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ITALO-MYCENAEAN POTTERY: THE ARCHEOLOGICAL AND ARCHAEOMETRIC DIMENSIONS

with contributions by

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FOREWORD

The present volume is the result of nearly half a century of research related to the evidence concerning Aegean-Mycenaean finds in Italian Bronze Age contexts, carried out with the participation of the Istituto per gli Studi Micenei ed Egeo-Anatolici *(ISMEA) of the National Research Council (CNR), which in 2001 took the name of* Istituto di studi sulle civiltà dell'Egeo e del Vicino Oriente (*ICEVO*). *Since 2013 ICEVO became part of the new* Istituto di Studi sul Mediterraneo antico (*ISMA), with a much wider scope concerning research on ancient Mediterranean civilisations.*

The present monograph is published in the series Incunabula Graeca*, established by ISMEA in the 1960s.*

Among the earliest activities on the subject in which ISMEA played an important role, we would like to mention the small exhibition, entitled I Micenei in Italia*, held in Taranto Museum in 1967, edited by one of the authors of this monograph together with Santo Tiné (Tiné, Vagnetti 1967). A second exhibition on the same subject was held in1982, again in Taranto Museum, on the occasion of the* XXII Congresso di Studi sulla Magna Grecia *dedicated to* Magna Grecia e Mondo Miceneo *(MGMM2). The exhibition and its catalogue (MGMM1) was based mainly on the results of new excavations undertaken in the late 1970s in particular on the island of Vivara in the Gulf of Naples by Massimiliano Marazzi and Sebastiano Tusa, at Broglio of Trebisacce in Northern Calabria by Renato Peroni, at Termitito in Basilicata by Salvatore Bianco and Antonio De Siena, and at Nuraghe Antigori in Southern Sardinia by Maria Luisa Ferrarese Ceruti.*

The new excavations significantly expanded the geographical and chronological horizons, enormously increased the archaeological evidence of Aegean-type finds from Italy, well related to local archaeological contexts, and above all provided new material on which new archaeometric methodologies could be applied to ceramics.

Thanks to the far-sighted vision and the spirit of cooperation of the directors of the excavations and of the archaeological superintendents then in office, the four sites mentioned above became real research laboratories in which archaeology and archaeometry participated with equal dignity to the development of specific research strategies.

A first sampling campaign due to John Riley of the University of Southampton, was soon followed by a project carried out by Richard Jones, co-author of this monograph, as Director of the Fitch Laboratory of the British School at Athens, with the full consent and support of the then Director of the School, Hector W. Catling. The first results were presented by R.E. Jones in 1984, as part of the congress Traffici Micenei nel Mediterraneo. Problemi storici e documentazione archeologica, *(TMM), attracting much interest and discussion (Jones 1986).*

*In the following years, it became possible through the excavations in particular at Broglio di Trebisacce which yielded an outstanding amount and variety of pottery classes related to Aegean technology and style – painted Mycenaean pottery and its later derivations, wheel-made Grey ware of Minyan technology, large containers inspired by Aegean-type pithoi (*dolia*) – to launch, thanks to the support of Renato Peroni, a wide-ranging strategy of archaeometric research, which also included a very detailed study of the local* impasto *pottery. The project was developed* in situ *especially by Sara T. Levi, with numerous national and international collaborations, the first phase of which was summarized in* *her Ph.D. Thesis (*Tecnologia e organizzazione sociale della produzione ceramica nell'età del Bronzo dell'Italia meridionale, Università di Roma 'La Sapienza', *1994) and soon after in a specific monograph (Levi 1999).*

The authors gratefully acknowledge the special role played by Renato Peroni and Hector Catling for the development of the research in which archaeology and archaeometry have been co-actors of the same objective.

In the1990s, ISMEA, in parallel with the development of archaeometric research outlined above, launched a project of systematic and thorough collection of archaeological, territorial and bibliographical data, concerning sites in peninsular and insular Italy, where evidence of Aegean-Mycenaean type material had been found. The relational database, called Dedalo, *aimed to systematically collect what was known from the literature and, in some cases, from first-hand information available to members of the team, coordinated by the present author. During that time, several young scholars took part in the project; among them I would like to mention Licia Re, whose contribution to the first layout of the the database structure and the first data collection was extremely useful (Vagnetti, Re 1996). Among the authors and collaborators of the present volume, Marco Bettelli, Sara Tiziana Levi and also Lucia Alberti have given their contributions at different stages. Marco Bettelli's activity has been particularly devoted to the the contextual study of the Aegean-type finds from Italy as well as to the study of Italian-type material in archaeological contexts of the Aegean (Bettelli 2002).*

An outcome of the Dedalo project are Chapters 2 and 3 of the present monograph, respectively dedicated to the 103 archaeological sites considered here and to the comparative chronology of the Aegean and Central Mediterranean areas. Chapter 2 has been developed in the present form by Lucia Vagnetti, Marco Bettelli, Sara Tiziana Levi and Lucia Alberti. The same Lucia Alberti has contributed, with her specific archaeological knowledge of the Aegean area in general and of Crete in particular, to define some aspects of the comparative chronology of the two areas.

Among those outside Italy whom we collectively want to mention is John Ll. Williams in acknowledgement of his pioneering petrographic study of Italian prehistoric pottery.

We turn finally to terminology. One of the most significant outcomes of the close collaboration between archaeology and archaeometry is the discovery that pottery of Aegean type and technology was produced at more than one site in Italy. The definition of Aegean-type pottery is broadly used to describe ceramics that are typical products of the Aegean area considered in its widest geographical extension. Within this area there are more specific regional units, such as Crete, the Greek mainland, the Cyclades and the Dodecanese, which at different historical moments are also characterised by their own aspects of the material culture.

When we talk of Aegean-type pottery we do not mean to enter into the precise identification and distinction between material manufactured in the Aegean and possible imitations manufactured in adjacent areas.

The progress of research has allowed a better definition of the various Aegean pottery classes and their regional variations, as well as their imitations produced in areas such as Northern Greece, the Anatolian coast, Cyprus, the Levant and the Central and West Mediterranean.

With regard to the Aegean-type pottery found in Italy, they were initially considered as imported from the Aegean, with occasional distinctions between possible provenances from Mycenaean Greece or from Crete, thanks to the familiarity of Italian archaeologists with the Bronze Age of Crete.

