-1939, n. 492).

[5] ASDL, AAL, *D*, * M 74; ASL, *D*, *S. Ponziano*, 1099 (ed. Goez, Goez 1998, nn. 51-52).

[6] ASL, *D*, *S. Giovanni*, 1197 novembre 13.

[7] ASDL, AAL, *D*, * G 22, † N 62, * H 99, * K 35 (ed. *Chartae Latinae Antiquiores*, v. 79, n. 21; v. 80, n. 26; v. 81, n. 20; v. 85, n. 21), * H 71, * O 24, † O 34, † O 72 (ed. Manaresi 1955-1960, nn. 141, 340, 376, 395, 406), ACB, *D*, Z 227 (ed. Volpini 1975, n. 39); ASDP, AAP, *D*, 171-172 (ed. Ghignoli 2006, nn. 174-175), ACP, *D*, 8 (ed. Volpini 1975, n. 10). Per un'utile rassegna degli atti di placito per destinatari toscani si veda Bougard 2013b. Cfr. anche il placito per il vescovato di Reggio (ed. Manaresi 1955-1960, n. 152).

Le *laubiae* cominciano a essere attestate dalla metà del secolo IX, durante il regno di Lotario I, nelle notizie di placito. Le menzioni crescono significativamente di numero nel X secolo e nell'XI sono ricordate anche quale luogo di rogazione di atti privati. Si trovano in tutte le strutture poste nella sfera pubblica, che incarnavano appunto il *palatium*, e laddove risiedevano le autorità maggiori, dotate di *potestas* coercitiva: il sacro palazzo pavese, il palazzo presso S. Pietro a Roma, le *curtes* ducali, comitali, poi anche vescovili e delle grandi abbazie regie, sia in città, sia sul territorio rurale. Si prenda il caso di Bellano, *curtis* di S. Ambrogio di Milano sulle rive del lago di Lecco (luglio 905). Una *laubia* poteva essere associata a una sala o, nel caso della residenza arcivescovile di Piacenza (30 settembre 990), anche a una torre (Miller 2000, pp. 62-64); in genere era solariata e fungeva da collegamento fra più ambienti, attraversando un cortile o giardino alberato (*brolium*). Di solito i palazzi ne avevano più d'una. Nelle fonti si aggiunsero, perciò, delle specificazioni: sono ricordate così una *laubia maiore*, *rotunda* o di forma allungata a mo' di galleria, come la *laubia longanea* lucchese[8]. Non sappiamo quanto tali strutture fossero diffuse nel regno italico nel periodo precedente alla loro comparsa documentaria nei placiti al tempo di Lotario I: il quadro è pesantemente condizionato dalla struttura delle fonti. Per restare alla situazione lucchese, come detto, non si hanno menzioni della *curtis* ducale prima della metà del IX secolo, quando gli atti giudiziari si fanno numericamente consistenti e più dettagliati nell'indicare i luoghi di riunione, e sconosciuta è la data di costruzione delle sue logge: la *longanea* è attestata una prima volta al tempo di re Ugo di Provenza (25 marzo 941)[9]. Non a caso, dato lo sbilanciamento delle carte sul versante episcopale, compare prima la *laubia* situata nel *brolium* presso le mura della chiesa matrice di S. Martino (19 maggio 902)[10].

Solo un breve cenno sul possibile ruolo della *laubia* nell'iconografia del potere altomedievale, tema che meriterebbe un approfondimento specifico. Consapevole della difficoltà di identificare precisi elementi architettonici nei contesti miniati e artistici in genere, strutture assimilabili a logge si ritrovano in molte raffigurazioni di età carolingia e ottoniana che contribuiscono alla costruzione dell'immagine tipica del sovrano altomedievale: assiso in trono con gli attributi del comando o nell'atto di far giustizia, circondato dal suo seguito aristocratico in armi, talvolta posto in rispecchiamento con Cristo giudice, seduto e accerchiato dalle sue schiere. Esempio emblematico e denso di significato è l'illustrazione apposta al salmo 51 di Davide, che ricorda i cattivi consigli portati a re Saul da Doeg l'Idumeo, nel salterio di Utrecht (*Cod. Rhenotraiectinae I, 32*, fol. 30r), prodotto a Reims al tempo dell'arcivescovo Ebbone o del suo successore Incmaro, in un ambiente che ben conosceva la corte e le sue insidie: ambedue furono coinvolti nelle lotte di palazzo che turbarono gli ultimi anni di Ludovico il Pio (Jaski 2016). Il sovrano ascolta le accuse che portano all'uccisione del sacerdote Achimelech e della sua famiglia, colpevole di avere fornito rifugio a Davide, posto di fronte a una struttura allungata con timpano e colonne che rimanda a una *laubia* palaziale, circondato dai suoi consiglieri: tanto costoro quanto il delatore sono abbigliati e armati secondo la classica foggia militare dell'aristocrazia altomedievale, con una spilla a fissare sulla clavicola il mantello e la lancia in mano. Davide, destinato a prendere il posto di Saul come nuovo re, con in un mano un rasoio, metafora per la lingua affilata di Doeg, si rivolge alla corte celeste, raffigurata specularmente a quella terrena (*fig.* 2).

Nella loggia, a dispetto della cornice ideologica e retorica moralizzante promossa dai grandi intellettuali dell'età carolingia, che mirava a presentare il sovrano come vicario di Cristo, responsabile della *correctio* e della salvezza dei suoi sudditi, non sempre regnava la giustizia: la cerchia che abitava il palazzo e assisteva l'autorità al placito nelle decisioni, in una società sempre più gerarchizzata e polarizzata in *pauperes* e *potentes*, spesso mirava all'interesse proprio, di amici e clienti, anziché al bene comune (Devroey 2006; De Jong 2009; Wickham 2009). L'imperatore, se voleva restare sul trono e non seguire il destino di Saul bensì quello di Davide, doveva ascoltare i giusti consiglieri – verrebbe da pensare lo stesso arcivescovo di Reims –, conformandosi all'insegnamento delle Sacre Scritture. Il lato oscuro della *laubia*, ricordato dall'inglese lobby, getta, d'altro canto, ancora oggi la sua lunga ombra.

3.2 *Fonti archeologiche: qualche dato preliminare*

Sposto ora l'attenzione sulle altre fonti materiali di origine lucchese – quelle non scritte – che riguardano la corte pubblica suburbana. Le evidenze disponibili sono scarse. L'esiguità dei dati archeologici sul palazzo marchionale di Lucca riflette lo stato della ricerca in Italia sull'archeologia delle sedi del potere che, come ha recentemente rimarcato Ghislaine Noyé, si trova ancora un poco in ritardo rispetto a Francia e Germania, dove da almeno due decenni sono stati avviati progetti d'indagine su larga scala delle residenze palaziali, sia urbane che rurali (Renoux 2001; Ehlers 2002; Noyé 2012). Ciò appare evidente scorrendo la lista dei partecipanti al colloquio di Istanbul dedicato al tema dei palazzi con un approccio comparativo e di lunga diacronia, di fresca pubblicazione (Featherstone *et al.* 2015). La situazione italiana si caratterizza, in particolare, per la precipua attenzione riservata ai contesti urbani: nell'ultimo quindicennio su questo filone di studi si sono collocate anzitutto le ricerche di Andrea Augenti ed Enrico Cirelli, dedicate ai *palatia* di Roma e Ravenna (Augenti 1996; Cirelli 2008).

A Lucca negli ultimissimi anni alcuni scavi di emergenza e interventi preventivi guidati da Giulio Ciampoltrini ed Elisabetta Abela nel settore sud-occidentale della città, compreso fra le antiche mura altomedievali e la cinta moderna, hanno portato alla luce dei dati. Le aree indagate si situano all'angolo fra Piazzale Verdi e Via San Paolino, davanti alla chiesa del Crocifisso dei Bianchi e dentro l'ex Manifattura Tabacchi, nella zona del chiostro del convento di S. Domenico. Sono qui emerse sepolture riconducibili forse a un'estesa area cimiteriale sviluppatasi fra VI e VII secolo e strutture altomedievali a ciottoli e bozzette lapidee possibilmente riferibili ad ambienti del palazzo (Ciampoltrini 2011, pp. 54-55, fig. 52; Abela *et al.* 2015, pp. 77-78). Romano Silva aveva, inoltre, già segnalato la possibile afferenza alle *laubiae* della residenza marchionale di un capitello a stampella reimpiegato alla fine del Cinquecento in un edificio vicino alla chiesa del Crocifisso dei Bianchi che, per iconografia ed esecuzione, appare databile all'VIII-IX secolo (Seidel, Silva 2007, fig. 208). Con la speranza recondita di poter in futuro disporre di risultati provenienti da uno scavo più estensivo, queste tracce, ancora frammentarie ed episodiche, confermano, tuttavia, la rilevanza del complesso, aprendo uno spiraglio sul suo possibile utilizzo in età gota e longobarda come residenza ducale, e il suo potenziale archeologico: lo smantellamento delle strutture palaziali intorno al 1080 potrebbe, d'altra parte, costituire un evento datante e 'congelante' del deposito.

[8] Si veda il seguente campione documentario: Manaresi 1955-1960, nn. 67 (Milano), 99, 107 (Piacenza), 111 (Roma), 117 (Bellano, Lecco), 122 (Pavia), 125 (Verona), 141 (Lucca), 181, 212 (Piacenza). Oltre alla loggia, anche il *solarium* può essere considerato un elemento caratteristico della topografia del potere in età carolingia, cfr. Bianchi 2012; Hodges 2016.

[9] ASDL, AAL, *D*, * H 71 (ed. Manaresi 1955-1960, n. 141).

[10] ASDL, AAL, *D*, † N 54, * H 40 (ed. Manaresi 1955-1960, n. 116).

3.3 Antapodosis*: una ricchezza sconfinata*

Per arricchire il quadro conoscitivo è necessario allora volgere lo sguardo fuori da Lucca, in cerca di altre testimonianze. Famosa è la descrizione che fa della corte lucchese uno dei 'capolavori' della letteratura mediolatina del secolo X: l'*Antapodosis* di Liutprando, vescovo di Cremona. Il presule fornisce un esemplare ritratto del palazzo quando narra del passaggio da Lucca di Ludovico III (*Antapodosis*: II, 38-39). L'episodio può essere collocato intorno all'anno 900, nel frangente in cui il sovrano, chiamato nel regno italico dal marchese di Tuscia Adalberto II e dalla moglie Berta, di ascendenza carolingia, si stava dirigendo a Roma per cingere la corona imperiale. Il racconto di Liutprando, redatto a circa mezzo secolo di distanza dall'evento, pone l'accento sull'onore (*dignitas*) e la ricchezza del marchese, sulla magnificenza e lo sfarzo della sua residenza (*domus*) a Lucca, affollata di aristocratici riccamente armati (*milites elegantes*). La potenza di Adalberto era tale che costui, nelle parole dello stesso Liutprando, solo fra i *principes* del regno era soprannominato *Dives* (*Antapodosis*: I, 40). La proverbiale opulenza della corte susciterebbe l'invidia del futuro imperatore, condensata nella frase «costui (*scil*. Adalberto) dovrebbe essere chiamato re, anziché marchese: non c'è nulla in cui mi sia inferiore, se non soltanto nel titolo» (*Antapodosis*: II, 39). I palazzi, si sa, hanno mille orecchie. Benché pronunciate sommessamente, le parole sarebbero giunte alla scaltra Berta, portando alla rottura dell'alleanza (*fidelitas*) fra Adalberto e Ludovico. Due luoghi comuni sono utilizzati così dal vescovo per spiegare il disfacimento dell'asse politico che sosteneva il sovrano e la sua conseguente caduta.

Per comprendere appieno il passo è utile riferirsi allo studio di lessicografia politica e sociale condotto da Germana Gandino sull'intera opera di Liutprando. Adalberto incarna il *potens* e *dives* per antonomasia. In Liutprando, il primo termine ha sempre valore di attributo e non è mai sostantivato. Costituisce una qualità dei laici che detenevano un ufficio pubblico ed è utilizzato per personaggi del recente passato, come il marchese: fra i contemporanei si attaglia solo all'imperatore Ottone I, 'mecenate' di Liutprando. La *praepotentia* di Adalberto si dispiega visivamente nel decoro straordinario della sua dimora, nella presenza di un foltissimo seguito armato dispendiosamente mantenuto (in accordo con la Gandino ritengo sia questa la giusta sfumatura con cui sciogliere l'espressione *milites elegantes*), nell'osservanza di uno stile di vita smodato, più che adeguato alla sua carica. Il potere poteva essere misurato esteriormente osservando vesti, armature e ornamenti preziosi, strumenti di distinzione sociale e finanche di riconoscimento personale, che erano oggetto di ostentazione e dono a palazzo[11]. Nelle loro eleganti dimore i grandi aristocratici che si muovevano nella sfera pubblica, secondo l'*habitus* di corte, fornivano ospitalità ed elargivano doni ad *amici* e *milites*, giacché la ricchezza, è questo un nodo importante, doveva essere detenuta con munificenza e socializzata (Gandino 1995, pp. 81-89). Per tornare alla narrazione di Liutprando, a generare invidia e preoccupazione in Ludovico non è la qualità delle cose che vede a Lucca, consone a un *princeps* del regno, ma la loro quantità, giudicata fuori misura.

È questa l'unica menzione di Lucca nell'*Antapodosis*. A ben vedere, la città e il suo palazzo compaiono nel passo in maniera metonimica: Ludovico, dopo aver preso il potere a Pavia e visitato tutta l'Italia, sta a dire la porzione settentrionale del regno, vuole vedere anche la Tuscia: recarsi alla *domus* suburbana di Adalberto significa visitare la regione (*Antapodosis*: II, 38). Nell'opera la Tuscia è spesso definita *provincia*: costituisce cioè un distretto percepito come qualcosa di altro dal regno, dotato di una propria e peculiare fisionomia (Gandino 1995, pp. 252-253). In quanto sede dell'ufficio comitale dei primi esponenti della dinastia adalbertina, eredi della tradizione ducale di età longobarda, Lucca è il cuore di questo organismo politico-territoriale. La centralità lucchese emerge anche dall'episodio appena analizzato: per Liutprando il palazzo di Lucca è la Tuscia. Questa ferma asserzione mal si concilia, tuttavia, con la lettura tradizionale data a un altro passo della stessa opera (*Antapodosis*: III, 16). La narrazione della venuta in Italia di un altro principe provenzale, Ugo, nel corso dell'anno 926, ha il seguente tenore: Ugo, conte di Arles, attraversa velocemente il mar Tirreno con il favore divino, che fa spirare venti favorevoli, e sbarca ad Alfea, «hoc est Pisam, quae est Tusciae prouinciae caput». Tale identità è subito ribadita da Liutprando mediante una diretta citazione virgiliana (*Aeneis*: X, 179): «Alpheae ab origine Pisae».

La storiografia, pressoché senza eccezioni, ha tradotto il termine *caput* con città principale, spesso in modo da esaltare il ruolo emergente della città di Pisa nel X secolo grazie alla sua proiezione marittima, in consonanza dunque con i toni trionfalistici ed encomiastici delle fonti narrative pisane del secolo XII, e da sottolinearne la precoce dinamica antagonistica con Lucca, antica 'capitale' della marca finalisticamente destinata, nella grande narrazione del Medioevo toscano, ad essere affiancata e poi superata dalle più attive Pisa e Firenze (Salvatori 2002, p. 25; Savigni 2005, p. 689). Secondo Andrea Puglia l'espressione sarebbe, ad esempio, funzionale a nobilitare la città, importante scalo mediterraneo, perché sede preferita dal futuro sovrano per il suo sbarco e incontro con i maggiorenti del regno. Ciò sarebbe avvenuto in contrapposizione a Lucca, più strettamente controllata dal marchese Guido (Puglia 2002, pp. 684-685). Non v'è, tuttavia, motivo di dubitare né del pieno controllo marchionale su Pisa, principale porto toscano, né, in quel frangente, del sostegno del marchese a Ugo, suo fratello uterino (Chiesa 2015, p. 472).

Liutprando non si contraddice. L'incoerenza dei due passaggi dell'*Antapodosis* è, a mio avviso, solo apparente. Le difficoltà sono, infatti, superate se, da un lato, si osserva il racconto dello sbarco di Ugo alla luce del modello letterario cui esplicitamente s'ispira; dall'altro, pensando ai tanti possibili significati del versatile vocabolo *caput*. Già Reginald Grégoire, in margine a una ricerca su altro argomento, giustificava l'espressione con l'antichità della città di Pisa e il riferimento a Virgilio (Grégoire 1990, p. 2). Benché Liutprando utilizzi poco prima lo stesso termine per Pavia nell'accezione di città principale del regno (*Antapodosis*: III, 8), qui sta più probabilmente per principio, punto di origine in senso geografico – per mare è la via d'accesso privilegiata alla regione – e, ancor più, genealogico. Così è inteso nei versi dell'Eneide dedicati al dio del fiume Tevere (*Aeneis*: VIII, 65) e, soprattutto, a Mantova, patria virgiliana fondata da Ocno, di sangue etrusco-tebano (*Aeneis*: X, 203). Proprio quest'ultimo passo si trova insieme ai versi su Alfea in una rassegna delle gloriose città cui appartengono gli alleati di Enea nello scontro finale contro Turno. Il racconto di Liutprando insiste appunto sulla genesi mitica di Pisa e sulla sua epica vetustà, di virgiliana memoria[12]: non vuole avvalorarne un supposto primato politico in Tuscia, piuttosto ricordare l'insigne passato del luogo da cui partì l'avventura italiana di Ugo, alla cui corte in gioventù lo stesso autore aveva servito (Giovini 1997, pp. 108-118).

[11] *Antapodosis*: I, 23, II, 62, IV, 12. Cfr. *Waltharius*: vv. 308-311, 555-558, 1269-1272.

[12] Sulle origini mitiche e l'eredità antica della città di Pisa cfr. Campopiano 2005; Meo 2014.

3.4 Ruodlieb*: il sogno a occhi aperti di ogni cavaliere di corte*

Uno squarcio inedito sul mondo di corte lucchese e sulla sua esemplarità nel panorama 'europeo', giunge dirigendo lo sguardo ancora più lontano, di là delle Alpi. Il *Ruodlieb* è un poema composto nel pieno secolo XI in esametri leonini che prende nome dall'eroe della storia narrata. L'opera, frammentaria, fu riscoperta all'inizio dell'Ottocento su pergamene recuperate da legatura di codici dell'abbazia imperiale di Tegernsee, in particolare il *Cod. Lat. Monacensis 1946*, che contiene anche alcuni interessanti indovinelli ed epigrammi. Il testo fu probabilmente prodotto nello stesso monastero bavarese, rifondato da Ottone II e pienamente inserito nell'orbita palaziale. Considerato il primo romanzo in versi dell'Europa medievale, è stato visto spesso come il precursore della narrativa cortese-cavalleresca: vi sono, tuttavia, fondati elementi per ritenere che il *Ruodlieb* non descriva l'alba di un'età nuova, bensì il tramonto del mondo altomedievale e pubblico; per dirla con Chris Wickham, l'estinguersi de "l'eredità di Roma" (Wickham 2009).