Lord William Taylour's book published in 1958, Mycenaean Pottery in Italy and adjacent areas, *somehow consecrated the prevalence of the term 'Mycenaean' on other definitions, which subsequently entered the relevant literature extensively in Italian and other European languages.*

Since the 1980s, as a result of new excavations and also the integration of an archaeometric dimension into archaeological research, the existence of pottery – often generically referred to as of 'Aegean-Mycenaean *type' – produced in Italy, coexisting with imports from the Aegean, has been ascertained. A second important development has been the possibility of differentiating, on the basis of archeometric analysis, the major production centres on peninsular and insular Italy.*

The present volume, Italo-Mycenaean Pottery: the Archaeological and Archaeometric Dimensions, *summarises the results of thirty years of research and tries to describe and discuss them as an overall picture, but still 'in progress'.*

The authors are clearly aware that the plurality of the regional influences and stylistic inspirations of Aegean-type pottery produced in Italy would make the label of Italo-Aegean pottery the most appropriate for the definition of such production. However, the term Italo-Mycenaean pottery has been chosen for the title of the book and is used throughout the text, on the basis of some considerations that can be summarised as follows:

1. *The whole phenomenon of the interrelations between the Aegean and Italy as far as pottery is concerned takes place in the chronological sequence of what we call 'the Mycenaean civilisation', corresponding to the Late Bronze Age of Greece, which encompassed a substantial part of the Aegean area.*
2. *The earliest imported material, apart from some typical LH I sherds, can be referred to fabrics and techniques such as the Matt-painted and Minyan pottery, which are at home in Mainland Greece, starting in the Middle Helladic period, but also continuing into LH I, as the new data from Tsoungiza in the N.E. Peloponnese seems to confirm (J. Rutter pers. comm.).*
3. *The important presence of ceramic materials imported from Crete is essentially datable to a period not earlier than advanced LM IIIA and IIIB, when the island was strongly integrated into the Mycenaean cultural orbit.*
4. *The same consideration holds true for the pottery of local production imitating Aegean prototypes: the typological, stylistic and chronological references are consistent with the same areas of origin of the imports, mainly Mycenaean Greece and LM III Crete.*

In the light of these considerations the authors feel justified, at least for the moment, in adopting the term 'Italo-Mycenaean pottery'. First of all, it follows a tradition of studies that has been consolidated over time; on the other hand, we would like to emphasise the idea that the present monograph should mark and summarise a phase of research, from which new paths may be developed, new questions may be formulated, a better understanding of the picture, both in detail and in its general overview, may be proposed, and also a more appropriate terminology could be established.

Lucia Vagnetti

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Marco Bettelli and Lucia Vagnetti gratefully acknowledge the full support received over the years by the *Istituto di Studi sulle Civiltà dell'Egeo e del Vicino Oriente (CNR-ICEVO)*, recently merged into the *Istituto di Studi sul Mediterraneo Antico (CNR-ISMA)* and in particular by the Directors Mirjo Salvini, Marie-Claude Trémouille, Paola Santoro and Alessandro Naso who accepted and confirmed the publication of the present monograph in the *Incunabula Graeca* series.

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CHAPTER 1

THE PROJECT AND ITS DEVELOPMENT

Richard Jones, Sara T. Levi, Marco Bettelli, Lucia Vagnetti

1.1. Introduction

Aegean contacts with the outside world during the Bronze Age have always attracted much scholarly archaeological interest, notably those contacts to the east in Cyprus, the Levant and Egypt where artefacts, principally pottery, having a distinctive Mycenaean appearance have been found.

Indeed one of the hallmarks of the Mycenaean palace economy was its close connection with the network of communication and exchange well established since the Early Bronze Age between Crete and the Eastern Mediterranean (in particular with Egypt), that continued throughout the Middle and the Late Bronze Age, when Mycenaean Greece became a pre-eminent actor on the international scene. This assumption, mainly based on archaeological evidence, takes into account Minoan and Mycenaean artefacts exported from (van Wijngaarden 2002), as well as the *exotica* and commodities imported into the Aegean area (Cline 1994; Burns 2010, 2010a).

But as documentation of Mycenaean or Mycenaean-type finds in the eastern Mediterranean has continued over the last century or more so the debate about the purpose, role and context of Mycenaean presence abroad intensified over a much shorter time, the last thirty years or so. This process, based on finds from excavation on land and under water, has required the adoption of differing approaches including textual evidence and the input of science-based analysis in order to explain the many facets of interaction in operation in the east Mediterranean. These facets constitute a spectrum ranging from the descriptive – the size and geographical extent of interaction through long and short-distance exchange – to the basic aspects of exchange reflecting the identification of markets by the producer to the demands of the *élites* and other consumers, to such intangibles as ideology, prestige and value.

The corresponding situation of investigating Aegean contacts in the Central Mediterranean is a newer phenomenon. Its progress can be charted, beginning with the important discoveries of Aegean Bronze Age material in Italy which were made at the end of the 19th century, in Sicily by Paolo Orsi (Chapter 2, sites 69, 71-72, 74-76, 83) and in Apulia by Quagliati (Chapter 2, site 26 b; Vagnetti, Bettelli 2005). There followed the milestone of the systematic excavations on the Aeolian Islands from the 20th century onwards where for the first time Mycenaean pottery found in stratified association with the local Bronze Age material provided the establishment of a comparative chronology (Chapter 2, sites 87-90). Taylour's (1958) important monograph applied an Aegean perspective on Mycenaean pottery to the corresponding finds in Italy, especially from sites in Apulia and Sicily. But it was the late 1970s that marked the starting point of a new phase of activity that continues to today and is characterised by systematic excavations, such as those at Vivara in the Bay of Naples (Chapter 2, site 47) and Broglio di Trebisacce and Torre Mordillo in Calabria (Chapter 2, sites 32, 34). To these archaeological sites can be added the Nuragic centre at Antigori near Cagliari in Sardinia (Chapter 2, site 98), Termitito near Greek Metaponto, (Chapter 2, site 30) and more recently Rocavecchia in Apulia (Chapter 2, site 17), Tolentino in the Marche region (Chapter 2, site 58) and Afragola near Naples (Chapter 2, site 49). Collectively, these sites together with those discovered by chance and through rescue operations – now over a hundred in number and situated throughout much of peninsular Italy, Sardinia and Sicily – have brought to light an enormously increased number of finds, in majority ceramics, indicative of Aegean contact. At the same time, there have been corresponding finds in Albania (Bejko 1994; Touchais 2002) and possibly in Croatia as well (Tomas 2005).

Several consequences of this phenomenon are apparent. At the practical level it has encouraged closer examination of the finds and their contexts, revealing for example that in some parts of Italy the finds comprise not only the well-known decorated Mycenaean pottery but also other Aegean-influenced pottery such as Grey ware and *dolia*. Furthermore, improved documentation of these finds – aided by their entry into digital databases – has gone hand in hand with their reporting in the archaeological literature. It has stimulated the application of science-based analysis of this pottery to determine its status as either imported or locally/regionally produced and its technological characteristics.