Parto da alcune osservazioni già esposte, nel 2003, dal suo editore Roberto Gamberini. Benché lo studioso nel sottotitolo definisca Ruodlieb il «primo eroe cortese», nell'introduzione al volume nota come il poema sia un fenomeno isolato: non c'è continuità, ma un deciso stacco con la tradizione successiva (Gamberini 2003). Come ha fatto, fra gli altri, Dennis Kratz, è forse più utile cercare dei paralleli con i poemi epici dei due secoli precedenti, su tutti il *Waltharius*, il cui contesto di produzione è stato di recente oggetto di un approfondito studio da parte di Anne-Marie Turcan-Verkerk, e i *Gesta Ottonis imperatoris* di Roswitha, canonichessa dell'abbazia imperiale di Gandersheim (Kratz 1977, 1987; Turcan-Verkerk 2016). Rispetto al romanzo cortese-cavalleresco persistono, inoltre, sostanziali differenze tematiche (Gamberini 2003). Con un tipico espediente della poesia eroica, la sapiente miscela d'idealismo e realismo, l'autore vuole collocare le gesta leggendarie del protagonista su uno sfondo di verosimiglianza per conferire al racconto forza di *exemplum*. Il mondo descritto dal *Ruodlieb* è abbastanza diverso da quello ritratto dai romanzi del ciclo cavalleresco. Il protagonista eponimo non si dedica primariamente alla guerra, ma è presentato come operatore di pace per conto del re con cui collabora, di cui condivide i valori e riproduce i modelli. Ruodlieb e il suo re, esplicitamente definito vicario di Cristo (*Ruodlieb*: IV, 154), seguono la stessa etica, improntata a ospitalità, generosità e clemenza, onore e fedeltà, con l'obiettivo di portare armonia e pace. Seguendo lo *speculum principis* offerto dal buon re cristiano, il cavaliere può così compiere il suo destino e coronare una parabola esistenziale tutta circoscritta entro la cornice pubblica, divenendo re a sua volta. Il poema presenta un'immagine armonica della società: al vertice sta il sovrano; la Chiesa è a lui solidale e costituisce quasi un 'apparato dello stato'; i gruppi differenziati, anche la piccola élite rurale, riproducono in piccolo una corte regale. Grandissima attenzione è data nella narrazione non tanto alle scene di battaglia, bensì ai cerimoniali solenni: arrivi e partenze, risvegli e vestizioni, banchetti e assemblee. Largo spazio è dato, poi, alle forme del dono, strumento di connessione sociale e politica basato sul principio di reciprocità, nelle tre diverse fasi del circuito maussiano: dare, ricevere, ricambiare. Più in generale, la vita è scandita da momenti pubblici: assembleari e conviviali. L'autore mostra in questi passaggi, arricchiti da descrizioni particolareggiate di oggetti donati e sfoggiati, una diretta conoscenza dei rituali di corte.

Negli ultimi due decenni del secolo scorso Karl Leyser e Timothy Reuter hanno ampiamente fatto ricorso al poema considerandolo una fonte decisiva per la comprensione della società e dei suoi modelli di rappresentazione nei secoli X e XI (Leyser 1982; Reuter 1991, pp. 221-229). Del *Ruodlieb* si sono serviti più recentemente altri medievisti, tutti di lingua tedesca (Weinfurter 1991, p. 85; Althoff 1997a, p. 144; Id. 1997b, p. 293; Id. 2003, p. 106; Wolfram 2000). Ne esce un quadro coerente che è possibile così sintetizzare. Prodotto entro la cerchia di palazzo da un soggetto che ben conosceva le *Spielregeln* della corte imperiale, esso offrirebbe uno spaccato sullo stile di vita e la mentalità aristocratica al tempo degli Ottoni e dei primi due Salii, mostrando da un lato la cornice ideologica che garantì consenso e legittimità al potere imperiale; dall'altro, le preoccupazioni e i sogni a occhi aperti dei *milites*. Più che proiettarla in avanti verso i secoli centrali del Medioevo, essa può essere utilizzata in chiave retrospettiva. Non poche sono le similitudini individuate fra episodi narrati nel *Ruodlieb* e note vicende della storia politica ottoniana, tramandate da altre testimonianze. Centrali sono l'ideale della pace e l'invito alla moderazione nell'esercizio di *potestas*: principi molti cari all'*entourage* di Enrico III. Sotto la vernice retorica di corte, palpabile è lo sforzo del sovrano di armonizzare una società sempre più violenta e riottosa, segnata dalla prepotenza dei grandi, fra loro in lotta per il potere. Solo qualche cenno sui lineamenti principali del profilo aristocratico emersi dalle riflessioni sul *Ruodlieb*: il poema attribuisce grande importanza all'*habitus* piuttosto che ai natali. *Nobiles* si nasce, ma ancor più lo si dimostra ogni giorno: con la condotta onorevole, il servizio a corte, la magnificenza e la munificenza. Quanto alle strutture familiari, sono state poste in rilievo dagli studiosi la fragilità dei meccanismi di trasmissione ereditaria, oggetto di contrattazione politica, e il protagonismo delle figure femminili, nel ruolo di mogli e di madri.

L'utilizzo di questa fonte, come detto, è rimasto in larga parte confinato, oltre che agli studi filologici e di storia della letteratura mediolatina, alla medievistica di area tedesca o, comunque, dedicata al regno teutonico. La corte presso cui Ruodlieb fa fortuna, ubicata in una favolosa e utopica Africa (*Ruodlieb*: XIII, 42, 47; XVI, 5), la "terra dell'oro" medievale *par excellence* (Insoll 2003), costituisce però un'immagine esemplare, un idealtipo cui la Tuscia, con le sue peculiari caratteristiche, può essere più di altri luoghi ricondotta. Al tempo della composizione del *Ruodlieb* la marca, retta dai Canossa-Lorena, si distingueva quale regione dove effettivamente c'era un'autorità che governava ancora con efficacia secondo forme 'tradizionali' e pubbliche. Del resto, essa era inserita nella stessa più ampia cornice politico-istituzionale dell'abbazia di Tegernsee: l'impero. La rottura fra la contessa Beatrice, madre di Matilde, ed Enrico III, mai realmente ricucita, si consumò negli anni Cinquanta del secolo XI (Ronzani 2012). Non si tratta solo di sfumate similitudini. Il modello generale presentato nel poema di una realtà politica e sociale incentrata su una splendida corte perfettamente funzionante, trova in due passaggi dei precisi punti di contatto con Lucca e la Tuscia marchionale: in un caso, il richiamo si fa esplicito.

Il protagonista Ruodlieb è un cavaliere (*miles*), *nobilis* per nascita e per costumi, che si pone al servizio di altri notabili (*domini*) più potenti per ricavarne *beneficia* e *honores*: potere e prestigio. Egli fornisce in prima battuta aiuto nelle faide, nella caccia e consiglio negli affari. Poiché non ha ricevuto dai suoi patroni quanto avrebbe meritato e si è procurato molte inimicizie per il suo servizio, è costretto ad allontanarsi dalla sua dimora (*domus*), affidandola alle cure della madre, sperando di trovare altrove qualcuno di potente e più generoso da servire. Giunto in terra straniera, diventa compagno di viaggio e stringe amicizia con il cacciatore regio, grazie al quale può presentarsi alla corte del re degli Africani. Il sovrano accetta i suoi doni e lo accoglie

nella sua clientela, che remunera senza misura (*Ruodlieb*: I). Noto, per inciso, come i rapporti con il cacciatore e il re siano basati sulla reciprocità, simboleggiata da strette di mani, scambio di baci e/o di doni, e non colorati di una sfumatura prettamente feudo-vassallatica: piuttosto, l'autore attinge al lessico dell'amicizia, della *societas*, della clientela.

A corte Ruodlieb trova così l''Eldorado' di ogni *miles elegans*: riesce a conquistarsi il favore del re, generoso e giusto, distinguendosi e servendolo fedelmente dapprima come pescatore e cacciatore, poi come comandante e ambasciatore (*Ruodlieb*: II-IV). Dopo dieci anni di onorato servizio decide di tornare a casa, richiesto in patria dagli antichi *domini* e dalla madre. Al momento del commiato il re degli Africani dispensa consigli e consegna al cavaliere preziosissimi doni – in ossequio al senso etimologico del termine italiano e spagnolo regalo –, che sono minutamente descritti (*Ruodlieb*: V, 308-391). L'elencazione, uno dei passi in cui l'autore dà sfoggio delle sue frequentazioni di alto bordo, ha consentito agli studiosi di circoscrivere la datazione del poema. Nascosti all'interno di recipienti d'argento, Ruodlieb riceve monete bizantine, riconducibili al conio dell'imperatore Romano III (1028-1034) la cui figlia fu promessa sposa a Enrico III, fibule e gioielli di foggia particolare. Le une e gli altri – per le spille si può parlare di stretta analogia piuttosto che di esatta corrispondenza – sono state trovate nel tesoro di Magonza dell'imperatrice Gisella (1027-1043), madre dello stesso Enrico III (Gamberini 2003). Ebbene, questi oggetti si rintracciano nei medesimi decenni a Lucca e in Tuscia, grazie a fonti archeologiche e documentarie.

Nelle Colline Metallifere grossetane lo scavo della canonica di S. Nicolò di Montieri, edificata probabilmente su terra fiscale nel primo quarantennio del secolo XI, ha restituito un oggetto straordinario, recentemente studiato da John Mitchell. Si tratta di una grande e sontuosa fibula d'oro a disco, decorata in filigrana e impreziosita da un granato, ametiste e perle di vetro opaco. Essa fu deposta in una buca tagliata dallo strato dove furono poi elevate le fondazioni dell'edificio, che presenta un'originalissima pianta esapetala. La fibula di Montieri è un oggetto di pregevole fattura, prodotto per committenti di alto livello sociale, e trova numerosi confronti nelle fonti iconografiche. Spille del genere connotano le massime sfere del potere, laiche ed ecclesiastiche, nella Germania e Italia tardo-ottoniana e salica: si trovano in molte raffigurazioni sia maschili, sia femminili. Nel caso degli uomini le fibule fissano il mantello sulla clavicola destra, nelle figure femminili lo chiudono sotto il mento per non scoprire il petto. Limitati, sono però i manufatti conservati a essa paragonabili per dimensioni e qualità. Il primo raffronto è appunto la grande fibula del tesoro di Magonza: monile realizzato per la corte imperiale nei primi decenni del secolo XI (Bianchi *et al.* 2014).

Da questa data in avanti per circa un secolo e mezzo, fibule e altri oggetti d'oro e d'argento (recipienti e calici, matrici sigillari, gioielli), armi e capi di vestiario, compaiono in gran numero anche nelle carte private toscane, soprattutto lucchesi e pisane. Essi rappresentavano in molti casi un contro-dono obbligatorio (*launegild*): nel diritto longobardo, un bene mobile di valore utilizzato per corroborare legalmente atti di donazione, dal momento che ogni transazione doveva essere contrassegnata da un tratto di reciprocità. Su ciò è tornato di recente Chris Wickham. Nei primissimi anni del secolo XI all'improvviso questi oggetti (*species*) godono di ottima visibilità documentaria poiché sono utilizzati come strumento di remunerazione (*meritum*) anche per gli atti di vendita, oltre che per donazioni, promesse, refute e investiture. Tale aspetto è stato studiato ormai diversi decenni orsono da David Herlihy e Gabriella Garzella, con risultati non concordi, e meriterebbe di essere approfondito in considerazione della vasta diffusione del fenomeno (Herlihy 1957, 1973; Garzella 1979; Wickham 2010). A Lucca, ad esempio, pressoché il 90% delle vendite del secolo XI vede l'utilizzo di *species* in vece della moneta – la prima menzione è dell'8 marzo 1002[13]. In questa sede mi limito a compiere alcune preliminari considerazioni, alla luce del confronto con il *Ruodlieb* e i dati archeologici provenienti dalla canonica di S. Nicolò.

L'uso di manufatti in oro e argento nelle transazioni per siglare relazioni socio-politiche ed economiche, richiama le pratiche di corte modellizzate nel poema. Vi sono evidenti corrispondenze fra gli oggetti donati al cavaliere dal re degli Africani e quelli che compaiono a Lucca come strumenti remuneratori nelle carte: in particolare, spille (*nuscae*) e bisanti d'oro. Questi ultimi sono attestati, peraltro, come *meritum* in un atto di giustizia della contessa Matilde, rogato presso la *curtis* marchionale di Pappiana il 21 giugno 1077[14]. Nel corso del secolo XI tali oggetti avevano in Tuscia ampia circolazione, ma si concentravano soprattutto a palazzo: presso le *curtes* marchionali, urbane e rurali, erano redistribuiti e sfoggiati. La stessa fibula di Montieri rimanda a un'ostentazione smaccata di status e potere in un contesto pubblico. La sua deposizione costituì un momento importante del rituale di edificazione della canonica, eretta su suolo fiscale probabilmente con un'operazione congiunta dal marchese e dal vescovo di Volterra Gunfredo, vicino alla corte imperiale (Collavini, Paganelli, Tomei c.s.). La fibula potrebbe aver siglato come *launegild* l'atto di dotazione, legittimando un rapporto che toccava la sfera ultraterrena. Benché il rituale di consegna e deposizione del gioiello sfugge nella sua puntuale composizione, si tratta, a ben vedere, di un *Inszenierung* che presenta retaggi antichi. Nel caso della canonica di S. Nicolò, l'offerta e plateale rinuncia a un oggetto prezioso, dal grande valore sociale ed economico, costituisce il punto di congiunzione fra due successivi modi di esprimere pubblicamente eminenza in rapporto all'aldilà: la sepoltura con corredo sostituita, dal primo secolo VIII nel regno longobardo, dalla fondazione e dotazione *pro anima* di enti ecclesiastici e monastici (Innes 2000; Bougard, La Rocca, Le Jan 2005; Collavini 2007).

Riprendo il filo della storia narrata dal poema. Carico di regali, Ruodlieb si mette in cammino salutando l'amico cacciatore. Dopo la morte di un nuovo compagno di viaggio dai capelli rossi, che ha preso a cavalcare con lui contravvenendo però sistematicamente a tutti i consigli del re, incontra per caso il nipote, con cui prosegue il percorso (*Ruodlieb*: VI-IX). I due cavalieri ottengono allora ospitalità alla residenza di una *domina*, dove fanno sfoggio di un ricercato abbigliamento (*Ruodlieb*: X, 113-122). È questa una delle frequentissime descrizioni di vesti, strumenti e accessori nell'opera, inserite per conferire un tocco di realismo alla vicenda epica. Le gambe di Ruodlieb, si dice, sono fasciate da bende di Lucca («ligaminibus de Lukka»), i piedi calzati da scarpette di seta («calceolos sericatos») allacciate con stringhe a loro volta di seta («corrigiis … sericosis»).

Il poema fa quindi esplicita menzione di un manufatto tanto famoso e diffuso fra i cavalieri dell'impero da essere nel pieno XI secolo un 'prodotto tipico' di Lucca, che ben si confà

[13] Nell'arco cronologico che va dal 1000 al 1096, su 269 carte di vendita ben 241 hanno *meritum* (il valore oltrepassa l'89%). Se restringiamo la forbice agli ultimi tre quarti del secolo, la percentuale aumenta sino a superare il 92% (225 su 244 atti). L'approssimazione è per difetto: i calcoli non tengono conto di due vendite di datazione incerta, ma con buona certezza collocabile nel secolo XI.

[14] ASDL, AAL, *D*, † C 15 (ed. Goez, Goez 1998, n. 22). Circa l'utilizzo di *nuscae* d'oro, si vedano ad esempio, ASDL, ACL, *D*, E 42, E 52 (ed. Guidi, Parenti 1910-1939, nn. 80, 97); ASL, *D*, *S. Ponziano*, 1012 dicembre 21 (ed. Degli Azzi Vitelleschi 1903-1911, n. 35).

a un *miles elegans* che ha servito alla corte perfetta del re degli Africani. Del resto, le capacità di tessere la seta si mantennero a Lucca in via eccezionale per il mondo germanico. La produzione lucchese, non potendo competere con quella orientale, si focalizzava sui gambali (*guindangassia*): un elemento caratteristico dell'abbigliamento aristocratico in Occidente, coprendo, dunque, una 'lacuna di mercato' (Tomei c.s.). Anche in questo caso il confronto con altre fonti documentarie dà esito positivo. I gambali di seta lucchesi sono noti da testimonianze grazie alle quali è stato possibile circoscrivere il loro contesto di produzione e circolazione. Le *guindangassia* sono ricordate in papiri romani del primo secolo VIII, ricopiati dal cardinale Deusdedit nella sua *Collectio Canonum* (ultimo quarto del secolo XI), e nelle carte lucchesi del secolo IX, quali accessori per vesti di seta intessuta con mohair sempre con riferimento al monastero di S. Pietro *in Cortina*, detto anche *Bellerifonsi*[15]. Con S. Maria *in Palatio*, esso costituiva uno degli enti ecclesiastici che cingeva, a mo' di corona, la *curtis* regia inframuranea. Soppiantata al volgere del secolo IX come residenza pubblica dal palazzo suburbano, come già ricordato, essa restò il polo artigianale, produttivo e commerciale della Lucca altomedievale. Qui sorgeva la zecca, compare il toponimo *Fisila* (da *pisele*, il gineceo per la tessitura), sono menzionati artigiani specializzati nella produzione di armi e punti dove era possibile comprare o cambiare oggetti e ottenere moneta (*stationes*, *mercata et banchae*)[16]. Le lavorazioni di vesti preziose, sovente impreziosite da fili d'oro e d'argento, e manufatti metallici di pregio, anch'essi riccamente decorati, si presentavano abbinate presso i luoghi di potere pubblici, dove si concentrava la domanda aristocratica: erano produzioni di lusso, in molti casi veicolate tramite i meccanismi del dono, utilizzate come strumento di remunerazione a vari livelli della società secondo pratiche ben diffuse a corte[17].