At the level of interpretation, the presence of Mycenaean or Aegean-type pottery in Italy has attracted considerable interest among Italian prehistorians and as well as more internationally, as clearly demonstrated by the widening literature and the number of conferences and specialist meetings devoted to the subject. It is therefore necessary in the present context to appreciate the breadth and scope of these media. Vagnetti (1999, 2010) has offered the essential overviews of the subject. Peroni (1983) and Bietti Sestieri (1988), for instance, have elaborated the theoretical framework for interpreting the data, and this has obviously connected with the need on the part of Italian prehistorians to establish the *nature* of Mycenaean/Aegean presence within the context of the structure and character of indigenous society in Italy (Bietti Sestieri 2008; Cazzella, Recchia 2009). In viewing the situation in Italy from the *outside* there has been a critical assessment of first the *identity* of the external influence on Italy which has led to a consensus that, at least during the later phases of the Bronze Age, eastern contact with Italy was in the hands of not only Mycenaeans or others in the Aegean but also Cypriots. Second, two facets of that eastern contact with Italy – its purpose and impact – treated either separately or together has received much attention. In ceramic terms, and returning to the practical level, that contact can be explored by viewing the pottery according to its status: imported, local imitation and derivatives, as defined in a previous paper by some of the authors of the present monograph (Jones *et al.* 2005).

And third there is the issue that communication between the Aegean and Italy was not uni-directional: that Italian goods reached the Aegean in the later phases of the Bronze Age is now confidently documented (Bettelli 2002, 2009 and see Chapter 3). Thus taking these issues together, what was initially a phenomenon of local interest has been transported to the international stage. The points raised above concerning the Aegean in relation to the east are now very relevant to the Central Mediterranean.

These introductory remarks set the scene for the present monograph. The work presented here has its origins in the period – the 1980s – that saw rapid growth of interest in Aegean-Italian connections during the Italian Middle to Final Late Bronze. Since that time, one of us, LV, has been in the vanguard in the recording, documentation and interpretation of Aegean and Cypriot pottery finds in Italy. That effort led to the creation, at the *Istituto di studi sulle civiltà dell'Egeo e del Vicino Oriente* (CNR-ICEVO) in Rome, of a database of those finds arranged according to findspot, from which the gazetteer in Chapter 2 derives; this database, called DEDALO, is introduced in the Foreword. Complementing the description and illustration of the pottery according to traditional criteria is the pottery's characterisation by chemical and other methods for information on origin and technology which constitute the basis of Chapters 4 and 5 respectively. The use of science-based analysis for the identification of status – import vs. local product – has formed a systematic component of the collaboration between the authors since 1986 (Vagnetti, Jones 1988; Jones, Vagnetti 1991; Jones *et al.* 2002a, 2005; Buxeda i Garrigos *et al.* 2003; Levi *et al.* 2006; Levi 2010; Levi, Muntoni in press).

The results of this approach greatly facilitate the identification of what has emerged as one of the principal findings of the whole project, that is, production in Italy of decorated Aegean-type pottery, which we call Italo-Mycenaean. An explanation of the term Italo-Mycenaean is given in the Foreword.

The data presented collectively in Chapters 2-5 is new in the sense that it provides a holistic view, with all of the relevant information being treated in a uniform manner; some of that data is drawn from publications by ourselves and many others which are scattered over a literature dispersed over the archaeological and scientific domains and available in Italian and English and to a lesser extent in other languages as well. Other data sets appear here for the first time. Chronology features significantly in this work in part because of the role that Mycenaean pottery plays in establishing synchronisms between Italy and the Aegean; the second part of Chapter 3 consists of a major review of comparative chronology. It is our conviction that only through as full a documentation as possible of all the relevant finds and their description/characterisation that progress can be made in understanding aspects of the Italian Middle and Late Bronze Ages and foreign contact with Italy at that time. That goal has demanded the preparation of a monograph such as this.

The fourth and large chapter opens with an introduction to the methods of analysis and data treatment and gives a graphical-visual overview of the geological environment. The chapter's third section presents the results of analyses arranged by site and according to region; the probable sources of the imports and the Italo-Mycenaean pottery are then separately discussed, and the chapter ends with a summary which includes illustration of the relevant pottery. Contributing to the science-based content of Chapter 5 on technology are, first, a review of firing structures of Middle to Final Bronze Age date in Italy and, second, an account of experimental firings of Aegean-type/influenced pottery carried out close to the excavations at Broglio di Trebisacce.

Taking advantage of the comprehensive nature of the data covering a large geographical area as well as a *longue durée* of over 500 years, the last chapter attempts a synthesis of the results. It has to navigate a complex multi-layered path, treating as a central theme the dynamics of the interactions between those who came, on an occasional or more long-term basis, from the Aegean or elsewhere and those that they encountered in Italy. But this theme may be tempered when viewed against the backdrop of later Italian prehistory that saw changes taking place in society on a local level; cumulatively those changes led many parts of Italy along a trajectory that had a momentum of its own, relatively unaffected by influences from the Aegean and elsewhere. At the other end of the spectrum is the inescapable fact that the so-called International Era of the 15th-14th centuries BC encompassed Italy, albeit manifested in different ways from regions to the east, with the result that Italy has been inexorably drawn into the debate about international relations during the Late Bronze Age. By the nature of its content this monograph addresses a decidedly wide-ranging audience.

1.2. The archaeological evidence

Ceramics, essentially pottery but including a few clay figurines, form by far the largest category of artefactual finds that are indicative of contact between the Aegean and Cyprus with Italy. They form the basis of this book and are introduced in summary form in Table 1.2.

The number of examples of Aegean-type pottery found in Italy, whether Italo-Mycenaean or imported runs into several thousands (including unpublished pieces). They are distributed all over Italy and the Islands but concentrate in the south. The sites with more abundant finds (up to several hundred) include Vivara, the Aeolian Islands, Scoglio del Tonno, Porto Perone, Rocavecchia, Broglio di Trebisacce, Torre Mordillo, Thapsos and Antigori. The Italian specialised wares whose production was Aegean influenced – *dolia*, Grey and Protogeometric in Table 1.1 – are attested only in southern Italy (Bettelli, Levi 2003).

Other finds are limited to ivory including a Mycenaean warrior's head from Sardinia made of hippo tusk (Vagnetti *et al.* 2005), a few seal stones (Pacciarelli 2001; Cucuzza 2006) and small vitreous objects (Rahmstorf 2005; Bellintani *et al.* 2006; Bellintani, Stefan 2009). For metalwork the presence of bronze weaponry, tools and fibulae in typologies common to both regions hints at the existence of a 'metalwork koine' in the 13th century BC (Bietti Sestieri 1973; Carancini, Peroni 1997), and the Cypriot connection is well documented through the finds in Sicily and Sardinia of copper oxhide ingots which are of Cypriot origin (Lo Schiavo *et al.* 2009). Moreover specific types of metal objects found in the Central Mediterranean, such as bronze vessels, tripod stands, mirrors, some types of figurines, double axes, and smithing tools, are closely associated with Cypriot prototypes; they have been extensively discussed in several studies (Lo Schiavo *et al.* 1985; Matthäus 1980). Less clear as regards the source of the influence are architectural features such as the fortification system at the coastal site of Rocavecchia in Apulia (Scarano 2012) and, more controversially, the complex buildings organised in a planned urban setting at Thapsos (Militello 2004, 2005; Tomasello 2004).

1.3. The chronological framework

The earliest evidence of contacts between the Aegean and southern Italy is limited to a few instances of late Middle Helladic typology and technique, possibly datable to LH I (Rutter, personal communication). There follows in LH I-II the first significant phase of contact when Aegean products are recognised in southern Italy, parts of Sicily, the Aeolian Islands and the Phlegrean Islands in the Bay of Naples; these are earlier in date than any Mycenaean pottery found in the Levant (Vagnetti 1982f).

The eclipse of Minoan supremacy in the Aegean and the consequent rise of Mycenaean influence throughout that area in LH IIIA-IIIB early sees a consolidation of regular interconnections with southern Italy as well as the appearance of Mycenaean pottery on Sardinia and Malta and even in Spain (Martin de la Cruz 1990; Mommsen *et al.* 1990); this phenomenon is contemporary with the marked increase in Mycenaean exports to the East Mediterranean; Cypriot products appear in Sicily

Italy	Aegean	Absolute Date BC	Publication
Middle BA 1	Late Helladic (LH) I	c. 1700/1675 c. 1635/00	Manning 2010
Middle BA 2	LH II	c. 1635/00 c. 1420/10	
Middle BA 2 Middle BA 3	LH IIIA	c. 1420/10 c. 1330/15	
Recent BA 1	LH IIIB	c. 1330/15 c. 1200/1190	
Recent BA 1 Recent BA 2	LH IIIC early	c. 1200/1190 c. 1170/60	Weninger, Jung 2009; Jung 2010
Recent BA 2	LH IIIC developed	c. 1170/60 c. 1150/40	
Recent BA 2 Final BA 1-2	LH IIIC advanced	c. 1150/40 c. 1100	
Final BA 1-2	LH IIIC late and Submycenaean	c. 1100 c. 1070/1040	

Table 1.1

for the first time. Following the collapse of Mycenaean palaces at the end of the 13th century BC, the character of Aegean contact with the west undergoes some change: direct connection from east to west seems to continue at a less intensive pace, while that in the reverse direction increases. Some LH IIIC imports are still represented and close imitations have been abundantly found at many sites in paninsular Italy and on Sardinia; yet the Aegean influence detectable in the material culture within Italy remains very evident until it fades out at the II/I millennium BC transition.

The correspondence between the Aegean and Central Mediterranean chronologies is shown in Table 1.1, leaving Chapter 3 to provide a detailed discussion of relative chronology based on Aegean-type pottery found in stratigraphic contexts at a number of sites in Italy.

1.4. The pottery classes

The analysed pottery classes are summarised in Table 1.2

Tradition	Class/Ware	Description	Date (Italian chronology)	Date (Aegean chronology)
Aegean and Cypriot	Matt-painted (MP)	Middle Helladic tradition. Produced from fine clay; vessels manufactured either by hand or on the wheel, surface covered with a slip and decorated with dark on light matt painted patterns, often geometric. Workshop level of production. Mountjoy 1981; Dietz 1991; Zerner 1993. http://www.dartmouth.edu/~prehistory/aegean/lesson 9.	Middle Bronze Age	Middle-Late Bronze Age
	Burnished (BU)	Middle Helladic tradition. Produced from fine clay; vessel manufacture either by hand or on the wheel, surface covered with a slip usually orange or yellow, very well burnished. Workshop level of production. Mountjoy 1981; Dietz 1991.	Middle Bronze Age	Middle-Late Bronze Age
	Minyan (MIN)	Middle Helladic tradition. Produced from very fine clay; vessels usually wheel-made, surface and ceramic paste grey, brown, yellow or black, well burnished. Fired under well-controlled reducing or oxidizing conditions. Workshop level of production. Dietz 1991; Whitbread *et al*. forthcoming; Gauss, Kiriatzi 2011; http://www.dartmouth.edu/~prehistory/aegean/lesson 9.	Middle Bronze Age	Middle-Late Bronze Age
	Mycenaean (M)	Produced from very fine clay; vessel usually wheel-made, surface covered with a light slip and decorated with red and black lustrous painted patterns, often naturalistic. Fired under well-controlled usually oxidising conditions. Workshop level of production. Mountjoy 1986, 1993, 1999.	Middle to Final Bronze Age	Late Bronze Age
	Base Ring (BR)	Cypriot table ware and containers. Produced from fine clay; vessels are hand-made, surface covered by a highly polished brown slip. Very standardized shapes. Workshop level of production. Åström 1972, 2001.	Middle-Late Bronze Age	Late Bronze Age