Il *Ruodlieb*, in conclusione, mostra di riflesso, tramite uno *speculum* esemplare, alcune dinamiche di funzionamento del palazzo lucchese e rimanda l'eco, così come l'*Antapodosis*, della sua proverbiale ricchezza. Il poema mette bene in luce il circuito di redistribuzione di beni mobili con cui era possibile ostentare pubblicamente uno status sociale di distinzione. Erano queste solo alcune delle risorse cui era possibile avere accesso gravitando nell'orbita pubblica. I manufatti di lusso prodotti e/o donati presso le corti fiscali, urbane e rurali, sotto le logge che ospitavano banchetti e assemblee di giustizia, spesso perfezionavano transazioni fondiarie con cui si stringevano relazioni di natura politica[18]. La principale fonte di ricchezza era la terra, di cui il marchese, principale rappresentante del *publicum* nella regione, conservò grandissima disponibilità. Il più importante sistema di circolazione di risorse dovette riguardare, pertanto, le estese proprietà fondiarie del fisco, dotate di castelli, torri e altre strutture di coordinamento e trasformazione, concesse però in Tuscia sotto forma di favori (*beneficia*) di per sé precari e revocabili, che lasciano labili tracce sul fronte documentario (Collavini c.s.). Gli altri flussi si appoggiavano e intersecavano con questo. Del resto, oro, argento e seta potevano giungere a Lucca anche grazie alla serie di vaste *curtes* fiscali del litorale maremmano, che includevano lagune dotate di punti di approdo. Con buona probabilità esse erano, inoltre, funzionali all'estrazione, lavorazione e approvvigionamento di materie prime locali che pertenevano alla sfera pubblica: in primo luogo, sale e ferro (Bianchi c.s.). Fu negli stessi decenni in cui fu vergato il poema che in Tuscia il mondo pubblico cominciò a tramontare. Andò così sfilacciandosi il tessuto connettivo che era stato capace per secoli di raccordare le diverse componenti del *palatium*. Su questa trama si erano mossi oggetti come la fibula di Montieri e personaggi alla Ruodlieb: eleganti cavalieri in vesti di seta che ambivano, servendo le autorità pubbliche, a innalzare la propria condizione sociale.

[15] ASDL, AAL, *D*, †† O 1, †† F 21 (ed. *Chartae Latinae Antiquiores*, v. 79, n. 5; v. 82, n. 40), †† N 65 (ed. Tomei 2012, p. 601); Wolf von Glanvell 1905, pp. 353-354.

[16] ASDL, AAL, *D*, * F 16, †† S 24 (ed. *Chartae Latinae Antiquiores*, v. 86, nn. 8-9), †† N 65 (ed. Tomei 2012, p. 590); Wolf von Glanvell 1905, pp. 353-354; Martin 2015, v. 3, n. 449.

[17] Per un interessante parallelo si vedano i laboratori della grande abbazia di S. Vincenzo al Volturno, pienamente inserita nella sfera pubblica, che producevano oggetti di prestigio per la propria clientela aristocratica, cfr. Hodges 2012, pp. 437-453.

[18] Per una suggestiva immagine di banchetto alla corte del re, imbandito con suppellettili preziose si veda *Walthariu*s: vv. 287-323. La scena si svolge in un'aula tappezzata di arazzi e nei vicini portici. Qui si consuma, nel racconto, il tradimento politico dell'eroe protagonista nei confronti del suo sovrano. Modello letterario di riferimento è ancora Virgilio, cfr. *Aeneis*: I, 637-642, 697-708.

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METALLI E MONETE NELLA TOSCANA MEDIEVALE: LE COLLINE METALLIFERE

1. INTRODUZIONE

Scopo di questo contributo è quello di illustrare alcune questioni alla base di uno dei settori portanti del nostro progetto ovvero quello imperniato sulle analisi metallurgiche applicate alle monete. Come è noto, si tratta di un filone di studi che negli ultimi decenni ha portato a risultati importanti[1], arrivando in alcuni casi a mettere in discussione dati che si potevano ritenere acquisiti, se non ovvi[2]. E il nostro caso potrebbe in effetti rientrare tra questi.

Vale la pena di notare che grazie al progetto nEU-Med si è potuto avviare anche per l'Italia medievale un programma di analisi sufficientemente articolato per iniziare a formulare alcune ipotesi sulla provenienza dei metalli monetati o, comunque, potenzialmente monetabili. Si sono usate queste diverse espressioni per accennare ad un problema sempre presente quando si affrontano questi temi, cioè quello del riciclo di riserve metalliche accumulate nel tempo sotto le forme più diverse. Al riguardo, ed in particolare per il Medioevo e l'area toscana, i lavori di David Herlihy e di Cinzio Violante furono pionieristici (Herlihy 1957; Violante 1986).

Questa parte del progetto vuole anche riprendere le fila di un discorso avviato anni fa nell'ambito di una ricerca internazionale condotta con numerosi amici e colleghi, alcuni dei quali ci hanno fatto il piacere di essere presenti al nostro seminario, che si proponeva di affrontare, tra i diversi problemi aperti, anche quello dell'identificazione delle fonti di approvvigionamento dell'argento nell'Europa carolingia (Sarah *et al.* 2008). È nostra speranza, e in continuità con quella esperienza, riuscire a rispondere ad alcuni dei quesiti rimasti allora aperti, in particolare riguardo alle coniazioni di zecca italiana (Rovelli 2004; Rovelli 2009a; Bianchi, Rovelli 2017).

In futuro ci auguriamo dunque di riprendere in esame anche l'età carolingia e di estendere la ricerca in modo da coprire tutto l'arco temporale interessato dal progetto (VII-XII secolo) ma, al momento, porteremo l'attenzione soprattutto sui primi risultati relativi ad un campione di denari databili al X-XI secolo, delle zecche di Pavia e Lucca. In particolare, le analisi si sono focalizzate su alcuni esemplari a nome di Ugo e Lotario II (2 esemplari), di Ottone (I-III), i cosiddetti *ottolini* (12 esemplari), di Ugo, marchese di Toscana (1 esemplare) e di Corrado II di Franconia (5 esemplari).

Motivi di natura diversa giustificano questa scelta iniziale. Innanzitutto, potevamo disporre di un campione relativamente consistente di esemplari grazie ai locali rinvenimenti archeologici e ad un piccolo lotto di *ottolini* da collezioni museali. Tra gli esemplari disponibili – e diversamente, come vedremo, dal quadro delineabile attraverso i rinvenimenti archeologici (Saccocci 2001-2002) – la zecca di Lucca è la più rappresentata. Il nostro campione è dunque sembrato utile per iniziare ad individuare le fasi iniziali dell'afflusso dell'argento delle Colline Metallifere alle zecche locali. Inoltre, la concomitante presenza di emissioni della zecca di Pavia offriva l'opportunità di verificare se le varie zecche regie avessero usufruito di diverse fonti di approvvigionamento.

Studi recenti hanno inoltre proposto una nuova convincente cronologia degli *ottolini* che, a differenza delle successive serie a nome di Enrico, sono dunque ben databili (Saccocci 2001-2002; *MEC*, 12, pp. 38-42). Sarà interessante, con il proseguire della ricerca, poter osservare l'evoluzione del contenuto intrinseco ed eventualmente contribuire a precisare le fasi delle emissioni a nome di Enrico della zecca di Lucca. Fino ad oggi, infatti, le ipotesi di classificazione di queste emissioni, che hanno un tipo immobilizzato con il monogramma di Enrico, si sono potute basare principalmente sull'analisi stilistica e lo studio delle diverse espressioni utilizzate nei documenti notarili per definire i denari richiesti nei pagamenti: *lucenses veteres, boni de argentum, rugi, de rigo* … (Matzke 1993).

Infine, e questo è il dato che ci ha convinto dell'opportunità di focalizzare la nostra attenzione sulle emissioni di età ottoniana e su quelle immediatamente precedenti o successive, bisogna ricordare che agli Ottoni (e più probabilmente ad Ottone I) è stata attribuita una sorta di riforma monetaria indirizzata a uniformare le emissioni delle zecche regie[3]. I tratti salienti di questa riforma della moneta, che si inserisce in una generale riforma dell'amministrazione del regno, sono noti grazie alle cosiddette *Honorantie civitatis Papie*, in particolare agli *Instituta regalia et ministeria camere regum Longobardorum*. Benché il testo giunto fino a noi sia databile all'XI secolo, si ritiene che la prima stesura delle *Honorantie* risalga proprio agli inizi dell'età ottoniana (Brühl, Violante 1983, pp. 80-84; Travaini 1989, pp. 223-232; Matzke 1993, pp. 138-143; *MEC*, 12, pp. 30-31).

Le disposizioni che ci interessano definiscono i compiti dei nove *magistri* della zecca di Pavia e dei quattro di Milano che dovevano vigilare in modo che i denari coniati nelle due zecche imperiali avessero un medesimo contenuto intrinseco, pari a 10/12 (*de pondere et argento de duodecim in decem*), cioè circa 833/1000. Questo dato, che sembra confermato da analisi distruttive compiute nel XIX secolo (Cipolla 1975, p. 18) ma non da quelle effettuate su alcuni *ottolini* presenti nei tesori di Le Puy (Lafaurie 1952) e Fécamp (Dumas 1991, pp. 604-607) sarà il punto di partenza per le analisi elementari che ci proponiamo di effettuare. Né la zecca di Lucca, né quella di Verona – quest'ultima, peraltro, inserita nel ducato di Baviera e dunque nel *Regnum teutonicum* (Matzke 1993, p. 138) – sono menzionate nelle *Honorantie* ma le diposizioni rivolte ai *magistri* di Pavia e Milano sembrano essere state recepite da entrambe, essendo entrambe, del resto, zecche regie. Sulla base di alcune analisi (a loro volta distruttive, ed effettuate nel XIX secolo) anche i denari di queste due zecche sembrano avere un titolo coerente con il testo delle *Honorantie*

* Desideriamo ringraziare in modo particolare il dott. Mario Iozzo e il dott. Fiorenzo Catalli che si sono operati per rendere disponibili alcuni esemplari appartenenti alle collezioni del Museo Archeologico Nazionale di Firenze, e i colleghi Stefano Campana, Federico Cantini e Marco Valenti che hanno diretto gli scavi da cui provengono molti dei materiali che costituiscono il nostro campione. La nostra gratitudine va inoltre alla dr.ssa Cristina Felici per l'assistenza durante le analisi delle monete conservate al Museo di San Giovanni d'Asso (Pava) e alla dott.ssa Beatrice Fatighenti per quelle eseguite al Museo di San Genesio (S. Miniato di Pisa).

[1] Sin dalla pubblicazione del volume *Methods of Chemical and Metallurgical Investigation of Ancient Coinage* (Hall, Metcalf 1972) e della serie *Metallurgy in Numismatics* (Metcalf, Oddy 1980; Oddy 1988; Archibald, Cowell 1993; Oddy, Cowell 1998) l'attenzione su questi temi è andata aumentando di pari passo con il perfezionamento dei metodi di indagine, cfr. Ponting 2012 e le bibliografie ragionate di Cowell 1986; Gilmore 1986; Oddy 1986a; Oddy 1986b; Stos-Gale 1986; Helly 1991; Barrandon, Guerra 1997; Cowell 2003; Blet-Lemarquand, Ponting 2009; Blet-Lemarquand, Nieto-Pelletier 2015.

[2] Sul ruolo dell'argento di Melle nell'approvvigionamento delle zecche dell'Aquitania, cfr. Barrandon, Dumas 1990: l'argento di Melle sembra aver alimentato solo alcune zecche dell'Aquitania e, inoltre, non sembra raggiungere le zecche di altre regioni franche.

[3] Herlihy 1957, pp. 6-7 considera le misure adottate (probabilmente) da Ottone I «one of the most important monetary reforms of medieval history»; cfr. inoltre Cipolla 1975, p. 18; Matzke 1993, p. 138; *MEC*, 12, pp. 30-31.

(circa 823/1000) (Travaini 1989, p. 228 e nota 12). Decisamente inferiore, invece, appare l'intrinseco dei denari a nome di Ottone III coniati a Venezia (Saccocci 2009, pp. 141-142 e note 21-23, analisi SEM/Eds.). In tutti i casi si tratta di esempi che attendono di essere inseriti in un campione più vasto.

Un dato che sembra invece indiscutibile è quello relativo al consistente aumento del volume delle emissioni avvenuto in età ottoniana. Gli *ottolini*, infatti, rappresentano un deciso cambiamento rispetto alle precedenti emissioni carolinge e costituiscono la prima serie monetale del *Regnum italicum* ad avere una circolazione ampiamente interregionale (Rovelli 2010, Saccocci 2013). Il problema dell'approvvigionamento del metallo è dunque centrale.

Al riguardo, ancora di recente Michael Matzke ha giustamente richiamato l'attenzione su un aspetto solo apparentemente ovvio, ossia sul fatto che una regolare e abbondante emissione monetaria non possa prescindere da una altrettanto regolare ed intensa attività mineraria, nonostante i possibili apporti di metallo di riciclo (Matzke 2011a, p. 271). Del resto, è questo il tema di fondo del grande libro di Peter Spufford che per primo ha seguito, in una dimensione europea, le molteplici diramazioni di quel lungo e tortuoso filo d'Arianna che ha legato gli sviluppi dell'economia medievale ai paralleli successi dell'attività mineraria (Spufford 1988, pp. 74-105). Da qui nasce l'interesse di quantificare la capacità estrattiva, di seguire i percorsi dell'argento appena estratto e, come si è accennato, di valutare il ruolo e la consistenza dello stock metallico preesistente, ovvero di quell'insieme eterogeneo, composto da monete vecchie o straniere, ma anche oggetti in argento – spesso frammentati – che le fonti tardo medievali chiamano *bolzone, bolsone* o *bolsonalia* (Finetti 1987, pp. 14-16 e nota 2; Baldasarri 2010, p. 69).

Fanno da corollario a questi temi i problemi sollevati dalla necessità di valutare il ruolo dei poteri locali nel controllo della produzione e del commercio dei metalli e, soprattutto, la capacità dell'amministrazione pubblica di gestire le risorse del sottosuolo e dunque, in definitiva, di approvvigionare le zecche[4]. Inutile insistere sull'interesse economico che derivava dal controllo della produzione dell'argento e sulla sua rilevanza politica, considerando i riflessi che la gestione di questa risorsa aveva su una delle più significative prerogative della autorità pubblica: ovvero la produzione di moneta (Matzke 2011b).

Soffermiamoci dunque, innanzitutto, sui problemi posti dai dati numismatici, dalle cesure e impennate visibili nelle collezioni museali e nei rinvenimenti archeologici. Diversi contributi hanno recentemente analizzato l'attività delle zecche e la circolazione monetaria nel periodo in esame, è sufficiente dunque ricordare gli elementi utili ad illustrare le premesse e i primi risultati delle ricerche in corso (Degasperi 2003; Rovelli 2010; Saccocci 2013).

Numerosi fattori rendono il caso toscano non solo un osservatorio privilegiato per quanto riguarda lo sviluppo delle attività minerarie, ma anche un esempio paradigmatico dei ritmi di sviluppo della moneta nell'Italia medievale. Lucca ebbe infatti un ruolo di primo piano tra le zecche dell'Italia longobarda (*MEC*, 1, pp. 55-73; Pardi 2003; Arslan 2011), pari se non superiore a quello di Pavia, capitale del regno (Rovelli 2015, p. 489); fu anche una delle poche rimaste attive in età carolingia seppure, sembrerebbe, in modo intermittente (Travaini 1989, p. 226; Matzke 1993, p. 138; Rovelli 2011). Infatti, per quanto riguarda la Toscana, Pisa e Pistoia, che erano state aperte in età longobarda, chiusero. Pisa riaprirà solo intorno alla metà del XII secolo (Baldassarri 2011, pp. 1027-1036), mentre Pistoia scomparve definitivamente (Villoresi 2011). La presenza di una zecca longobarda a Chiusi non fu totalmente esclusa da Philip Grierson (*MEC,* 1, tav. 7) ma in seguito l'ipotesi non è più stata discussa (Day, Travaini 2011).

Le emissioni di Lucca, che con Roma rimase l'unica zecca attiva nell'Italia centrale, sono attestate, come si è detto, grazie a pochi esemplari. Il *CNI* riporta solo alcuni denari di Carlo Magno 5 e un denaro per Ludovico il Pio (*CNI* XI, p. 60, n. 1, tav. IV, 19). Dopo Ludovico il Pio, le coniazioni lucchesi sembrano interrompersi per circa un secolo (l'attribuzione di un denaro agli anni di Lotario I è incerta[6]). Riprendono con Ugo di Provenza associato al figlio Lotario II (931-947) ma, sulla base dei dati oggi disponibili, sembrano essere ancora di un volume assai ridotto. Un solo esemplare è ricordato nel *Corpus nummorum italicorum* (*CNI* XI, p. 61, n. 1, tav. IV, 21) e i due presenti nel nostro campione, rinvenuti nello scavo di Vetricella, sono della zecca di Pavia. È solo nel corso della seconda metà del X secolo che l'attività della zecca assume ritmi più regolari, anche se il volume delle emissioni continua ad essere quantitativamente ridotto (Matzke 1993, pp. 138-143).

Ad oggi, gli scavi archeologici non hanno portato sostanziali modifiche al panorama che abbiamo finora delineato soprattutto a partire dagli esemplari presenti nelle collezioni museali. Nel 2013, le monete del *Regnum Italiae* rinvenute in Toscana erano circa 200, provenienti da 29 siti diversi. Di questi 200 pezzi, circa 160 appartengono a 5 tesori, mentre i cosiddetti *single finds* sono circa 40. Al periodo carolingio sono riconducibili solo 5 esemplari, alcuni dei quali da tombe. La quasi totalità dei rinvenimenti è composta da denari di X secolo, in massima parte a nome di Ottone. Come sottolinea Andrea Saccocci, l'arrivo dei Franchi e l'introduzione del denaro d'argento in sostituzione del tremisse aureo non sembrano avere avuto alcun impatto sulla circolazione monetaria che inizia ad aumentare solo con l'età ottoniana (Saccocci 2013, p. 30; Rovelli 2010).

In questo panorama, fondato su ricerche archeologiche che hanno interessato, seppur in modo diverso (scavi estensivi o prospezioni), un campione composto da ben 240 siti di età medievale (Valenti 2008a, p. 194), i 16 denari databili tra l'età di Berengario I (re 888-915, imperatore 915-924) e Corrado II (1024-1039) rinvenuti a Vetricella rappresentano una notevolissima eccezione che concorrerà a precisare la storia e la funzione del sito.