Tradition	Class/Ware	Description	Date (Italian chronology)	Date (Aegean chronology)
Aegean and Cypriot	Pithoi (P)	Cypriot and Aegean large transport and storage jars. Workshop level of production. Christakis 2005 (Crete); Åström 1972; Pilides 2000 (Cyprus).	Middle-Late Bronze Age	Late Bronze Age
	Coarse ware (CW)	Produced from a medium to coarse clay with addition of temper(s); generally wheel-made, surface usually rough.	Late Bronze Age	Late Bronze Age
Mixed Italian products	Italo-Mycenaean (IM)	Produced from fine clay; vessel usually wheel-made, surface covered with a light slip and sometimes burnished; decorated with red and black lustrous painted patterns, often naturalistic, closely reproducing the Mycenaean decorative repertoire. Fired under well-controlled usually oxidising conditions. Workshop level of production. Taylour 1958; Vagnetti, Jones 1988; Vagnetti, Panichelli 1994; Bettelli 2002.	Middle to Final Bronze Age	Late Bronze Age
	Dolia (D) and Basins (B)	Large transport and storage jars, closed (*dolia*) or open (basins). Characteristics lie between a fine ware and *impasto*: usually fine clay, sometimes with addition of abundant temper; wheel-made or finished; surface is slipped; fired under oxidising conditions, giving a pink or light brown colour; basins decorated with matt painted geometric designs. Workshop level of production. Levi 1999; Levi, Schiappelli 2004; Schiappelli 2006.	Recent Bronze to Early Iron Age	Late Bronze Age and Early Iron Age
	Grey (G)	Mainly tableware in open shapes. Produced from a fine, calcareous clay; vessel is wheel-thrown and is well burnished; surface and ceramic paste dark or light grey, fired under well-controlled usually reducing conditions. Technologically derives from Minyan ware. Workshop level of production. Belardelli 1994; Bettelli 2002.	Recent to Final Bronze Age	Late Bronze Age
	South-Italian Protogeometric and Geometric (PG)	Often termed *figulina*, it inherits many of the characteristics of Aegean pottery: produced from a fine clay, hand or wheel-made; slipped and decorated with red and black matt-painted geometric designs. Fabric is typically pink or light brown. Workshop level of production. Yntema 1990.	Final Bronze Age-Early Iron Age	
Italian	*Impasto* (I)	The most abundant class of indigenous pottery, produced from a medium to coarse clay with addition of temper(s); generally hand-made, but examples of forming or finishing on the wheel occur in the later phases. Smoothed or burnished surface. Fired under variable conditions, giving red, brown or black colours, often mottled. Household/workshop level of production. Cocchi Genick 1999; Levi 1999, 2010.	Bronze Age and Early Iron Age	

Table 1.2

1.5. Archaeometric analyses

As explained above (section 1.1), the project incorporated from its earliest stages, in the mid-1980s, *chemical* (elemental) characterisation with the principal task of determining the origins of Aegean-type pottery, mainly decorated, and some suspected imports from the east Mediterranean found in Italy. The number of pots analysed chemically (often with more than one technique) is about 600 Aegean and Italo-Mycenaean and about 500 Mixed Italian products (*dolia* and Basins, Grey, South-Italian Protogeometric and Geometric) and *impasto*. *Petrographic* analysis has been employed for a similar purpose and applied to the coarser fabrics of suspected imports; it has also found very appropriate application to the characterisation of *impasto* from many of the findspots of Aegean-type pottery. Other science-based techniques were drawn into the project for specific and more limited purposes.

The rationale for the chemical characterisation has been the consistent recognition that the status of decorated Mycenaean or more broadly Aegean pottery cannot be unambiguously assessed on macroscopic criteria alone. In this situation chemical analysis can provide an objective viewpoint on origin, but underlying its potential success is the requirement of geochemical differences in the composition of clay materials between much of the Greek Mainland and Crete on the one hand and Italy and associated islands on the other. As the results in Chapter 4 demonstrate, these differences are apparent but they are not absolute with the result that some statements made about origin have to be tempered with some caution.

While the data generated by the project dominates the contents of Chapter 4, the results of relevant archaeometric projects carried out by other researchers are also treated in that chapter. The Appendix includes the technical background relating to the chemical and other analyses carried out for origin determination. The full composition data is set out according to analytical technique in the Databases (1-5). Chapter 5 presents the results of the technological investigations, obtained mainly with radiography and the scanning electron microscope.

CHAPTER 2

GAZETTEER OF SITES

Lucia Vagnetti, Marco Bettelli, Sara T. Levi, Lucia Alberti

2.1. Introduction

This chapter deals with the distribution and description of the sites located in peninsular Italy, Sicily, Sardinia and on the minor islands where pottery of Aegean and Cypriot type have been found and, to some extent, published.

As the focus of the present monograph is the presentation and discussion of archaeological and archaeometric characterisation of Aegean and Cypriot-type pottery and of derivative ceramic classes found in this area, sites where other type of evidence of interconnections with the East Mediterranean, such as ivory, vitreous material and metal objects (including oxhide ingots), have not been included in our list, nor mentioned in the 103 entries of the Gazetteer.

On the other hand, for each class of evidence other than pottery the reader can easily refer to a specialised and substantial bibliography. In particular, ivory finds and connected problems have been treated in a specific conference and in more recent studies (Vagnetti *et al.* 2005; Guglielmino *et al.* 2011); several studies by Paolo Bellintani and his group are devoted to glass and *faïence* (Bellintani *et. al.* 2006, Bellintani, Stefan 2009); oxhide ingots are thoroughly treated in a monograph edited by Lo Schiavo *et al.* (2009). As far as metal artefacts in general are concerned, apart from a limited number of imports from the Aegean and Cyprus, the vast problem of typological similarities and the so-called metalwork *koine* of the Recent and Final Bronze Age has been treated by many authors from the 1970s until today (Bietti Sestieri 1973; Matthäus 1980; Harding 1984; Bettelli 2002; Jung 2009). More generally, the problem of recognizing the *exotica* in Bronze Age Mediterranean contexts has been examined in a volume of collected papers edited by Vianello (2011).

The 103 sites listed in the Gazetteer are arranged in a numbered list according to region, beginning with Apulia and ending with Sardinia. In each entry the site name is followed by the name of the nearest administrative centre (*Comune*) and province abbreviation.

The precise location of each site and a brief description of its immediate topographic and geological environment are based on the data reported in the relevant sheet of the IGM (Istituto Geografico Militare) 1:25.000 map series. For the reader's use the sites are pinpointed on the distribution map (Fig. 2.1), accompanied by a numbered list of sites and by a second list, arranged alphabetically.

Sites are defined as 'coastal', 'sub-coastal' and 'inland' according to their distance from the coast. We have given our classification in a rather mechanical way, assigning the label 'coastal' to sites that today are located within 2 km of the coast; 'inland' sites are at a minimum of 10 km from the coast. We are aware that such a classification may be to some extent deceptive, as it is very rarely possible to establish how deeply changes in the coastline may have affected the original distance of the site from the sea, in the way of both erosion and sedimentary accumulation. This observation certainly makes more uncertain the classification of sites termed 'sub-coastal', i.e. between 2 and 10 km from the coast, whose change in location may have been more substantial, especially in the case of sedimentary accumulation. In the light of this *caveat* the reader should take the information as a general statement that, in the case of a particular site, needs to be supplemented by more detailed topographic and environmental survey.

A brief archaeological description of the site, the nature of its exploration, a definition of its function (settlement or necropolis) and its date according to local and Aegean chronologies are given. There is a summary of the pottery finds and, where relevant, their archaeometric analyses, followed by a select bibliography.

While the Aegean and Italo-Mycenean pottery is always quantified, under the entry 'Other Italian mixed products' only Grey ware and *dolia* are listed. Protogeometric and Geometric are not listed; in fact the two wares are ubiquitous in south-eastern Italy, but the relevant information that can be gathered about them from the literature is very often insufficiently precise.

At those settlement sites where Aegean-type pottery came to light at more than one location the site number is followed by a letter (e.g. 18a-e Otranto). In the rare cases that both settlement and necropolis are known and both have given evidence of Aegean-type pottery they have received an individual number (e.g., 70 Thapsos – settlement; 71 Thapsos – necropolis). For sites located on minor islands the number refers to the island and a letter is added to each different location. In order to avoid repetition the geographical and geological description of the island is given only once (e.g. 89. Island of Lipari; 89a-c. three different locations).

This is certainly not the first Gazetteer of Bronze Age sites in the Central Mediterranean with archaeological evidence of Aegean and Cypriot finds. After Marazzi and Tusa's first systematic attempts (1976a, 1979), other scholars have collected information from the existing literature with differing degrees of detail and accuracy (Smith 1987; van Wijngaarden 2002; Vianello 2005). Our Gazetteer, a version of which limited to southern Italy was published in Italian some years ago (Bettelli *et al.* 2001-02), is based exclusively on the use of first-hand bibliography, very often dispersed in rare local periodicals, authored in most cases by the site's excavator. Limited space is given to studies which are not a first-hand presentation of data. Moreover, the topographic, geographical and geological descriptions are quite detailed, as well as the correlation between the local Bronze Age chronology and the Aegean and Cypriot chronology. As similar compilations are very quickly superseded by new discoveries, a short paragraph at the end of the chapter offers a brief updating concerning sites discovered only recently, known through brief quotations without details, which may offer new important information in the future. In the same paragraph the exclusion from our list of some sites which had been included in previous studies is also explained.

Special abbreviations for Chapter 2

a.s.l.: above sea level.
IGM: Istituto Geografico Militare (topographical maps 1:25.000 for Sardinia and 1:25.000 V for peninsular Italy and Sicily).

2.2. Gazetteer of sites

APULIA

1. Manaccora, Peschici, FG

Location and geography: IGM Peschici 157 IV NW. On the coast, in an inlet. A small, rather narrow and elongated promontory, with two inlets on each side between Vieste and Peschici. The site lies in a cave on the west side of the bay, with the entrance on a cliff-face, very close to the sea level and just below a plateau where Bronze Age remains have been found. The Gargano area is characterised by the presence of many promontories of different sizes, and stretches of low and sandy coast that sometimes becomes marshy. Inland there is an often rough, mountainous area with several valleys through which seasonal streams run.
Lithology: Sedimentary rocks: limestones, dolomites, marls, chert, clays.
Investigation: Excavation.
Function and description: Burial cave. The cave is a large pseudo-rectangular cavity, 49 m in length, 18 m in width, and 18 m in height at the entrance. The principal axis of the cave is N-NE. The entrance is now very close to the sea. At its bottom there is another cavity (annexe) with a further small, narrow and elongated burial cave where several mainly MBA burials were discovered.
Local chronology: MBA, RBA, FBA, EIA.
Aegean chronology: LH I-II, LH IIIB (?).
Aegean and Italo-Mycenaean pottery: 4 fragments.
Other Italian mixed products: *Dolia.*
Archaeometric analyses: 2 Matt-painted and 2 Mycenaean probably imported from Peloponnese, 1 Protogeometric, 4 *impasto* (INAA, see Chapter 4 in this volume), technological investigation of *impasto* (Levi, Recchia 1995).
Bibliography: Rellini *et al.* 1930-31, 1934; Puglisi 1948; Baumgärtel 1951, 1953; Marazzi 1993; Recchia 1993; Tunzi Sisto 1999, 2010.

2. Molinella, Vieste, FG

Location and geography: IGM Vieste 157 IV SE. On a coastal plain (10 m a.s.l.), in a marshy area NW of Vieste. The coastline is low and indented, and bounded by long sandy beaches. For the geography see site 1.
Lithology: Sedimentary rocks: limestones, dolomites, marls, clays, chert.
Investigation: Excavation.
Function and description: Settlement. A defensive wall constructed of large stones that probably enclosed some huts, has been discovered on the NW side of the slope of the promontory. A dolmen and M-RBA cremation necropolis have also been found in the same area.
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH IIB.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Puglisi 1948; Peroni 1967a; Nava 1982, 1982a.

3. Coppa Nevigata, Manfredonia, FG

Location and geography: IGM Manfredonia 164 I NE. Sub-coastal (7 km from the coast). On a hill on the north side of the River Candelaro, at the edge of the Gargano promontory, in a partially marshy plain, by an ancient lagoon, now reclaimed (20 m a.s.l.).
Lithology: Sedimentary rocks: limestones, clays, sands.
Investigation: Excavation.
Function and description: Settlement. A huge stone fortification, with a monumental gate reinforced by towers, was built in the MBA (Protoapennine). The settlement grew beyond the wall at the end of the Protoapennine period. Two new fortification walls were built and the early gate was blocked during the Apennine period; the area gained a new function linked to activities involving the use of firing structures.
During the MBA (Apennine period) a ditch was excavated and remained in use until the FBA. Several dwellings mainly belonging to the early phases of the settlement have been identified. Some rectangular domestic structures, sometimes multi-room, furnished with ovens and served by streets, belong to the RBA.
The exploitation of murex shells for purple production seems to have been a particularly important economic activity at this site. It starts in the earliest phases of the settlement, continues throughout the advanced MBA and the RBA, and is probably linked to the exchange activities of the site.
Local chronology: Neolithic, Eneolithic, MBA, RBA, FBA, IA.
Aegean chronology: LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: About 300 fragments, some of which belong to restorable pots.
Other Italian mixed products: Grey, *dolia*?
Archaeometric analyses: 2 Burnished? locally produced, 2 Mycenaean probably imported from the Peloponnese and 25 Italo-Mycenaean, 3 Grey, 20 Protogeometric and Geometric, 2 *impasto*, 2 various (INAA, ICP in Jones, Levi 2012 and Chapter 4 in this volume); 10 Italo-Mycenaean, 41 Protogeometric and Geometric, 140 *impasto* and daub locally produced (XRF, XRD, PE in Levi *et al.* 1994-95, 1995; Amadori *et al.* 1995; Boccuccia *et al.* 1995); investigation of the pumice in the *impasto* (PE, SEM in Levi, Cioni 1998; Levi *et al.* 1998b, 1999a, 1999b, 2005); investigation