Con esclusione del caso di Vetricella, le scarse attestazioni archeologiche dei denari d'argento trovano puntuale riscontro nella documentazione scritta di molte regioni dell'Italia centrale dove i documenti databili tra il X e l'XI secolo mettono in evidenza l'uso diffuso della moneta di sostituzione sia per il pagamento di censi che acquisti di terra. È utile ricordare, a parziale spiegazione di questo fenomeno, che tra l'età ottoniana e la seconda metà del XII secolo, Lucca fu la sola zecca attiva nell'Italia centrale. Roma, infatti, fu chiusa per cause che ancora oggi non hanno trovato una risposta e fu riaperta solo intorno al 1180 (Rovelli 2009b).

Quali furono le cause di questa debole produzione monetaria? Dobbiamo infatti tenere presente che gli *ottolini* rinvenuti in Toscana (come del resto altrove, sia in Italia che a nord delle

[4] Rimane ricco di dati e suggestioni Salvioli 1901. Per quanto riguarda la Toscana, cfr. Francovich, Wickham 1994; Francovich, Farinelli 1994; Wickham 1996. Si veda inoltre il contributo di S. Collavini e G. Bianchi in questa sede.

[5] *CNI* XI, pp. 9-18; il n. 8 è considerato un denaro, ma la legenda *flavia luca* lascia supporre che si tratti di un tremisse dal titolo molto basso. *MEC*, 1, p. 208 nota l'influenza anglo-sassone sui tipi di Lucca e sottolinea la rarità delle emissioni di Carlo Magno delle zecche di Lucca e Pisa.

[6] *CNI* XI, pp. 60-61, n. 1, tav. IV, 20; per l'attribuzione di questo esemplare al marchese Rainier o Ranieri (1024-1027) che si era ribellato a Corrado II, cfr, Matzke 1993, pp. 142-143. A favore della tradizionale attribuzione al duca Manfredo e agli anni di Lotario I è Vanni 2011, p. 787.

Alpi) sono prevalentemente della zecca palatina di Pavia. Lucca, pur essendo a sua volta zecca regia, appare avere avuto un ruolo di secondo piano e altrettanto possiamo dire, in questa fase, per quanto riguarda Milano.

I due fenomeni che abbiamo richiamato:

1) il mancato impulso alla coniazione nel momento del passaggio dal sistema aureo longobardo a quello argenteo carolingio; 2) il limitato volume delle emissioni lucchesi durante l'età ottoniana e in parte dell'XI suscitano inevitabilmente diversi quesiti. Ci siamo dunque chiesti, in primo luogo, quale possa essere stato il ruolo dei locali filoni argentiferi nell'assicurare una sia pur ridotta produzione monetaria e quando queste attività estrattive siano iniziate. Si doveva inoltre considerare, oltre all'eventuale uso di argento tesaurizzato, il possibile apporto di metallo nuovo proveniente da miniere non locali.

Come abbiamo ricordato, Peter Spufford ha tracciato un ampio affresco di questi problemi mettendo in rilievo, per il periodo in esame, il ruolo delle miniere della regione di Goslar in Sassonia. È grazie a questo metallo che oltre 80 zecche furono aperte in 'Germania' in età ottoniana, mentre solo 2 erano attive sotto Corrado I di Franconia (Spufford 1988, p. 76). Riguardo all'Italia e al possibile utilizzo di argento proveniente dalla Sassonia, le stime di Spufford sono prudenti proprio in ragione del fatto che, diversamente dalla Germania, non è chiaro da dove provenisse l'argento coniato dalle zecche italiane: «It is not clear whence Italy drew its silver at this time, and there are contradictory indications about what was happening there» (p. 97).

Cercando di rispondere a questi problemi, le nostre prime analisi sono state modulate anche per individuare eventuali tracce dell'AR sassone nei denari delle zecche imperiali in Italia.

Le prime analisi effettuate, per quanto relative ad un campione ancora ristretto, danno delle risposte piuttosto interessanti e anche, almeno al momento, piuttosto nette, soprattutto per quanto riguarda gli *ottolini*. Come verrà argomentato a breve, le analisi isotopiche indicano infatti, per tutti i 12 esemplari esaminati, una indubbia compatibilità con l'argento dei giacimenti dello Harz in Sassonia, sia per quanto riguarda i denari lucchesi (sette esemplari), sia per quanto riguarda i denari di Pavia. In un solo caso, un denaro di Ottone I e II della zecca di Lucca, è visibile il possibile apporto di argento toscano accanto ad argento della Sassonia. Un quadro simile è riscontrabile tra i cinque denari a nome di Corrado II della zecca di Lucca, tutti compatibili con le miniere dello Harz ma con un esemplare in cui si nota anche il possibile utilizzo di argento toscano.

2. IL CAMPIONE ARCHEOLOGICO-NUMISMATICO E LE ANALISI ARCHEOMETRICHE

2.1 *Il campione archeologico-numismatico*

Nell'ambito del progetto nEU-Med ed in funzione delle future analisi archeometriche, si è proceduto in primo luogo al riordino e al completamento del censimento di tutti i materiali numismatici provenienti in particolar modo da alcuni insediamenti delle Colline Metallifere indagati archeologicamente negli ultimi decenni, ma non solo. Tra i siti di provenienza delle monete campionate figurano quelli dei castelli di Scarlino (Francovich 1985), Rocca San Silvestro (Francovich 1991; Cicali 2005, pp. 81-119) Donoratico (Bianchi 2004), Montemassi (Bruttini, Dallai 2006) e Rocchette Pannocchieschi (Grassi 2013; Cicali 2013, pp. 134-139); dei villaggi di Poggibonsi (Valenti 1996; Cicali 1996, pp. 314-326; Valenti 2007; Cicali 2007, pp. 254-256), Miranduolo (Valenti 2008b; Cicali 2008, pp. 403-414) e San Genesio (Cantini 2008, 2010), del monastero di S. Pietro a Monteverdi (Francovich, Bianchi 2006), della pieve di Pava (Campana, Felici, Marasco 2008), della Canonica di S. Niccolò (Bianchi, Bruttini, Grassi 2012) ed infine del sito di Vetricella (Marasco 2013) (*fig.* 1). In futuro il campione verrà ulteriormente implementato. Completerà la ricerca la ricognizione per quanto possibile esaustiva dell'edito dei reperti numismatici provenienti dall'attuale Toscana. A conclusione della ricerca i dati saranno sistematizzati e resi disponibili su una piattaforma GIS.

C.C.

2.2 *Le analisi pXRF*

Il censimento del materiale numismatico ha permesso di selezionare 154 pezzi sui quali si è effettuata una prima analisi composizionale non distruttiva, realizzata mediante la tecnica di fluorescenza a raggi X portatile (pXRF).

Lo strumento utilizzato per le analisi, e disponibile presso il dipartimento di Biotecnologie, Chimica e Farmacia dell'Università degli Studi di Siena, è uno spettrometro portatile (pXRF) Olympus Delta Premium Innov-X equipaggiato con un tubo a raggi X di 40kV, 4 W e 200 μA, anodo di Rh, un detector SDD a grande area, un accelerometro e un barometro per la correzione della pressione atmosferica. Lo strumento è dotato anche di una telecamera interna che permette il corretto posizionamento dell'area di indagine.

L'analisi composizionale non distruttiva pXRF (Navas, Asuero, Jimenez 2016, pp. 207-221) è servita principalmente, in questa prima fase, per verificare il quantitativo di piombo presente nelle monete in modo da selezionare i materiali più idonei per le successive analisi isotopiche del Pb, oltre che per avere un'analisi chimica qualitativa della lega e per creare un database composizionale semi quantitativo di tutte le monete campionate, in particolar modo di quelle conservate e custodite nei musei (Museo di Pava, di San Genesio, di Rocca S. Silvestro e Museo Archeologico di Firenze) che non sarebbero state disponibili per ulteriori e più dettagliate analisi (ad esempio con il metodo LA-ICP-MS) che avrebbero richiesto il trasferimento dei reperti. La pubblicazione e discussione dei dati forniti dalle analisi pXRF attende il completamento delle ricerche sull'intero campione.

V.V., A.D.

2.3 *Le analisi isotopiche del piombo*

Gli isotopi del piombo sono notoriamente lo strumento più largamente utilizzato in campo archeometrico per rintracciare la provenienza dei metalli impiegati per la produzione dei manufatti. Il metodo funziona non solo per i manufatti di piombo ma anche per quelli di altri oggetti o leghe purché contengano sufficienti quantitativi di piombo per effettuare l'analisi. Il metodo si basa sul principio che il piombo presente nei minerali (come la galena argentifera sfruttata per produrre l'argento) è costituito da quattro isotopi (Pb^{206}; Pb^{207}; Pb^{208}; Pb^{204}). L'abbondanza relativa di questi, ovvero la «composizione isotopica», rappresenta una sorta di «impronta digitale» del Pb contenuto nel minerale e tale impronta è caratteristica del giacimento da cui è estratto il minerale. Esistono fra i diversi giacimenti presenti in tutto il mondo notevoli variazioni della composizione isotopica del piombo. Inoltre, il piombo non subisce frazionamento isotopico (ovvero non modifica la sua composizione isotopica) durante il processo metallurgico (Gale, Stos-Gale 2000) per cui il minerale contenente piombo, i prodotti di scarto (scorie prodotte, metallina etc), il metallo prodotto e l'oggetto finito hanno tutti la stessa composizione isotopica del piombo. Per questo motivo è possibile in linea teorica risalire dalla composizione isotopica del Pb del manufatto al giacimento di provenienza del minerale.

I principali vantaggi del metodo risiedono nelle piccole quantità di piombo necessarie per fare le analisi (con i moderni spettrometri sono sufficienti quantitativi di Pb nell'ordine dei 100-1000 ng di piombo) e quindi nella possibilità di effettuare dei micro-prelievi. Inoltre è pubblicato un esteso database relativo alla composizione isotopica della maggior parte dei giacimenti metalliferi struttati in epoca antica che è ovviamente in continuo aggiornamento con il procedere delle ricerche (Cattin *et al.* 2009). Fra i principali limiti dobbiamo ricordare l'inevitabile sovrapposizione dei campi di composizione isotopica. Siccome la composizione isotopica di un determinato giacimento dipende dalla sua storia ed evoluzione geologica la sua composizione isotopica può essere in alcuni casi distintiva ma è molto probabile che più giacimenti, ubicati in diverse parti del mondo, abbiano una composizione isotopica simile e che il loro campi composizionali si sovrappongano in modo più o meno significativo (Brill, Shields 1972; Gale, Stos-Gale 2000). Questo fa sì che gli isotopi del Pb più che dare una risposta univoca alla provenienza di un determinato metallo possano suggerire in base alla compatibilità isotopica i possibili giacimenti di provenienza, o in alcuni casi, escluderne altri con una certa ragionevolezza.

Un altro limite risiede nel fatto che gli isotopi del Pb danno informazione solo del piombo contenuto nella lega (argento o argento-rame nel caso dei nostri campioni) e pertanto possono risentire di fenomeni di miscelamento, riciclaggio (Gale, Stos-Gale 2000; Stos-Gale 2001) o addirittura di fenomeni di aggiunta di piombo di diversa provenienza. A tal proposito ricordiamo che l'argento ha una grande affinità per il piombo metallico e che quest'ultimo gioca un ruolo fondamentale nei processi di estrazione dell'argento: il piombo fa da collettore dell'argento ed è facilmente separabile dalle scorie perché più denso e pesante (Bachmann 1993)[7]. Il problema dell'eventuale mixing di metalli contenenti piombo di diversa provenienza può essere ad esempio schematizzato per alcune delle monete da noi investigate nei diagrammi di *fig.* 2. Nel caso in cui una moneta in argento venga prodotta a partire da due lingotti di Ag aventi circa lo stesso contenuto di Pb di diversa provenienza o aggiungendo e riciclando oggetti in Ag di diversa provenienza con simili contenuti di Pb (*fig.* 2a) la moneta finale avrà una composizione isotopica intermedia fra quelle dei due lingotti (o oggetti originari) tanto più spostata verso il lingotto che è stato usato in proporzione maggiore. Qualora venga prodotta una moneta in mistura (*fig.* 2b) siccome i tenori di Pb nel rame sono in genere molto inferiori a quelli di Pb nell'argento, anche se la moneta contiene poco argento (es 20% peso) la sua composizione isotopica del Pb sarà molto simile a quella dell'argento usato per produrre la moneta.

Sulla base di quanto sin ora esposto appare chiaro che sebbene la composizione isotopica di un oggetto in argento possa essere isotopicamente ben distinguibile, la provenienza dell'argento stesso non può essere univocamente identificata senza che ci sia il supporto di altri tipi di evidenze, in particolare è fondamentale il supporto delle evidenze di tipo storico ed archeologico per supportare o meno le ipotesi di provenienza proposte su base isotopica (Baron, Tămaş, Le Carlier 2014).

2.3.1 Metodo analitico

In base ai risultati forniti dall'XRF portatile sono state selezionate le monete aventi sufficiente piombo per effettuare le analisi isotopiche. Sulle monete investigate sono stati effettuati dei micro prelievi (con bisturi sterile) dal bordo della moneta che non viene toccata sulle due facce. Il prelievo è in genere dell'ordine di 0.5 mg (ovvero 0.0005 g) senza pertanto alterare il peso della moneta. I campioni sono stati analizzati per gli isotopi del piombo presso il laboratorio dell'Institut für Geologie, Universität Bern, usando un MC-ICP-MS Nu Instruments™. I campioni sono stati analizzati dal Prof. I.M. Villa, numerose misure dello standard internazionale NIST SRM 981, sono state effettuate nel corso delle misure per stimare la precisione analitica che è risultata pari a quanto riportato in letteratura (Galer, Abouchami 1998).

2.3.2 Risultatati e discussione

I dati isotopici delle monete sono stati confrontati con quelli del distretto metallifero della Toscana meridionale, delle Alpi Apuane e con vari distretti piombo-argentiferi europei potenzialmente sfruttati in epoca medievale (Melle in Aquitania, Massiccio Renano e Harz in Germania, Erzgebirge in Germania-Repubblica Ceca). Come schematicamente rappresentato in *fig.* 3, mentre la composizione isotopica delle mineralizzazioni della Toscana meridionale (campo rosso in figura) è chiaramente distinguibile, molti degli altri giacimenti dell'Europa centrale, avendo simile età di formazione e storia geologica hanno dei campi di composizione isotopica (poligoni colorati in *fig.* 3) in gran parte sovrapposti. Pertanto, è possibile fornire soltanto alcune ipotesi sulla compatibilità isotopica fra le monete da noi analizzate con alcune di queste mineralizzazioni. Le ipotesi qui presentate vanno pertanto considerate come ipotesi preliminari visto che il database è in continuo aggiornamento e che sono da valutare con il proseguo delle indagini anche altre aree che possono aver fornito metallo (in particolare argento) nel periodo di interesse come ad esempio l'area Massiccio Centrale in Francia o l'alta Valle del Reno in Germania. Accenniamo brevemente a quali siano i periodi storici per cui è attestato lo sfruttamento delle miniere europee sin ora incluse nel nostro database e riportate nei diagrammi (*fig.* 4).

Le miniere di Melle in Aquitania sono storicamente considerate le più importanti miniere di argento del periodo Merovingio e Carolingio; il loro sfruttamento iniziato forse già nel V secolo sotto l'impero romano, incrementa significativamente fra il VII e il IX secolo come largamente testimoniato dalle tracce di attività mineraria e dalla diffusione geografica delle emissioni di Melle (Téreygeol 2007, 2013; Coupland 2011). Le miniere vedono un netto declino alla fine del X secolo (Téreygeol 2013).

La zona del Massiccio Renano, nella Germania occidentale ospita numerose mineralizzazioni a piombo, zinco, rame e argento con tracce di sfruttamento in epoca romana ma le evidenze di possibili attività estrattive nell'alto Medioevo sono scarse. Le fonti storiche menzionano attività estrattive dell'argento solo a partire dal XII-XIII secolo per le miniere di Mechernich (vicino ad Aquisgrana), Lüderich (ad est di Colonia), Altenberg (Siegerland) e Bad Ems/Holzappel (Bartels, Klappauf 2012). Similmente nell'area di Ramsbeck, sebbene le fonti storiche menzionino la miniera solo a partire dal XIV secolo alcune tracce di attività mineraria sono probabilmente databili al X-XI secolo (Strassburger 2006, 2007).

Ci sono indizi dello sfruttamento delle miniere dell'Harz (Sassonia) forse già nel III secolo d.C. (Klappauf 1989), ma rame piombo e argento sono sicuramente stati estratti dal IX secolo (Klappauf *et al.* 1990). La prima menzione storica è nella "Storia dei Sassoni" di Vitichindo di Corvey che afferma che nel 968 furono aperte in Sassonia "vene di argento". Successivamente il Tietmaro di Merseburgo nell'XI secolo scrive che le miniere di argento della Sassonia furono aperte sotto il regno di Ottone I (936-973 d.C.) (Steuer 2004) riferendosi sicuramente alle montagne dello Harz. Nonostante lo sfruttamento dell'argento nell'Harz sia storicamente associato alla miniera di Rammelsberg, questa è principalmente una miniera di rame mentre i depositi dell'Upper Harz caratterizzati da abbondante

[7] Per una descrizione dettagliata dei processi di estrazione dell'argento in epoca antica si rimanda a Merkel 2016.

galena argentifera (Asmus 2012) sono stati probabilmente più importanti per l'estrazione dell'argento in epoca altomedievale (Klappauf *et al.* 2008; Klappauf 2011;) come testimoniato anche dalle evidenze archeologiche di IX-X secolo (Alper 2003).

Anche l'area dell'Erzgebirge a confine fra l'attuale Germania e Repubblica Ceca è famosa per i giacimenti di argento, ma le tracce archeologiche di sfruttamento sembrano indicare che l'attività di estrazione dell'argento a larga scala sia iniziata solo nella seconda metà del XII secolo (Kenzler 2009, Id 2012) mentre le evidenze legate alla metallurgia dell'argento sono riferibili principalmente al XIII-XIV secolo (Eckstein *et al.* 1994).

In tutta l'area delle Colline Metallifere, nella Toscana meridionale ed in particolare nell'area di Campiglia Marittima dove le prime tracce dello sfruttamento del rame risalgono al 3400-3100 a.C. (Artioli *et al.* 2016), si trovano tracce di coltivazioni minerarie sia di epoca etrusca che romana. Per quanto riguarda il Medioevo, benché la maggior parte dei castelli collocati in stretta associazione spaziale con le occorrenze minerarie (a ferro e a rame – piombo argentiferi) del territorio, sorgano fra VIII e X secolo (Rocca San Silvestro, Rocchette, Cugnano) le tracce di attività minerarie e metallurgiche di queste prime fasi di vita degli insediamenti sono molto labili, mentre la maggior parte delle attività estrattive si concentra tra il XII ed il XIV secolo come testimoniato dai grossi cumuli di scorie che caratterizzano i siti di Cugnano, Rocchette e tutto il territorio intorno al castello di Montieri (Benvenuti *et al.* 2014).