a) List of sites by numbers

1. Manaccora
2. Molinella
3. Coppa Nevigata
4. S. Maria di Ripalta
5. Madonna del Petto
6. Trani - Capo Colonna
7. Giovinazzo
8. Giovinazzo - S. Silvestro
9. Bari
10. Monopoli
11. Egnatia
12. Chiancudda
13. Torre S. Sabina - C. Morelli
14. Torre S. Sabina-Tumulo
15. Torre Guaceto
16. Punta le Terrare
17. Rocavecchia
18. Otranto
19. Capo S. Maria di Leuca
20. Parabita
21. Scalo di Furno
22. Avetrana
23. Oria-S. Cosimo
24. Torre Castelluccia
25. Porto Perone-Satyrion
26. Taranto
27. Cozzo Marziotta
28. Timmari
29. S. Vito
30. Termitito
31. Toppo Daguzzo
32. Broglio di Trebisacce
33. Francavilla Marittima
34. Torre Mordillo
35. Motta di Cirò
36. Crotone
37. Capo Piccolo
38. Grotta Petrosa
39. Taureana di Palmi
40. Punta Zambrone
41. Grotta Cardini
42. Grotta del Pino
43. Grotta di Polla
44. Paestum
45. Eboli
46. Pontecagnano
47. Vivara
48. Castiglione d'Ischia
49. Afragola
50. Monteroduni
51. Casale Nuovo
52. Vaccina
53. Monte Rovello
54. Luni sul Mignone
55. S. Giovenale
56. Scarceta
57. Treazzano di Monsampolo
58. Tolentino
59. Jesi
60. Ancona–Montagnolo
61. Frattesina
62. Lovara
63. Fabbrica dei Soci
64. Fondo Paviani
65. Castello del Tartaro
66. Terranegra
67. Bovolone
68. Montagnana
69. Mulinello di Augusta
70. Thapsos, settlement
71. Thapsos, necropolis
72. Pantalica
73. Buscemi
74. Floridia
75. Cozzo del Pantano
76. Matrensa
77. Siracusa
78. Madre Chiesa
79. Monte Grande
80. Milena-Monte Campanella
81. Milena-Serra del Palco
82. Cannatello
83. Marina di Agrigento
84. Erbe Bianche
85. Milazzo
86. Ustica
87. Filicudi
88. Salina
89. Lipari
90. Panarea
91. Stromboli
92. Orosei
93. Nuraghe Nastasi
94. Nuraghe Arrubiu
95. Su Nuraxi
96. Nuraghe Corti Beccia
97. Monte Zara
98. Nuraghe Antigori
99. Nuraghe Domu s'Orku
100. Nuraghe Is Baccas
101. Nora
102. Tharros
103. Duos Nuraghes

b) List of sites in alphabetic order

Afragola (49)
Ancona-Montagnolo (60)
Avetrana (22)
Bari (9)
Bovolone (67)
Broglio di Trebisacce (32)
Buscemi (73)
Cannatello (82)
Capo Piccolo (37)
Capo S. Maria di Leuca (19)
Casale Nuovo (51)
Castello del Tartaro (65)
Castiglione d'Ischia (48)
Chiancudda (12)
Coppa Nevigata (3)
Cozzo del Pantano (75)
Cozzo Marziotta (27)
Crotone (36)
Duos Nuraghes (103)
Eboli (45)
Egnatia (11)
Erbe Bianche (84)
Fabbrica dei Soci (63)
Filicudi (87)
Floridia (74)
Fondo Paviani (64)
Francavilla Marittima (33)
Frattesina (61)
Giovinazzo (7)
Giovinazzo - S. Silvestro (8)
Grotta Cardini (41)
Grotta del Pino (42)
Grotta di Polla (43)
Grotta Petrosa (38)
Jesi (59)
Lipari (89)
Lovara (62)
Luni sul Mignone (54)
Madonna del Petto (5)
Madre Chiesa (78)
Manaccora (1)
Marina di Agrigento (83)
Matrensa (76)
Milazzo (85)
Milena-Monte Campanella (80)
Milena-Serra del Palco (81)
Molinella (2)
Monopoli (10)
Montagnana (68)
Monte Grande (79)
Monte Rovello (53)
Monte Zara (97)
Monteroduni (50)
Motta di Cirò (35)
Mulinello di Augusta (69)
Nora (101)
Nuraghe Antigori (98)
Nuraghe Arrubiu (94)
Nuraghe Corti Beccia (96)
Nuraghe Domu s'Orku (99)
Nuraghe Is Baccas (100)
Nuraghe Nastasi (93)
Oria-S. Cosimo (23)
Orosei (92)
Otranto (18)
Paestum (44)
Panarea (90)
Pantalica (72)
Parabita (20)
Pontecagnano (46)
Porto Perone-Satyrion (25)
Punta le Terrare (16)
Punta Zambrone (40)
Rocavecchia (17)
S. Giovenale (55)
S. Vito (29)
S. Maria di Ripalta (4)
Salina (88)
Scalo di Furno (21)
Scarceta (56)
Siracusa (77)
Stromboli (91)
Su Nuraxi (95)
Taranto (26)
Taureana di Palmi (39)
Termitito (30)
Terranegra (66)
Thapsos, settlement (70)
Thapsos, necropolis (71)
Tharros (102)
Timmari (28)
Tolentino (58)
Toppo Daguzzo (31)
Torre Castelluccia (24)
Torre Guaceto (15)
Torre Mordillo (34)
Torre S. Sabina-C. Morelli (13)
Torre S. Sabina-Tumulo (14)
Trani-Capo Colonna (6)
Treazzano di Monsampolo (57)
Ustica (86)
Vaccina (52)
Vivara (47)