Per quanto riguarda invece il comprensorio minerario delle Alpi Apuane nella Toscana settentrionale, alcune tracce di coltivazioni sono forse riferibili anche ad epoca etrusco-romana ma in epoca medievale è attestato uno sfruttamento solo fra XI e XIV secolo (Mascaro, Benvenuti, Guideri 1991).

Il gruppo più cospicuo di monete analizzate fino ad ora è costituito da denari a nome di Ottone (I-III) coniati a Pavia e Lucca e databili nell'intervallo cronologico compreso fra 962 e 1002. Come si vede chiaramente dalla *fig.* 5 nessuna di queste è isotopicamente compatibile con il campo composizionale delle miniere della Toscana meridionale (in rosso). Fatta eccezione per il campione nominato A in *fig.* 5 la maggior parte delle monete, indipendentemente dalla zecca di provenienza, si concentra in una porzione del grafico in cui si concentrano la maggior parte dei giacimenti centro-europei quali Melle, Harz, Massiccio Renano, Erzgebirge (*fig.* 3) e pertanto i campioni sono isotopicamente compatibili, in parte o in toto, con tutte queste mineralizzazioni.

In particolare, i denari a nome di Ottone mostrano tuttavia una forte compatibilità isotopica con due serie di monete coeve (Sachsenpfennige, 950-1000, e Otto-Adelheid-pfennig, 985-1040) coniate in Sassonia da Ottone I – III probabilmente a Magdeburgo e Goslar (triangoli bianchi e verdi in *fig.* 5) sulle pendici del massiccio dell'Harz e recentemente pubblicate (Merkel 2016). La maggior parte di quest'ultime hanno composizione chimica ed isotopica compatibile con le miniere dell'Harz settentrionale dove ci sono coeve evidenze archeologiche della produzione di argento; è pertanto probabile che si tratti di denari prodotti con metallo nuovo estratto dalle montagne dell'Harz (Merkel 2016). È ragionevole supporre che anche campioni coniati nelle zecche italiane nello stesso periodo e dagli stessi sovrani siano prodotti a partire da metallo di provenienza sassone o comunque transalpina.

Una simile provenienza può essere suggerita anche per i denari a nome di Ugo e Lotario II (931-947) di Pavia e Ugo il Grande marchese di Toscana (969-990 circa) di Lucca, i quali recano una impronta isotopica compatibile con i giacimenti centro europei come Melle e la Sassonia.

Anche i cinque denari a nome di Corrado II (1026-1039) tutti della zecca di Lucca, fatta eccezione per il campione denominato B in *fig.* 5, non mostrano nessuna correlazione isotopica con i giacimenti toscani e si collocano in prossimità dei giacimenti della Sassonia.

Da quanto sin ora esposto non si trova nelle monete analizzate una segnatura isotopica del piombo univocamente compatibile con le mineralizzazioni della Toscana meridionale. È comunque possibile che tali mineralizzazioni fossero sfruttate (magari per la coltivazione del rame e del piombo) ma, stando ai nostri esemplari, parrebbe che l'argento eventualmente estratto da tali giacimenti non fosse impiegato per scopi monetali. Una eccezione è costituita dalle due monete denominate con A, B, nelle *fig.* 5, le quali non cadono formalmente né nel campo della Toscana meridionale né in quelli dei giacimenti centro europei. Si tratta di due diverse monete in argento (a nome di Ottone e di Corrado II) tutte coniate dalla zecca di Lucca, la cui composizione isotopica cade a metà fra il campo della Toscana meridionale e quello dei giacimenti centro europei e che potrebbero essere compatibili con un uso misto di argento proveniente da entrambe le tipologie di giacimenti. Questa evidenza, da comprovare con l'aumento della campionatura delle monete, potrebbe suggerire un uso sporadico di argento proveniente dalle colline metallifere nel corso del X-XI secolo.

L.C., M.B., I.M.V.

4. CONCLUSIONI

I risultati finora ottenuti appaiono dunque piuttosto sorprendenti e propongono dati preziosi ed innovativi che contribuiranno a precisare i contorni, non solo cronologici, dello sviluppo economico della regione e delle aristocrazie locali.

Si tratta inoltre di risultati che, se confermati da ulteriori indagini, possono offrire una risposta plausibile ai quesiti posti dall'insieme dei dati numismatici. Alla luce di questi, infatti, il prevalere della moneta pavese nella circolazione del Regno (il nostro campione, dove prevalgono denari di Lucca, è, come si è detto, il risultato di scelte arbitrarie) potrebbe essere stato il frutto di una precisa politica regia interessata a potenziare il ruolo di Pavia come capitale del regno anche attraverso il rafforzamento della zecca palatina. Verso quest'ultima, dotata di nove *magistri monetarii* (erano solo quattro a Milano, secondo quanto testimoniato nelle *Honorantie*), erano dirette le più consistenti risorse metalliche che gli imperatori si procuravano dove era per loro più agevole e più conveniente.

I dati relativi alla zecca di Lucca appaiono a loro volta coerenti con questo progetto regio. In età ottoniana, anche Lucca sembra infatti prevalentemente approvvigionata con argento delle miniere della Sassonia. Tuttavia, l'esiguità delle sue emissioni lascia supporre che l'attenzione del re fosse rivolta prevalentemente alla zecca palatina di Pavia. Per quanto inaspettati, questi dati potrebbero dunque spiegare i lenti ritmi di espansione delle emissioni lucchesi. Almeno fino al regno di Corrado II, la zecca di Lucca sembra infatti dipendere dall'argento di provenienza transalpina al quale solo sporadicamente si aggiunge argento locale che, nel nostro campione, è stato rilevato in un solo denaro tra i cinque che compongono il nucleo di esemplari a nome di Corrado II.

Sulla base del nostro campione, l'impiego dell'argento toscano nelle emissioni di Lucca databili tra la metà del X secolo e la prima metà dell'XI appare ancora piuttosto evanescente. Si tratta, è utile sottolinearlo, di dati ancora largamente provvisori, che tuttavia mettono in crisi, come si diceva in apertura un modello che si poteva ritenere consolidato.

A.R.

Giovanna Bianchi, Simone M. Collavini

BENI FISCALI E STRATEGIE ECONOMICHE NELL'ALTO MEDIOEVO TOSCANO: VERSO UNA NUOVA LETTURA

In questo contributo è nostra intenzione riprendere i dati salienti che emergono dai precedenti articoli, allargando lo sguardo anche a contesti esterni al territorio campione del progetto. Questo, però, tenendo conto di due aspetti che contraddistinguono la storia di quest'area:

– la presenza di rilevanti beni pubblici, sovente preceduti da importanti proprietà senatorie ed imperiali (vedi *supra* nota 4 contributo Briano *et al.*).
– la fine del IX ed il X secolo come arco cronologico nel quale sembrano concentrarsi alcuni dei più importanti cambiamenti del paesaggio antropico e naturale (vedi *supra* contributi Pieruccini *et al.*; Marasco *et al.*).

Tali evidenze consentono di avviare una serie di riflessioni preliminari su come la presenza e la gestione di beni pubblici possano avere influenzato le dinamiche economiche di territori a essi legati. Al tempo stesso, il rimando alla forbice temporale sopra citata induce a concentrare l'attenzione su un preciso contesto storico che potrebbe avere favorito il verificarsi di determinate condizioni alla base dei cambiamenti che investirono il sito di Vetricella e il suo territorio.

Nel primo paragrafo gli argomenti saranno trattati partendo dall'analisi delle fonti documentarie. Di seguito il dato archeologico sarà letto o rivisto alla luce di una nuova ottica interpretativa stimolata, appunto, dai dati che stanno emergendo grazie al progetto nEU-Med.

Tenendo conto della serie di domande e ipotesi formulate nel primo contributo di questo volume (Hodges *supra*) nel paragrafo conclusivo si cercherà di tirare le fila di una serie di considerazioni con l'intento di fornire argomenti di discussione e riflessione per la futura strategia di ricerca.

G.B., S.M.C.

1. UNO SGUARDO D'INSIEME A PARTIRE DALLE FONTI SCRITTE

1.1. Da un paio di anni ho avviato, in collaborazione con alcuni giovani studiosi, una ricerca sulle "basi materiali" del potere pubblico in Tuscia tra IX e XI secolo. L'indagine, che si è mossa a partire da interrogativi sul sistema politico toscano, ha offerto spunti interessanti anche in altri ambiti: dalla storia della produzione documentaria alla storia economica. È proprio su quest'ultimo aspetto che ci si concentrerà in questa occasione, cercando di far interagire i primi risultati provenienti da questo lavoro con i dati finora prodotti dal progetto nEU-Med.

Uno dei primi esiti della ricerca è la preparazione di un archivio informatico, "Fiscus", che censisca i beni fiscali noti nella regione tra VIII e XIII secolo, aggiornando l'ultima ricerca sistematica al riguardo, quella di Fedor Schneider pubblicata nel 1914 (Collavini c.s.; Schneider 1975). In attesa del suo completamento, per provare a farci un'idea delle dimensioni di questo patrimonio, possiamo partire dal doppio dotario del dicembre 937 con cui re Ugo concentrò nelle mani delle mogli sua e del figlio Lotario (rispettivamente Berta e Adelaide) molti beni fiscali, parte dei quali in Tuscia. Nonostante esso offra un quadro solo parziale del patrimonio fiscale nella regione, il dotario ha alcuni evidenti vantaggi: innanzitutto offre un quadro d'insieme e quantifica grossolanamente le dimensioni delle aziende curtensi citate. Fu inoltre prodotto proprio nella prima metà del secolo X, quando erano in corso pesanti trasformazioni materiali di alcuni dei siti indagati. Infine, aspetto non meno fondamentale, il dotario ricorda due *curtes* connesse alle vallate e in particolare ai siti al centro del progetto nEU-Med: *Cornino* e *Valli*.

I beni toscani citati nei dotari (esclusi quelli della Lunigiana, allora esterna alla marca) consistono in una decina di *curtes* e in tre grandi monasteri regi; di ogni complesso patrimoniale si indica la quantità complessiva di mansi che lo costituivano. Si tratta di stime generiche, da prendere con prudenza, ma sono dati impressionanti: le *curtes* toscane constavano di 880 mansi, mentre i tre monasteri, nei quali era stato allora concentrato il resto dei beni fiscali (S. Salvatore di Sesto, S. Salvatore al Monte Amiata e S. Antimo in Val di Starcia), possedevano in tutto 3500 mansi[1].

Il miglior modo per farsi un'idea più concreta delle dimensioni di questo enorme complesso patrimoniale è confrontarlo con l'unico patrimonio ecclesiastico toscano noto in dettaglio per questa fase, quello del vescovato di Lucca, descritto negli inventari di Pietro II di fine IX secolo: esso era formato da circa 500 mansi, dunque era pressappoco un nono di quello regio dei dotari e un quarto di quello del solo monastero lucchese di S. Salvatore di Sesto (2000 mansi)[2].

Stiamo parlando, dunque, di un patrimonio immenso e di una vastissima massa di uomini e di produzione economica controllata dal re o dal marchese. Per limitarsi a un esempio, pensiamo al patrimonio del monastero di S. Salvatore di Sesto: i suoi 2000 mansi dovevano corrispondere a circa 10.000 persone, ben più degli abitanti della città di Lucca al tempo. In termini economici il patrimonio attestato dal dotario era, innanzitutto, un insieme di mansi che garantiva un grandissimo reddito agrario, facendo di chi lo deteneva il maggiore attore economico della regione anche in termini solo quantitativi. Esso, però, oltre a produrre derrate agricole, date le quantità in gioco, doveva conservarle, trasformarle e farle circolare (anche se non necessariamente per via commerciale). Come vedremo, infine, sebbene il dotario taccia al riguardo, le ricerche archeologiche stanno mostrando che le *curtes* regie (e certo a maggior ragione i monasteri) erano anche centri di non irrilevanti produzioni artigianali. Insomma, cercare di comprendere l'attività economica del fisco nelle sue varie componenti significa confrontarsi con un attore fondamentale nell'economia regionale del tempo, finora trascurato dalla ricerca storica sulla regione.

1.2. Restando ancorati ai testi dai quali siamo partiti, osserviamo ora la struttura spaziale del dotario (Vignodelli 2012, carte alle pp. 258, 273, 280). Essa ha varie cause, ciascuna delle quali non esclusiva. Essa mostra, infatti, quale fosse il fulcro politico del

[1] Schiaparelli 1924, nn. 46, 47 (937); cfr. Vignodelli 2012, spec. pp. 258, 271-275. Il numero dei mansi compresi nel dotario potrebbe destare qualche perplessità, ma un confronto con le "dimensioni ideali" delle grandi canoniche carolingie secondo il concilio di Aquisgrana dell'816 (fra 3000 e 8000 mansi per le maggiori; fra 1000 e 2000 per le medie; fra 200 e 300 per le minori, vd. *Concilium Aquisgranense*, cxxii, p. 401 rr. 7-20), ne suggeriscono sia la verosimiglianza, sia le dimensioni non troppo estese rispetto ai grandi enti ecclesiastici del centro del mondo franco.

[2] Calcoli basati su Luzzati 1979. Nel calcolo non si considerano le terre allivellate dal vescovato, per le quali esso riceveva dei canoni (spesso ceduti in beneficio), ma che di fatto non controllava più. Anche di queste terre il vescovo fece redigere un elenco (relativo ai livelli del predecessore Gherardo), recentemente edito in Tomei 2012 (da vedere anche per la bibliografia sugli inventari lucchesi).

potere regio in Toscana nel 937, cioè l'area in cui re e marchese avevano più terra da distribuire per garantirsi il consenso; fa emergere una serie di assi viari lungo i quali si muoveva un potere politico pur sempre itinerante; infine, – e questo è il punto centrale per il nostro ragionamento – suggerisce alcune strategie economiche messe in campo dal potere regio. Per coglierle, concentriamoci dapprima sul nucleo centrale dei beni pubblici toscani (quello settentrionale), il più ampio e articolato, osservandone distribuzione spaziale e dimensioni quantitative. Si riconoscono tre principali gruppi di *curtes*. Il primo insiste sul Valdarno, sul sistema lacustre a nord del fiume (lago di Sesto/Bientina) e sul Pistoiese[3]. Queste *curtes* (cui vanno aggiunte quelle lucchesi pisane e fiorentine, rimaste al marchese, fra cui S. Genesio, il cui domocoltile è in corso di scavo da parte di Federico Cantini) erano innanzitutto grandi aziende agrarie, volte alla produzione agricola (cereali, vite, olivo). Esse però non si limitavano a produrre derrate alimentari, ma trasformavano i prodotti e li facevano circolare. A partire da questa base, ovviamente, potevano svilupparsi attività artigianali, talora suggerite dalle fonti scritte (come la tessitura a Bientina), talora attestate dalle indagini archeologiche (S. Genesio)[4].

1.3. Le rimanenti *curtes* del dotario si concentrano, invece, in due ambiti ben più ristretti e, apparentemente, più marginali sia politicamente che dal punto vista degli itinerari regi: l'area prospicente il Monte Pisano (su cui insisteva il patrimonio di S. Salvatore di Sesto e forse anche quello della *curtis* di Bientina); e la costa della Maremma populoniese e in particolare le due valli indagate dal progetto nEU-Med, le valli del Cornia (*curtis* di *Cornino*) e del Pecora (*curtis* di *Valli*). Si tratta di zone senz'altro meno ricche da un punto di vista agricolo, caratterizzate da regioni pianeggianti mosse da rilievi poco produttivi e/o da ampie aree lacustri o lagunari frutto del ristagno delle acque. Inoltre, nel caso delle *curtes* maremmane, la distanza dal "cuore" della marca doveva rendere economicamente irrazionale trasportare su lunga distanza prodotti analoghi a quelli coltivati nel Valdarno per farli arrivare alla corte marchionale, collocata appena fuori dalle mura di Lucca.

Queste *curtes* eccentriche hanno un'altra caratteristica in comune: il numero di mansi di ciascuna di esse è relativamente poco consistente rispetto al resto del patrimonio fiscale. Perché, dunque, mettere al sicuro tramite il dotario *proprio* queste *curtes*? E perché gestirle come aziende curtensi a sé stanti, anziché aggregarle ai grandi patrimoni dei monasteri fiscali che insistevano sulle stesse aree? Si può abbozzare una spiegazione, ipotizzando che esse controllassero risorse particolari, economicamente e politicamente strategiche. Ciò ne spiegherebbe anche il notevole rilievo economico, attestato positivamente almeno in un caso, nonostante la limitata produzione agricola garantita dai (relativamente) pochi mansi[5].

Partiamo dal complesso più settentrionale, quello per il quale, in attesa di indagini archeologiche non solo occasionali, il ragionamento deve muovere dalle fonti scritte e dall'osservazione dell'ambiente naturale e delle risorse locali note. Le *curtes* a corona del Monte Pisano (Nozzano, Avane, Lugnano, cui si aggiunse in seguito la *curtis* marchionale di Pappiana, attestata dal 1014) comprendevano un numero di limitato di mansi (Nozzano 40, Avane 60, Lugnano 30)[6]. Esse insistevano, però, sul versante sud-occidentale del Monte Pisano e sull'altro affioramento roccioso, posto immediatamente a occidente del primo (Monte Spazzavento), che separano Lucca da Pisa, chiudendo il corso del Serchio. Si tratta di un'area fin dall'epoca medievale intensamente sfruttata per le cave di pietra da costruzione. Se si pensa che anche il resto del massiccio del Monte Pisano era di pertinenza fiscale, in primo luogo attraverso il monastero di S. Salvatore di Sesto, ne deriva che re e/o marchese avevano di fatto il monopolio di questa gigantesca cava, il cui prodotto forniva il materiale per l'edificazione di chiese, mura e palazzi del basso Valdarno e della piana di Lucca[7].

Né si trattava probabilmente soltanto della pietra da costruzione: quasi sulla vetta del monte della Verruca, uno dei rilievi sud-orientali del massiccio del Monte Pisano, almeno dall'inizio del IX secolo sorgeva una chiesa senz'altro di pertinenza fiscale, dato che le sue scarse attestazioni sono connesse a personaggi ed enti, non legati fra loro, ma tutti vicini al potere regio e marchionale. La cappella, dedicata a san Michele, fu trasformata in monastero probabilmente dal marchese Ugo alla fine del secolo X, rimanendo però sottoposta a S. Salvatore di Sesto e quindi parte del sistema fiscale[8]. Perché, dal punto di vista economico, fondare una chiesa in un luogo apparentemente così privo di risorse e così geograficamente remoto? Ebbene, ancora oggi, il sentiero che dall'Arno (e dalla pieve di Caprona che sorge in una sua ansa) reca al monastero passa per un'area di consistenti affioramenti di ardesie, atte alla produzione di lastrine per la copertura dei tetti. Del resto lo sfruttamento della pietra, anche se forse non esplicitamente l'ardesia, e il suo trasporto fino all'Arno (verosimilmente proprio a Caprona) a dorso di mulo, sono positivamente attestati, seppur solo per la prima metà del XII secolo, proprio in relazione a S. Michele alla Verruca da un testo scritto[9].

Infine, a conferma della forte attenzione allo sfruttamento della "risorsa-pietra" fin dal X secolo, come anche – fatto ancor più significativo per noi – della precoce comparsa di forme di specializzazione produttiva connesse sia a questa specifica risorsa che alla sfera del *publicum*, possiamo citare il caso di Fibbialla in Versilia. Sebbene essa non compaia nel dotario, anche Fibbialla faceva parte di un ampio complesso di beni

[3] Oltre ai beni del monastero di S. Salvatore di Sesto posti nell'area contermine al suo sito, fanno parte del complesso le *curtes* di Bientina (60 mansi), *Cortenuova*/Empoli (70 mansi), S. Quirico (40 mansi) e *Pionta*, presso Pistoia (500 mansi). Quest'ultima doveva essere la *curtis* che gestiva tutti i beni fiscali del *comitatus* di Pistoia.

[4] Cf. Bianchi, Cantini, Collavini c.s. Per le tracce di attività tessili nella *curtis* di Bientina vd. Tomei c.s.; per le produzioni artigianali a S. Genesio vd. Cantini 2018.

[5] Sul carattere eccettuativo, di protezione dei beni fiscali nei confronti dei potenziali usurpatori, del dotario vd. Lazzari 2012 e Vignodelli 2012: ciò induce a pensare a una pianificazione regia nella scelta delle *curtes* da inserire nel dotario e non semplicemente a una passiva registrazione dei beni fiscali presenti allora nella regione.

[6] La prima attestazione Pappiana di viene dalla data topica di due diplomi di Enrico II (DD. HII, nn. 295, 296); sulla storia successiva di questo complesso patrimoniale di derivazione marchionale e sull'ubicazione del suo castello vd. Ceccarelli Lemut 1998, pp. 464, 475-80.

[7] Sull'uso della pietra del Monte Pisano, cfr. p. es. Franzini, Lezzerini, Mannella 2001 e Franzini, Lezzerini 2003 e Bianchi, Cantini, Collavini c.s.; sull'argomento ha in corso una tesi dottorato in Archeologia di Giuseppe Tumbiolo.

[8] Per una rassegna delle fonti scritte su S. Michele alla Verruca vd. Ceccarelli Lemut, Sodi, 2017, pp. 223-226 e, più ampiamente, Giuliani 2005, che sottovaluta però la centralità dell'elemento fiscale nella storia del monastero. Il sito di S. Michele è stato oggetto di un lunga campagna di scavo (1996-2003), i cui esiti sono editi in Gelichi, Francovich 2003 e Gelichi, Alberti 2005.

[9] Vd. Scalfati 2006, n. 166 [1150 c.]: molti testi fanno riferimento all'attività di cava e di taglio di *petras* e di *lapides* (non è chiaro se due prodotti differenti o due modi di indicare la medesima materia prima) anche da parte di *magistri* in diversi luoghi, compresa la non precisamente identificabile *Serra de Plaia*. Uno dei testi, invece, dichiarò che «lapides incidit, quos deferebat ad Sarnum et solvebat ei [*scil.* all'abate] pretio et alii asinarii». Cfr. Andreazzoli 2003, pp. 44-45, rispetto al quale però va rilevato che nel documento niente induce a ritenere che la cava fosse stata aperta in vista della ricostruzione del monastero.

pubblici, piccole parti del quale furono scorporate e cedute a soggetti connessi ai re o ai duchi di Lucca, mentre altre parti più consistenti furono concesse in forma precaria alla famiglia lucchese dei Cunimundinghi, parte dell'*entourage* marchionale (Tomei 2017, pp. 121, 133-134, 149-151, 180). Anche il vescovo di Lucca fu beneficiato da queste concessioni: perciò tre mansi di Fibbialla compaiono nel *Breve de feora* (l'inventario dei beni vescovili dati in beneficio) di fine IX secolo. Non sono però i mansi a interessarci, ma il nome della località e la glossa che lo spiega. Si parla infatti di una «Flabianula Archaria, ubi arche faciunt»[10]. Indipendentemente da cosa esattamente fossero le *archae* in questione (sarcofagi, manufatti per stoccare i cereali, entrambi o qualcosa d'altro), è chiaro che a Fibbialla – nella seconda metà del secolo IX – non solo si cavava la pietra e la si lavorava, ma si era tanto specializzati nella produzione di *arche*, che l'attività dava ormai nome alla località[11]. Proprio come i soprannomi derivanti da mestieri, questa è una delle prime tracce di specializzazione artigianale veicolata da fonti come gli atti privati, notoriamente avare di informazioni su attività economiche differenti dall'agricoltura. Fibbialla – va ribadito – fece senz'altro a lungo parte di un complesso fiscale e la sua produzione di materia prima e manufatti doveva perciò essere indirizzata al fisco (allora i duchi Adalberti) quando il "soprannome" si affermò, avanti la fine del secolo IX. Va inoltre sottolineato che il "soprannome", seppur mai in forma altrettanto esplicita che nell'inventario, fu in seguito impiegato con assoluta regolarità fino 1063: non è chiaro se lo si facesse in maniera solo inerziale o se dobbiamo intendere questa circostanza come l'indizio di una vocazione produttiva di lunga durata[12]. Solo quando entrò in crisi e poi tramontò il "sistema economico fiscale" alla fine dell'XI secolo, nel contesto della crisi e poi della dissoluzione della marca di Tuscia, questa attività specializzata dovette scomparire o almeno ridursi drasticamente: dal 1081 in poi, infatti, non si ha più traccia del "soprannome"; e nei secoli successivi, stante la necessità di distinguerla dall'omonima località posta nel Pesciatino, si affermò il soprannome che tuttora designa la località: *Fibbialla dei Canonici*, dall'ente ecclesiastico divenuto proprietario del castello e della signoria negli anni venti del XII secolo[13].

1.4. Possiamo svolgere riflessioni analoghe anche per le *curtes* maremmane? Ritengo di sì. In questo caso, poi, dati ben più stringenti e sostanzialmente convergenti con quanto sostenuto finora vengono dall'archeologia, compresi i primi risultati del progetto nEU-Med. Per le *curtes* di *Cornino* e di *Valli*, infatti, non è difficile scorgere peculiari specializzazioni produttive, connesse allo sfruttamento (e trasformazione, Fibbialla Arcaria *docet*) di materie prime presenti *in loco*; materie prime rare e strategiche, fondamentali per un potere politico di orizzonte almeno regionale, come quello dei marchesi di Tuscia e dei loro sovrani.

Partiamo dalla Val di Cornia, meglio illuminata dalle fonti scritte, per passare poi alla Val di Pecora. Il grande patrimonio fiscale centrato sulla *curtis* pubblica di *Cornino*, che controllava larga parte della bassa Val di Cornia, è attestato almeno fin dall'inizio del secolo VIII e si trova in un'area archeologicamente ben indagata (scavi e indagini di superficie). Ciononostante, non ne è stato finora scavato (e neppure identificato con certezza) il centro domocultile (vedi *supra* Dallai *et al.*). Nel dotario la *curtis* è stimata 30 mansi. Erano solo i resti dell'enorme complesso longobardo: re e duchi di Lucca ne avevano staccato le parti più marginali (come gli strati esterni di una cipolla) a favore di loro protetti. Il fatto che uno dei concessionari sia stato il vescovo di Lucca spiega perché conosciamo così bene l'area[14].

Nonostante le concessioni a privati – e il probabile scorporo dei beni dell'alta val di Cornia, il cosiddetto Gualdo del re –, la *curtis* di Cornino mantenne un rilevante valore strategico e continuava garantire entrate economiche consistenti: solo questo può spiegarne l'inserimento, nonostante l'eccentricità, nel dotario. Se nel 937 essa era in mano al re, nel pieno XI secolo era ormai passata agli Aldobrandeschi, la più potente stirpe maremmana, che in antico aveva anche esercitato l'ufficio di conti di Populonia. Nel frattempo la *curtis* aveva mutato il nome, ma non la propria natura. Era detta, infatti, *curtis* di *Franciano* (toponimo tuttora esistente, nella forma Franciana, in connessione al quale però al momento non sono emerse tracce del centro domocoltile), ma rimaneva – a differenza delle "normali" *curtes* toscane note dai testi scritti – non un aggregato di terre dominiche e mansi sparsi in un areale più o meno ampio, ma una vasta unità terriera compatta precisamente confinata (Collavini 2016, pp. 67-68). Non si tratta di caso unico in Val di Cornia, dato che le medesime caratteristiche aveva, nell'XI secolo, anche la *curtis* di Gualdo distaccata dal vasto complesso fiscale originario in un momento non precisabile e a metà XI secolo in mano agli Aldobrandeschi[15]. In questo caso, poi, la toponomastica dell'interno, assai più conservativa di quella dell'area costiera sconvolta dalle operazioni di bonifica, permette persino di azzardare una ricostruzione di massima dei confini. È del resto possibile, sebbene in questi casi le fonti siano ambigue, che lo stesso avvenisse anche per altri due complessi fondiari[16].

Dobbiamo le nostre puntuali conoscenze sulla *curtis* di Franciana al fatto che tra la fine del secolo XI e il 1121 la sua metà fu ceduta dagli Aldobrandeschi, prima in forma precaria poi definitivamente, al monastero di S. Quirico di Populonia.

[10] Luzzati 1979, p. 231 «In Flabianula Archaria, ubi arche faciunt, habet manentes duo et sinditio uno». Cfr. anche il parallelo placito dell'897, esito delle ricognizioni patrimoniali di Pietro II, in cui il nome della località, scritto da un notaio forestiero, è storpiato in *Flaviana seu Arcana* (citata fra i beni in mano a Cunimundo), Manaresi 1955-60, I, n. 102.

[11] Cfr. Collavini 2013, p. 71 (con un cenno alla fonte da correggere) e *passim* per le funzioni delle *arche*.

[12] Barsocchini 1841, n. 1268 (939) *Flabbianula Arcaia*; n. 1539 (983) idem; n. 1540 (983) idem; n. 1566 (983) *Flabbianula Archaia*; n. 1654 (991) *Flabbianula que dicitur Archaia*; n. 1716 (997) *Flabbianula Archaia*; Archivio Storico Diocesano di Lucca, Archivio Arcivescovile di Lucca, *Diplomatico*, +C 21 (983) idem; A 17 (1062) *Fabianula que dicitur Arcaia*; ++ B 82 (1063) *Fabianula Archaia*; Angelini 1987, n. 26 (1034) *Fabianula que dicitur Archaia*. Devo i documenti inediti alla segnalazione di Paolo Tomei, che ringrazio.

[13] Il primo esempio del venir meno del "soprannome" è Guidi, Parenti 1910, n. 453 (1081): fra i testimoni c'è Ugo *de Fabianula* figlio del fu Pietro. Quando la *curtis*, ormai incastellata, fu ceduta dai Cunimundinghi al Capitolo di S. Martino, esso ormai era definitivamente scomparso, vd. Guidi, Parenti 1910, n. 796 (1123), n. 800 (1123), n. 562 (1099), n. 564 (1099), n. 826 (1126) ecc.; il nuovo nome di "Fibbialla dei canonici" non si affermò prima della fine del XII secolo vd. *Fibbialla dei Canonici* 2004. Per la Fibbialla presso Pescia vd. Barsocchini 1841, n. 1639 (988), n. 1737 (998) e Ghilarducci 1990, n. 21 (1019).

[14] Le analisi più dettagliate delle fonti sul *Cornino* sono quelle di Ceccarelli Lemut 1985 e 2004; cfr. anche Garzella 2005 e Collavini 2016. Per le prime attestazioni del complesso fiscale in Val di Cornia, risalenti al tempo dei re Ariperto II e Liutprando, vd. von Glanvell 1905, III, 191, p. 155 sulla cui datazione e interpretazione cfr. Tomei c.s.

[15] Archivio di Stato di Firenze, *Diplomatico*, *Vallombrosa*, *S. Maria di Acquabella*, 1053 giugno 10 (id. 0007438), copia del 1501, cfr. Collavini 1998, pp. 115, 156.

[16] Si tratta delle *curtes* di S. Vito (in mano al vescovo di Lucca) la cui dimensione territoriale è però attestata da un atto tardo (e dunque potrebbe essere solo un'acquisizione recente legata alla nascita della signoria territoriale) e della *curtis* di Casalappi, per la quale non abbiamo una confinazione, ma che viene usata per la localizzazione di alcuni beni (posti all'interno della *curtis*) e quindi doveva avere una carattere 'territoriale', cfr. Collavini 2016, p. 67 e Ceccarelli Lemut 2004, pp. 6-8, 20 e nt. 108.

Le carte relative a questi negozi, conservate dal cartulario del monastero, fanno emergere con chiarezza tre punti essenziali. La *curtis*, pur ridotta di dimensioni, rimaneva compatta e insisteva sulla parte finale della valle, a ridosso della laguna costiera[17]. Nonostante una produzione agricola modesta (suggerita dai soli 30 mansi nel dotario e da un ambiente naturale circostante poco propizio all'agricoltura), garantiva redditi notevolissimi: non appena ricevuta metà della *curtis* di Franciana, il monastero avviò un'operazione di riconfigurazione della propria identità – da piccola chiesa locale a monastero con ambizioni regionali – attestata sia dalle evidenze di scavo, sia dai testi scritti (Collavini 2016, pp. 68-69). La ricchezza di *Cornino*/*Franciano* derivava in primo luogo dal controllo delle saline costiere. Esse sono esplicitamente citate nelle donazioni e nel privilegio papale del 1143; sono attestate dalle altre fonti medievali e dalla cartografia moderna; tracce, seppur concernenti solo strutture bassomedievali, sono emerse dallo scavo del sito di Carlappiano (posto all'interno dello spazio della *curtis*), indagato nel quadro del progetto nEU-Med (Collavini 2016, pp. 75-76 sulle saline; per lo scavo vd. *supra* il contributo di Dallai *et al.*).

1.5. Considerazioni sostanzialmente convergenti, seppur basate su un manipolo più limitato di fonti, possono essere svolte anche per la Val di Pecora e la *curtis* di Valli, sebbene in questo caso il fatto il vescovato lucchese avesse meno interessi nella zona rende le nostre conoscenze solo frammentarie. Originariamente, il complesso fiscale di Valli doveva corrispondere alla parte finale del corso del *Teupascio* (acqua del re), come era allora chiamato – con un nome decisamente parlante – l'attuale Pecora. Lo suggerisce, oltre all'analogia con i casi esplicitamente attestati di *Cornino* e di Castiglione della Pescaia[18], lo stesso toponimo, chiaramente un areale connesso alla depressione nella quale scorreva il fiume prima di formare la laguna che ricopriva allora gran parte dell'attuale piana di Scarlino. La documentazione su questo complesso patrimoniale, per quanto povera, consente alcune certezze: innanzitutto la sua matrice fiscale. La prima menzione di Valli (e della sua *curtis*) viene dal dotario di Adelaide (937), che ricorda i 50 mansi da essa dipendenti. La tenuta della struttura aziendale fino alla fine del secolo X è suggerita, invece, dall'assenza di altre attestazioni del sito, rimasto in mano alla regina e poi al monastero di S. Salvatore di Pavia da lei fondato. Nella stessa direzione porta il fatto che gli Aldobrandeschi, anche in quest'area la principale potenza in ascesa, non potessero rivendicare, a fine X secolo, diritti su Valli, ma solo su Scarlino, una sua appendice marginale, probabilmente scorporata dal nucleo centrale della *curtis* (vd. Kurze 1981, n. 203, cfr. Collavini 1998, pp. 80-85).

Le cose, però, cambiarono radicalmente all'inizio del secolo XI. Valli, infatti, non compare più nel diploma di Ottone III per San Salvatore di Pavia (1000): il ritiro a vita privata di Adelaide (995 circa) aveva fatto venir meno la struttura creata dal dotario e la stessa attribuzione al monastero della *curtis* (Vignodelli 2012). Essa era quindi tornata contendibile da parte da chi aspirava a gestire quei beni pubblici (la marca, le famiglie dell'*entourage* marchionale, le famiglie comitali, i monasteri regi e marchionali). Pur nella povertà di attestazioni documentarie, lo chiariscono le poche notizie disponibili. Nel 1010 troviamo un Aldobrandeschi (Rodolfo III) datare un atto dal castello di Valli: doveva trattarsi di una nuova struttura fortificata costruita nello spazio della *curtis*, forse dagli stessi conti. Si usciva allora da una fase di dura guerra civile per l'eredità del trono di Ottone III (tra Arduino di Ivrea ed Enrico II) e della marca, in seguito alla morte di Ugo di Tuscia, che in Tuscia aveva visto prevalere proprio la fazione guidata da Aldobrandeschi e Gherardeschi, favorevole a Enrico II (Cavallini 1972, n. 11; cfr. Collavini 1998, p. 96, 100-101). Non stupisce che in un simile contesto gli Aldobrandeschi volessero e sapessero impadronirsi della *curtis* di Valli e incastellarla. Si può anzi supporre che proprio queste vicende politico-militari possano essere lo sfondo nel quale collocare una prima destrutturazione del sito di Vetricella, almeno a livello funzionale, se non delle sue strutture materiali.

In ogni caso la presa di possesso da parte degli Aldobrandeschi non fu un esito definitivo, perché il rafforzamento sia del sovrano che dei marchesi di ufficio da lui imposti in Toscana (soprattutto con Ranieri) rimise in discussione gli equilibri usciti dalla guerra civile. Gli Aldobrandeschi dovettero rinunciare allora sia al controllo su S. Pietro di Monteverdi, la cui natura di abbazia regia fu ribadita da un diploma (1014), sia verosimilmente alle *curtes* di Valli e di Scarlino[19]. Il possesso di Valli, infatti, nel cinquantennio successivo risulta oscillare tra diversi soggetti ed enti legati al potere regio e marchionale, senza che nessuno ne prendesse mai pieno controllo: la famiglia lucchese dei Rolandinghi, prima, il vescovato lucchese e il monastero di S. Bartolomeo di Sestinga, poi[20]. L'unico rapporto con gli Aldobrandenschi noto è puramente in negativo: nel 1055 il conte Ugo I, nipote del Rodolfo III che aveva rogato l'atto del 1010 dal castello di Valli, promise al vescovato lucchese di non danneggiarne o contenderne i beni in varie località, fra cui proprio Valli[21]. Le fonti, dunque, suggeriscono non solo l'accendersi di contese per i diritti sul patrimonio della *curtis*, ma anche un suo possibile smembramento fra più soggetti, certo corresponsabile della sua riduzione d'importanza politica ed economica. Nessun indizio sembra invece mostrare il perdurare di una centralità economica di Valli al passaggio tra XI e XII secolo, al contrario di quello che abbiamo notato per Franciano. Possiamo attribuire questo declino tanto alla suddivisione della *curtis* in più proprietà agricole, quanto a una crisi della sua originaria vocazione produttiva artigianale.

I pochi documenti disponibili, fra l'altro poveri di informazioni sulla struttura della *curtis* di Valli, non chiariscono né la sua estensione ed esatta struttura spaziale (del resto probabil-

[17] Giorgetti 1873-74, n. 40 (1121): «Petralata est ex una parte et Cornachini et rivus Pertuli currit in Notulo et Notulo vadit in stagno, ex altera parte est terra Sancti Petri de Monteviridi et Sancte Marie Grasse et tenet secus stagnum et usque in Notulum» (testo corretto sull'originale in Archivio di Stato di Firenze, *Diplomatico*, *Riformagioni. Atti pubblici*, 1029 gennaio 4 [id. 0000401]). La *curtis*, dunque, includeva le terre prospicienti lo stagno con le saline, ricordate fra le sue pertinenze, estendendosi su entrambi i lati del Cornia (probabilmente allora corrispondente alla successiva Corniaccia): a NO fino al corso del Notro, a SE fino a un punto imprecisato, da ubicare prima di Vignale. Essa confinava fra l'altro con terra dell'abbazia regia di S. Pietro di Monteverdi e con quelle di un altro monastero (*S. Marie Grasse*), forse S. Maria di Lagrasse nell'area di Carcassonne, a conferma della sua origine fiscale e del graduale scorporamento di parti del complesso patrimoniale a favore di soggetti legati al potere regio.

[18] Il carattere di complesso unitario e precisamente confinato della *curtis* di Castiglione della Pescaia emerge da DD. LI, n. †46 (814), seppur interpolato.

[19] DD. HII, n. 285 (1014), S. Pietro di Monteverdi era stata rivendicata come possesso della famiglia nel 973 (Kurze 1981, n. 203) e, infatti, non era stata inserita nel dotario del 937. Anche Scarlino, in mano dei conti nel 973, risulta poi passare ad altri soggetti, tutti legati al *publicum*: evidentemente era stata recuperata dal sovrano e reimmessa nel circuito dei beni fiscali, cfr. Ceccarelli Lemut 1985 per la storia successiva di Scarlino.

[20] Per i diritti dei Rolandinghi vd. Guidi, Parenti 1910, n. 227 (1048); per quelli di S. Bartolomeo di Sestinga Manaresi 1955-60, III/1, n. 397 (1055), in un passo interpolato del placito; per quelli del vescovo di Lucca vd. nota successiva.

[21] Ghilarducci 1995, n. 97 (1055), le altre località ricordate dal giuramento sono *Sussiano*, *Cangna*, Teupascio, Portiglioni e *Monte di Muro*, vd. Collavini 1998, p. 116; interessi della famiglia per Valli riemergono nel pieno Duecento, ma derivarono dall'acquisto dei diritti dagli Alberti nella località, vd. Collavini 1998, pp. 329-30.

mente mutevole nel tempo), né quale fosse la materia prima che indusse prima Ugo di Arles a salvaguardare il controllo della *curtis*, poi Adelaide e il monastero di San Salvatore di Pavia a mantenerne a lungo il possesso e, infine, gli Aldobrandeschi e i loro avversari a cercare di impadronirsene dopo il Mille. Sono, invece, le indagini archeologiche da tempo intraprese da Lorenzo Marasco e ora approfondite nell'ambito del progetto nEU-Med nel sito di Vetricella, senz'altro parte della *curtis* di Valli, a offrirci chiare risposte al riguardo. Dei rilevanti investimenti nel sito nel corso del secolo X, della loro connessione con altri interventi pianificati nella valle del Pecora e del rapporto tra questi interventi e la lavorazione del ferro dirà di seguito Giovanna Bianchi (e si dà conto negli altri contributi del volume). Ora importa solo di sottolineare che il dato archeologico relativo a Vetricella (forse momentaneamente il *caput curtis* di Valli, oppure una sua appendice produttiva specializzata) conferma in pieno le linee evolutive emerse dai pochi testi disponibili: un primo massiccio investimento nel pieno secolo X (che si connette al dotario), la sua prosecuzione nella seconda metà del secolo (controllo di Adelaide), e poi una crisi di inizio XI secolo che prelude al definitivo abbandono del sito nel corso di quel secolo (probabilmente connesso alla frammentazione e defunzionalizzazione della *curtis*).

S.M.C.

2. UNO SGUARDO D'INSIEME A PARTIRE DAL DATO ARCHEOLOGICO

La stesura di contributi, già editi, scritti durante i primi mesi di svolgimento del progetto nEU-Med, ha consentito di elaborare delle ipotesi iniziali sul tema affrontato da questo contributo, che i risultati ottenuti con il proseguimento del progetto stanno in buona parte confermando o arricchendo.

Nell'edizione delle ricerche sul monastero di San Quirico di Populonia (*fig.* 1), Sauro Gelichi, nel capitolo dedicato al promontorio tra la tarda Antichità e l'alto Medioevo (Gelichi 2016) partendo dai risultati dei recenti scavi nell'acropoli di Populonia, ha evidenziato come l'originario nucleo abitato, dopo un diffuso abbandono a partire dalla tarda Antichità, conobbe una rinnovata seppur limitata vitalità, tra la fine dell'VIII e soprattutto i primi decenni del IX secolo. Gelichi ipotizza che in quei decenni Populonia fosse deputata a sede seppur temporanea del *comitatus* di Roselle-Populonia, a quel tempo probabilmente affidato ai conti Aldobrandeschi. Il portato materiale di questa operazione è riscontrabile in alcune risistemazioni delle strutture più antiche e soprattutto nella presenza di una particolare cultura materiale caratterizzata da ceramiche di importazione, quasi del tutto assenti nei circuiti costieri e interni di questo territorio. Il successivo legame del monastero con gli Aldobrandeschi avrebbe favorito quel salto di scala politico ed economico che trasformò il cenobio da comparsa ad attore primario in un comprensorio in cui la casata comitale ebbe un ruolo pubblico di rilievo sin dall'alto Medioevo. Furono, infatti, proprio le donazioni degli Aldobrandeschi ad ampliare in quantità e qualità i possessi del cenobio, a partire soprattutto dalla *curtis* di *Franciano*, con le sue saline, posta in prossimità della laguna di Piombino che, allo scorcio dell'XI secolo, confluì nel patrimonio di San Quirico (Collavini 2016 e *supra*). È inoltre possibile che dagli Aldobrandeschi fossero derivati al monastero anche i diritti sul promontorio che, in età basso medievale, avrebbe giustificato una serie di tentativi di ripopolamento dell'acropoli con l'intenzione di impiantare nell'area sommitale un insediamento fortificato dipendente dal monastero (Bianchi 2016). L'insieme di questi dati evidenzia, quindi, alcuni nuovi punti essenziali: l'interesse del potere pubblico per questo territorio al punto di organizzare una seppur provvisoria sede di potere nell'Acropoli; l'importante ruolo dei conti Aldobrandeschi in quanto funzionari pubblici; il valore delle aree umide con la presenza di risorse di rilievo come il sale, controllate sino alla fine dell'XI secolo da una *curtis* in origine pubblica. Torneremo su questi punti in seguito.

Il tema del legame tra gli insediamenti inseriti nei possedimenti pubblici e i possibili circuiti economici a essi collegati è al centro di un contributo, all'interno del quale si fa già riferimento, seppur solo in maniera limitata, ai primi dati del progetto nEU-Med (Bianchi 2018).

Nell'articolo, per la fine del IX e il X secolo (cui si legava la cronologia delle sequenze e dei reperti sino ad allora ritrovati) si supponeva, infatti, che Vetricella avesse avuto un ruolo di rilievo nel sistema di scambi tra costa e interno proprio per la sua appartenenza ai beni fiscali, forse regi, punto su cui torneremo in seguito. A Vetricella, si ipotizzava, sarebbero state, inoltre, svolte attività di stoccaggio di merci e produzioni specializzate legate soprattutto alla manifattura di oggetti in ferro. La vocazione del sito, il suo particolare assetto e i già parziali dati sull'organizzazione del cantiere lo avvicinavano ai vicini centri di altura di Donoratico e Monterotondo Marittimo (*fig.* 1) nei quali, per le coeve sequenze, l'indagine archeologica aveva individuato caratteristiche simili, ovvero un forte e monumentale cambio di assetto e la presenza di produzioni specializzate (ceramica a vetrina sparsa a Donoratico; stoccaggio di cereali a Monterotondo Marittimo).

In questo articolo, questi siti venivano denominati 'fuori scala' proprio per differenziarli da quelli a essi contemporanei, sottoposti a indagine archeologica e caratterizzati da più semplici sequenze di vita.

Un tratto comune di questi siti 'fuori scala' sarebbe stata la loro caratteristica di essere beni fiscali, seppur diversi per origine e forme di gestione. Questa comune origine giustificherebbe una simile strategia economica che nell'articolo era letta come propria del potere pubblico. Perlomeno per il X secolo quest'ultimo, si ipotizzava, sarebbe stato uno degli attori principali, anziché secondario, sul palcoscenico della crescita economica. La realizzazione dei siti 'fuori scala' e quindi l'investimento pubblico, collegato a importanti trasformazioni dell'ambiente naturale e forestale, avrebbe, infatti, creato i presupposti di nuovi legami e di scambi tra campagna e città, favoriti dall'esistenza di possibili ampi sistemi economici, anche collegati tra di loro, gestiti dal potere pubblico.

Come per l'articolo appena citato, in questo contributo si continuerà a fare riferimento all'arco cronologico compreso tra la seconda metà del IX e il X secolo, dal momento che a questo periodo appartengono le evidenze materiali sinora indagate meglio datate e di conseguenza di più sicura interpretazione.

Per quanto riguarda il sito della Vetricella, come si desume dal contributo a essa dedicato in questo volume (si veda Marasco *et al. supra*), dopo la campagna di scavo 2016 possiamo ipotizzare con maggiore certezza rispetto al passato una serie di dati: il sito fu definitivamente abbandonato nel corso dell'XI secolo; contrariamente a quanto ritenuto in passato il sito non si formò solo nel corso del IX secolo, ma si impostò su preesistenze risalenti al primo alto Medioevo, sulla cui natura e forma faranno luce le future indagini archeologiche; è però solo dagli ultimi decenni del IX secolo che si verificarono consistenti ristrutturazioni che conferirono al sito l'assetto particolare già evidenziato in fase diagnostica. Questo importante cambiamento avvenne però in più fasi: una prima riguardò lo scavo dei canali e dei fossati, con forse già la presenza di un edificio centrale; una seconda,

durante la quale i fossati furono riempiti e fu costruita, al di sopra del riempimento di quello più interno, una cinta con base in muratura e forse in alzato deperibile, mentre nel cerchio più esterno fu realizzata una palizzata in legno. Come indicano i reperti, e soprattutto le numerose datazioni al radiocarbonio, le due fasi furono molto ravvicinate nel tempo e possono essere collocate tra gli ultimi decenni del IX e il X secolo. Purtroppo i valori delle misurazioni al radiocarbonio non consentono di definire lassi di tempo più ristretti; questo è un problema che ci auguriamo di risolvere con l'acquisizione di nuovi dati. Il periodo in questione, infatti, come sappiamo si lega a una storia complessa e datare più precisamente le trasformazioni può fare una differenza sostanziale nell'interpretazione storica degli eventi.

In ogni caso le operazioni svolte in queste fasi evidenziano una complessa progettazione con impiego di maestranze specializzate, ma anche con un cospicuo impegno di forza lavoro necessaria in particolare per scavare i fossati. La presenza di specialisti è provata anche dall'uso di miscelatori da malta (*fig.* 2), che ormai una recente rilettura indica come dei sicuri *markers* non solo di conoscenze specializzate, ma anche di maestranze provenienti da un ambito geografico esterno (Bianchi 2011). Se per la prima fase, caratterizzata dai fossati, è difficile ipotizzare presenza ed eventuale forma di un edificio centrale, quest'ultimo è sicuramente meglio definibile nella seconda. L'edificio turriforme, esattamente al centro dei limiti circolari, aveva una fondazione in muratura e un alzato in legno ed era provvisto di una grande tettoia forse su tutti i lati, che copriva un'area provvista, perlomeno sul lato ovest, di una sorta di pavimentazione in malta di calce. La grande quantità di ceramica ritrovata nella campagna di scavo 2016 è ancora in buona parte rapportabile a contenitori da dispensa e quindi funzionali allo stoccaggio (vedi *supra* Briano *et al.*), confermando quanto ipotizzato in precedenti contributi sulla vocazione del sito. Dal momento che nello spazio interno al cerchio centrale non sono state ritrovate altre strutture con funzione abitativa, è plausibile che sia gli spazi della torre, sia quelli esterni coperti fossero destinati allo stoccaggio di vari prodotti. Il ritrovamento di un altissimo numero di oggetti in ferro (più di 700 reperti), tra cui anche piccoli coltelli, oltre alla presenza di numerose scorie da forgia, suggerisce l'ipotesi che nel sito si concentrassero luoghi di lavorazione di tali oggetti. Questa ipotesi troverà una conferma definitiva solo con il ritrovamento nelle future indagini delle relative strutture produttive, dal momento che buona parte degli oggetti sono stati per ora rinvenuti in depositi secondari[22]. Il proseguimento della ricerca consentirà inoltre di datare più precisamente questa importante fase produttiva, al momento oscillante tra fine IX e inizi XI secolo (vedi Marasco *supra*).

Se in tempi recenti si era ipotizzato un ruolo di Vetricella per la lavorazione dei metalli monetabili e in particolare dell'argento, oggi alla luce delle analisi archeometriche svolte su monete di X secolo, si è acquisito un primo importante dato da verificare con un incremento del numero dei campioni, ovvero che i metalli monetabili erano in massima parte estratti nelle miniere imperiali dell'area germanica (Benvenuti *et al. supra*). Eventuali lavorazioni connesse, quindi, ad argento o ad altri minerali come rame e piombo argentifero, se provate con certezza alla Vetricella, dovrebbero essere ricondotte alla fabbricazione di oggetti preziosi e non al ciclo della monetazione.

Le prime analisi condotte sulle scorie da forgia indicano, invece, la presenza nel sito sia di ferro proveniente dalle Colline Metallifere, sia di ematite elbana[23]. Questo risultato è in ogni caso da valutare con cautela, dal momento che le scorie analizzate provengono da depositi secondari e quindi non connessi a sequenze specifiche. Se però confermato, il dato sarebbe di grande importanza, perché attesterebbe come le maestranze fossero dotate di conoscenze tali da saper impiegare minerali provenienti da contesti diversi per ottenere una lega qualitativamente superiore. Inoltre nell'ottica di un rapporto di scambi con l'Elba acquisirebbe maggior senso la posizione di Vetricella ai bordi della laguna, attraverso la quale potevano sia partire che arrivare merci dall'attuale golfo di Follonica.

Si spera che i futuri scavi possano chiarire anche un altro punto rimasto in sospeso, ovvero la presenza di un abitato. Come scritto sopra, i dati dello scavo nel cerchio interno smentiscono per ora questa presenza. Resta da capire se un abitato esistesse negli spazi compresi tra i cerchi più esterni oppure nelle immediate vicinanze del sito.

Nell'economia delle attività svolte a Vetricella questo dettaglio potrebbe, tuttavia, essere poco importante dal momento che il *survey* svolto in un recente passato attesta la presenza di molti piccoli abitati accentrati di pianura vicini al sito e in particolare la presenza di uno poco distante dalla Vetricella che, grazie anche le più recenti analisi diagnostiche, sembra mostrare una certa compattezza ed estensione (Marasco 2013; Marasco *et al. supra*).

Se Vetricella fu, quindi, un sito dove, tra fine IX e X secolo, si stoccavano merci e si lavoravano prodotti, non si può escludere che molta della sua forza lavoro provenisse dai vicini abitati satelliti.

Vetricella sarebbe stata quindi al centro di un sistema di scambi e sfruttamento di risorse dove sarebbero confluite merci e materie prime per essere stoccate o lavorate. Questo particolare ruolo del sito potrebbe spiegare il rinvenimento di 17 monete, tutte databili tra fine IX e inizio XI secolo, un numero consistente se confrontato con la pressoché totale assenza di monete nei siti coevi del territorio già indagati archeologicamente (Rovelli in Benvenuti *et al. supra*).

L'assetto quasi monumentale assunto dalla Vetricella in ambedue le fasi, confermato dal recente scavo, e il suo ruolo economico centrale in questa porzione di territorio costiero supportano sempre più l'ipotesi di trovarci di fronte a un sito a diretta gestione regia, già ipotizzata in precedenza anche per la prossimità alla *curtis* di Valli (si veda quanto scritto *supra* da Collavini). Le future ricerche consentiranno di definire meglio il rapporto tra questo sito e lo stesso centro curtense, sinora ritenuto coincidente con l'omonimo castello localizzato a non molta distanza da Vetricella, sulla sommità di una piccola collina (Ceccarelli Lemut 2004, p. 5; Cucini 1985, pp. 235-236). Al momento possiamo però attenerci alle considerazioni formulate da Collavini nel precedente paragrafo, che contemplano la possibilità che Vetricella fosse il *caput curtis* di Valli oppure una sua appendice specializzata.

Riguardo alla scala di produzione, al momento possiamo fare delle approssimazioni, partendo proprio dal numero di reperti rinvenuti. I frammenti di ceramica da dispensa, in massima parte rapportabile a contenitori in acroma depurata, sono indicativi di una notevole attività di stoccaggio, considerando che in altri siti del territorio i numeri di reperti delle medesime classi e cronologie sono notevolmente inferiori. La stessa considerazione

[22] Solo alla fase precedente l'abbandono del sito risale la presenza di una piccola forgia e di limitate stratigrafie rapportabili a possibili attività metallurgiche (vedi Marasco *et al. supra*).

[23] Sono questi i dati preliminari desunti da specifiche indagini svolte nel Dipartimento di Scienze della Terra di Firenze per la preparazione del campione e dal Laboratorio Actlabs (Ancaster, Ontario, Canada), per le analisi degli stessi campioni.

vale in maniera esponenziale per i reperti in ferro. Buona parte di quelli ritrovati presenta una tipologia purtroppo inseribile in ampi archi cronologici, solitamente compresi tra alto Medioevo e secoli centrali del Medioevo. Il sicuro abbandono di Vetricella nel corso dell'XI secolo, però, esclude una loro cronologia bassa e consente di datarli al più tardi all'XI secolo, quando siamo certi, grazie a recenti cataloghi, che in questo territorio la presenza di reperti di questo tipo era veramente molto ridotta e circoscritta (Belli 2018).

Il confronto tra i reperti rinvenuti in questo sito e negli altri coevi del comprensorio pone l'accento anche su di un altro importante aspetto, ovvero l'apparente assenza di ricadute di questa produzione sul territorio circostante.

Le stesse considerazioni possono essere formulate anche per un altro sito prima citato come 'fuori scala', ovvero Donoratico dove si ipotizza una produzione specializzata di vetrina sparsa, sinora attestata dalla presenza di oltre 3.000 frammenti. Un dato simile non trova nessun confronto negli altri siti indagati, dove i frammenti di questa classe ceramica consistono al massimo in qualche decina di unità. Lo studio di questa ceramica, oggetto di una tesi di dottorato, fornirà sicuramente dati preziosi per comprendere la cronologia e la possibile destinazione di questa produzione (per le prime considerazioni si rimanda all'intervento di Briano *et al. supra*).

I tratti comuni di questi siti 'fuori scala', quindi, sono particolarmente significativi malgrado si trattasse, probabilmente, di beni fiscali di diversa natura: una proprietà forse direttamente dipendente dal re nel caso di Vetricella; beni fiscali concessi a soggetti importanti come il monastero di S. Pietro in Palazzuolo di Monteverdi Marittimo nel caso di Donoratico; forse lo stesso vescovo di Lucca o lo stesso monastero per Monterotondo Marittimo.

La diversa natura di questi beni non esclude che sia esistito un omogeneo programma di ristrutturazione dei siti come dimostra la, già sottolineata, evidenza dei miscelatori da malta. La presenza di una torre è un altro tratto comune ai siti di Vetricella, Donoratico e forse Monterotondo Marittimo (*fig.* 3). Questo, nel caso di quest'ultimo sito, se interpretassimo come resti di una simile struttura i lacerti di muro di grande spessore adiacenti al recinto, che definirebbero un grande edificio peraltro posto in una posizione molto simile a quello di Donoratico, ovvero collegato al circuito murario. Anche la torre potrebbe di conseguenza essere letta come il segnale di una specifica vocazione dei siti 'fuori scala', all'interno dei quali questo edificio poteva essere legato all'immagazzinamento di specifici prodotti, oltre a svolgere una più usuale funzione abitativa. Del resto non è un caso che la presenza di torri, destinate a divenire l'elemento peculiare dei successivi castelli signorili, è segnalata dai documenti scritti in questo areale solo in corrispondenza di grandi proprietà, esito probabilmente di importanti concessioni fiscali, come nel caso (per rimanere in questo territorio) della *curtis* di S. Vito al Cornino di proprietà del vescovo di Lucca e confinante con le *curtes* pubbliche di *Franciano* e appunto di Valli (Ceccarelli Lemut 2004, pp. 6-8).

Resta da capire attraverso le future ricerche se proprio a questa diversa natura dei beni fiscali sia da imputare invece l'elemento più discordante tra questi siti 'fuori scala', ovvero l'assenza di un definito borgo nel caso della possibile *curtis* regia di Vetricella, che contrasta invece con la presenza di un sicuro abitato a Donoratico e a Monterotondo Marittimo (come si desume dalle fonti scritte e archeologiche). Può non essere un caso che questa discordanza si colleghi al diverso destino dei tre siti, dal momento che all'abbandono definitivo di Vetricella nel corso dell'XI secolo, corrispose invece la graduale trasformazione in castelli legati alle nuove signorie territoriali per Monterotondo e Donoratico.

Malgrado il fervore costruttivo e produttivo dei siti 'fuori scala', buona parte di questo territorio, sia nell'assetto sia a livello di produzioni ceramiche, non sembra subire in questa fase grosse trasformazioni, essendo caratterizzato, sino all'XI secolo inoltrato, da produzioni locali seppure in alcuni casi più specializzate. Quest'ultimo dato è testimoniato dalla circolazione dei piccoli contenitori da trasporto realizzati tra Roccastrada e l'area di Monterotondo Marittimo, di cui si scrive in questo volume (Briano *et al. supra*). Potrebbe essere questo, però, un segno della vitalità delle comunità rurali che popolavano quest'area con le loro piccole *élites*, già ipotizzata in recenti contributi, a cui probabilmente fu dovuta anche la buona riuscita di questa sorta di programma sostenuto dalle autorità centrali (Bianchi 2015). Nelle future indagini sarà essenziale capire se il mancato arricchimento della cultura materiale di queste comunità sia indicativo di una loro pressoché totale impermeabilità a questo programma pubblico oppure se il suo portato ebbe conseguenze in ambiti ancora da definire.

L'analisi dei reperti ceramici di questo territorio evidenzia, inoltre, la mancanza di importazioni sino all'XI secolo avanzato, salvo eccezioni come la vetrina pesante rinvenuta all'acropoli di Populonia, la cui presenza risulta ora più plausibile ipotizzando che quel luogo fosse la sede dell'omonimo comitato (Gelichi 2016).

Lo studio, in questo volume, dei reperti ceramici provenienti da *portus Scabris*, situato ai limiti del golfo di Follonica mostra l'esiguità delle ceramiche di importazione per tutto l'alto Medioevo anche in questo approdo marittimo (Vaccaro *supra*). Tale dato porterebbe pertanto a interpretarlo più come un luogo di sosta lungo le rotte di cabotaggio tirreniche, che non come un vero e proprio scalo funzionale a scambi tra la costa e l'interno.

Un quadro simile evidenzia quindi un notevole scarto, perlomeno nel X secolo, tra l'assenza quasi totale di movimenti commerciali o di scambi legati alle rotte tirreniche e indirizzati all'interno e la notevole vitalità di progetti e cambiamenti che registriamo nelle campagne, non solo in relazione ai 'siti fuori scala', ma anche a profondi cambiamenti del paesaggio.

Le analisi geomorfologiche e archeobotaniche relative al paleo-alveo del fiume Pecora, presentate in questo volume (Pieruccini *et al. supra*), riportano infatti soprattutto agli ultimi decenni del IX e al X secolo importanti interventi sia sul corso del fiume stesso, sia nel territorio limitrofo, con possibili incendi finalizzati all'acquisizione di maggior suolo coltivabile o pascolabile. Queste azioni suggeriscono uno stretto legame tra il sito di Vetricella e le nuove strategie di sfruttamento del territorio circostante perseguite a una scala così vasta da lasciare pochi dubbi sulla loro pianificazione all'interno di un ampio programma legato a importanti soggetti politici. La creazione dei siti 'fuori scala' sembrerebbe, almeno per la valle del fiume Pecora, legarsi, quindi, a un progetto di riorganizzazione del territorio.

Si spera che le future indagini nell'adiacente valle del fiume Cornia possano fornire dati altrettanto utili per una simile interpretazione. In questa valle si trovava, infatti, un altro importante possesso pubblico, la *curtis* di Cornino, anch'essa citata nel dotario di Ugo di Arles. Nel primo paragrafo di questo contributo Collavini ipotizza che questa *curtis* prima regia, fosse poi passata nelle mani degli Aldobrandeschi, conti di questo comitato, cambiando nome in *Franciano* e con questa denominazione donata al monastero di S. Quirico di Populonia nel corso dell'XI secolo. Il valore di questo possesso è indirettamente riflesso dal salto economico e politico del monastero

al momento della sua acquisizione. Franciana (e prima la *curtis* di Cornino) comprendeva anche l'areale prossimo all'originaria palude di Piombino. Questa zona, come sappiamo dalle fonti coeve, si caratterizzava per la presenza di saline. Lo scavo nel sito di Carlappiano ha consentito di ritrovare le tracce di parte di questi impianti, riferibili però solo ai secoli basso medievali. È comunque possibile, così come ipotizzato da Dallai, che tali evidenze insistessero su di un'area da tempo destinata a questa funzione, delle cui tracce più antiche (data la loro deperibilità) si sarebbe persa testimonianza, sebbene la lunga frequentazione sia stata ipotizzabile grazie alle ceramiche ritrovate durante le campagne di *survey* (Dallai *et al. supra*).

Se tali ipotesi fossero corrette, si prospetterebbe uno scenario finora non contemplato in nessuna ricostruzione storica, ovvero la presenza di importanti nodi produttivi, di gestione delle risorse del territorio e forse anche possibili centri amministrativi, posti nell'area costiera, dipendenti direttamente dal potere pubblico. Questi centri sarebbero stati correlati ad altri dell'interno e tale legame si sarebbe verificato o rafforzato soprattutto nel corso del X secolo, quando avvenne una totale ristrutturazione di questi siti e si creò un sistema più ampio e correlato, finalizzato allo sfruttamento di importanti risorse o a specifiche produzioni.

G.B.

3. CONCLUSIONI: IL SIGNIFICATO DEI SITI 'FUORI SCALA'

Volendo trarre delle conclusioni provvisorie, utili a impostare le domande che possano indirizzare la prosecuzione del progetto nEU-Med, si può cercare di sintetizzare i punti salienti emersi dalla nostra lettura con l'obiettivo di supportare e implementare le considerazioni svolte da Hodges nel suo contributo a questo volume (Hodges *supra*).

Il caso di Vetricella, comparato con quelli di Donoratico e Monterotondo Marittimo, ha posto in primo piano la presenza di siti che presentano una profonda differenza nell'assetto e nella funzione rispetto ad altri di questo stesso comprensorio, da tempo indagati archeologicamente. Al momento, un grande cambio di assetto si può collocare tra gli ultimi decenni del IX e il X secolo. Le future indagini, soprattutto a Vetricella e nel suo territorio, consentiranno di precisare meglio la cronologia, anche in rapporto a successive, possibili, ristrutturazioni e riorganizzazioni dei siti.

Richard Hodges, cercando di collocare la Vetricella di fine IX-XI secolo all'interno di griglie interpretative che fanno riferimento all'Europa del Nord, la definisce, per il X secolo, un centro amministrativo e produttivo al pari di un *solar central place*. Questo carattere verrebbe meno nel corso dell'XI, quando Vetricella, prima del suo abbandono, assorbita all'interno di un possibile distretto signorile, avrebbe mantenuto solo la funzione (forse a scala ridotta) di centro produttivo soprattutto di manufatti in ferro.

Per Donoratico e Monterotondo Marittimo i dati archeologici disponibili non consentono di adottare, per il X secolo, la medesima definizione di *solar central place*. In attesa delle future indagini preferiamo, quindi, attribuire ai siti qui analizzati la generica definizione di 'fuori scala', per sottolinearne la peculiarità.

In base alle nostre conoscenze attuali, possiamo provare in primo luogo a riflettere su cosa questi siti 'fuori scala' *non sono*. Non sono, innanzitutto, dei luoghi centrali degli scambi locali, perché le produzioni specializzate non sembrano avere pressoché alcuna ricaduta sui territori circostanti. Al tempo stesso i siti 'fuori scala' non sembrano essere fulcri di articolate reti commerciali regionali o extra-regionali, dal momento che vi manca proprio il principale indicatore dei traffici, cioè le ceramiche d'importazione, assenti sino all'XI secolo inoltrato nell'entroterra e molto scarsamente presenti negli approdi costieri.

Le evidenze materiali e i dati delle fonti scritte mostrano, anche, abbastanza chiaramente che cosa questi siti *sono*. Si tratta di siti inseriti in un'unica proprietà e appartenenti a una medesima tipologia, ovvero beni pubblici direttamente gestiti dal potere regio, oppure confluiti nei patrimoni di importanti soggetti politici direttamente beneficiati dai re e/o dai marchesi con parti del patrimonio fiscale. L'insieme di questi siti, ben comparabili con i casi già citati e provenienti dal nord della Tuscia, venne a creare una massa critica di rilievo a partire soprattutto dal X secolo all'interno di uno spazio politico unitario, la Marca di Tuscia, in questa fase in piena espansione. Questi siti ebbero forme di produzione specializzata, puntuale o meno, e tali attività sembrano inserite in un quadro economico complesso e pianificato da parte del potere centrale. Nel caso di Vetricella, il suo sviluppo non portò alla formazione di un abitato, presente invece in altri casi come a Donoratico, a Monterotondo Marittimo o, nel nord della Tuscia, a San Genesio. Le future indagini potranno chiarire se quest'assenza fu connessa alle peculiari forme di gestione di questo bene fiscale (rimasto sotto il controllo diretto del re), al tipo di produzione che caratterizzava in primo luogo Vetricella (il ferro) o, infine, ad altri fattori ancora da identificare.

Come poteva funzionare il sistema? In base soprattutto al dato archeologico, possiamo dire che si trattava di una rete di siti (curtensi o meno) funzionali alle necessità di un 'grandissimo proprietario' (il fisco); essa era stata messa in piedi per gestire ampissimi patrimoni agricoli, per sfruttare le risorse naturali e per produrre manufatti, spesso di una certa complessità e destinati a specifici usi: ceramiche, ferro (armi, ma anche strumenti necessari a lavorazioni artigianali, come i piccoli coltelli trovati a Vetricella), pietra (costruzioni militari e di prestigio), derrate alimentari e sale. Di nuovo, la dimensione eccezionale – rispetto agli standard curtensi – suggerisce lo sviluppo di forme di specializzazione complessa capaci di creare una rete infrastrutturale che sta alla base di un sistema di scambi. Al momento possiamo ritenere che la circolazione di questi prodotti non avvenisse, almeno in una prima fase, in forme propriamente commerciali, dal momento che la produzione di questi centri era probabilmente indirizzata sia verso le città e la corte, sia forse verso gli altri siti 'fuori scala' e le altre grandi proprietà fiscali. All'interno di questa rete infrastrutturale i siti posti lungo la viabilità e le coste avevano anche lo scopo di rendere possibile lo spostamento dei prodotti, fungendo da punti di partenza del prodotto locale verso il centro del sistema, rappresentato appunto da corte, città e altre grandi proprietà fiscali.

Qual è il ruolo di questo sistema nell'evoluzione economica della Tuscia? Al momento, in attesa dei nuovi dati che verranno dal nostro progetto e di una riflessione più approfondita e matura, possiamo già ipotizzare che dal funzionamento di questo sistema derivasse, indirettamente, un portato propriamente economico-commerciale. L'economia fiscale legata ai siti 'fuori scala' e ai loro territori e risorse, potrebbe, infatti, essere quella 'materia oscura', poco valutata nelle ricostruzioni della storia economica, capace di costituire il presupposto (demografico, produttivo, tecnologico) alla base del prodigioso e improvviso slancio dell'economia Toscana dalla fine dell'XI secolo (cf. Molinari 2010), quando il sistema, con la crisi della Marca di Tuscia, smise di funzionare e alcuni dei siti chiave, come Vetricella, furono abbandonati, mentre altri conobbero un'ulteriore e rapida espansione, come S. Genesio.

La crisi della Marca, che decretò la fine di questo sistema economico fiscale, fu seguita anche da una riorganizzazione economica nel senso di una maggior localizzazione legata in

particolare al più marcato sviluppo delle signorie territoriali, come avvenne in campo politico e sociale. Alcuni degli originari gangli del sistema fiscale, divenuti importanti pedine nel processo di affermazione delle signorie locali, andarono a connettersi più strettamente alle economie locali, come mostra l'archeologia, divenendo in alcuni casi punti di riferimento dei nuovi distretti signorili (si vedano i casi di S. Genesio, Donoratico o Monterotondo Marittimo, vd. Cantini, Salvestrini 2010; Bianchi 2004; Bruttini, Grassi 2009).

Una simile proposta interpretativa permetterebbe di spiegare i presupposti – o almeno alcuni dei presupposti – che consentirono alla Toscana di divenire nel pieno Medioevo una delle regioni più ricche d'Europa, nonostante un tessuto aristocratico modesto, una proprietà fondiaria frammentata e una limitata connessione alle reti di scambio sovraregionale prima dell'XI-XII secolo (Wickham 2005, pp. 214-16, 387-93; Cantini 2015).

La validità di queste ipotesi provvisorie andrà verificata da un lato con il proseguimento della ricerca nel territorio campione, dall'altro attraverso una più ampia e puntuale comparazione con altre aree della Tuscia e del centro-nord della Penisola.

G.B., S.M.C.

The nEU-Med project is part of the Horizon 2020 programme, in the ERC Advanced project category. It began in October 2015 and will be concluded in October 2020. The University of Siena is the host institution of the project.

The project is focussed upon two Tuscan riverine corridors leading from the Gulf of Follonica in the Tyrrhenian Sea to the Colline Metallifere. It aims to document and analyze the form and timeframe of economic growth in this part of the Mediterranean, which took place between the 7th and the 12thc. Central to this is an understanding of the processes of change in human settlements, in the natural and farming landscapes in relation to the exploitation of resources, and in the implementation of differing political strategies.

This volume brings together the research presented at the first nEU-Med workshop, held in Siena on 11-12 April, 2017. The aim of the workshop was to draw up an initial survey of research and related work on the project, one and a half years after its inception. The project is composed of several research units. Each unit covers an aspect of the interdisciplinary research underpinning the nEU-Med project, each with their own methodology. For this first volume of results, it was decided not to give an account of all the work carried out within all the units, but to select those lines of investigation which, at the end of the first year and a half, have made it possible to articulate and develop an interdisciplinary research strategy.

Origins of a new economic union (7th-12th centuries)
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edited by
Giovanna Bianchi, Richard Hodges

€ 39,00
ISSN 2035-5319
ISBN 978-88-7814-879-6
e-ISBN 978-88-7814-880-2
BAM-25
9 788878 148796