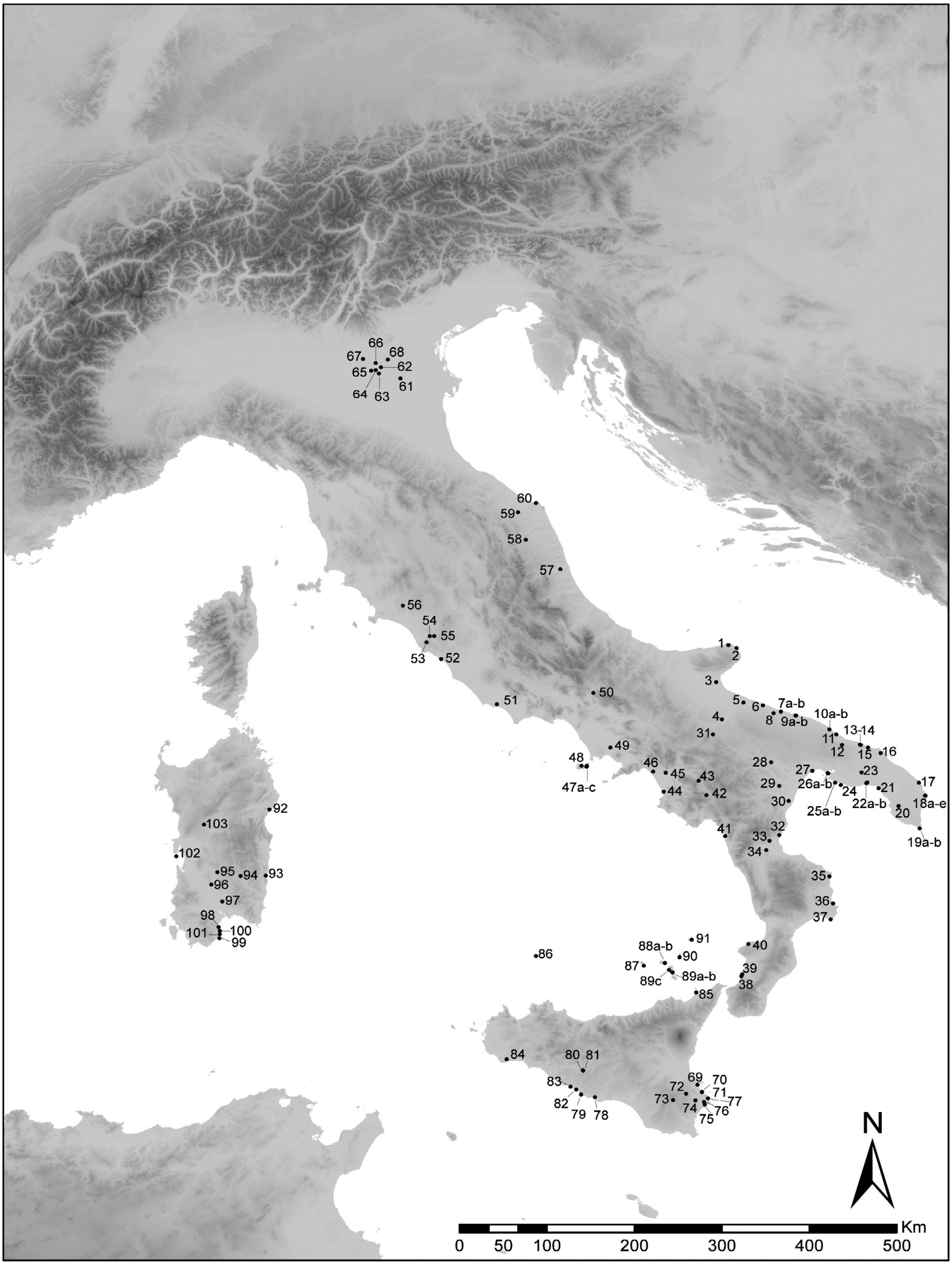

Fig. 2.1. Distribution Map with the list of sites: a) by numbers and b) in alphabetic order.

of manufacturing techniques of Italo-Mycenaean, Protogeometric and Geometric (X-ray in Boccuccia *et al.* 1995, 1998); functional analysis of *impasto* (PE, porosimetry in Aldi *et al.* 1997, Recchia, Levi 1999); pigment analysis of 1 Italo-Mycenaean (SEM, see Chapter 5 in this volume); 8 Neolithic locally produced (XRF, XRD, PE in Cassano *et al.* 1995).
Bibliography: Mosso 1909; Taylour 1958; Cazzella, Moscoloni 1987, 1988, 1999; Cazzella *et al.* 1991a, 1998, 2004, 2010, 2012; Boccuccia 2002; Belardelli 1993, 2005.

4. S. Maria di Ripalta, Cerignola, FG

Location and geography: IGM S. Maria di Ripalta 175 I SE. Inland (30 km from the coast), on an isolated plateau (150 m a.s.l.), about 10 km S of Cerignola. On high ground naturally protected with sheer cliffs onto the valley, in a strategic position on the north side of the River Ofanto. The area is characterised by a chain of low hills linked by small cols.
Lithology: Sedimentary rocks: clays, sandstones, limestones, sands.
Investigation: Excavation.
Function and description: Settlement. Several huts, sometimes rectangular, and a MBA pottery kiln (?). A storage building and *enchytrismos* burials are dated to the FBA.
Local chronology: MBA, RBA, FBA, EIA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: Some unpublished fragments.
Other Italian mixed products: *Dolia.*
Archaeometric analyses: investigation of the pumice in the *impasto* pottery (XRF, XRD, PE, SEM in Levi, Cioni 1998).
Bibliography: Nava 1980; Nava, Pennacchioni 1981; Tunzi Sisto 1995, 1999.

5. Madonna del Petto, Barletta, BA

Location and geography: IGM Canne della Battaglia 176 IV NE. Sub-coastal (6 km from the coast), on an isolated plateau (26 m a.s.l.) bounded by steep slopes, on the northern edge of the Murge plateau. The site lies on the south side of the River Ofanto.
Lithology: Sedimentary rocks: limestones, clays, marls, dolomites.
Investigation: Excavation.
Function and description: Settlement. Structures and finds are mainly dated to the FBA. Earlier pottery has been found on the surface. Two burials, one *enchytrismos*.
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 3 fragments.
Other Italian mixed products: *Dolia.*
Archaeometric analyses: 1 Italo-Mycenaean, 4 *dolia*, 3 Protogeometric, 8 *impasto*, 2 daub (XRF, SEM, PE, XRD, DTA, TG in Laviano *et al.* 1995; Eramo *et al.* 2002).
Bibliography: Muntoni 1995, 1998, 2010.

6. Trani, Capo Colonna, BA

Location and geography: IGM Trani 176 I NE. On a coastal peninsula (9 m a.s.l.). Close to Trani, on the low peninsula of Capo Colonna linked to the coastline by a low and narrow isthmus. The site is located between the Medieval abbey overlooking the promontory and the sea. The low and sandy coastline is straight, and Trani bay is the only harbour in the area. Close to the coast the land is flat, while the hinterland is characterised by low hills rising to the Murge plateau.
Lithology: Sedimentary rocks: limestones, dolomites.
Investigation: Excavation.
Function and description: Settlement. Beaten earth floors and post holes for rectangular huts in the upper layers; circular huts dated to the MBA in the lower layers.
Local chronology: MBA, RBA, FBA, EIA.
Aegean chronology: LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: 1 published and some unpublished fragments.
Other Italian mixed products: *Dolia.*
Archaeometric analyses: none.
Bibliography: Muntoni, Radina 1994; Radina, Recchia 2006; Radina 2010; Bettelli 2010a.

7a. Giovinazzo, Piazza San Salvatore, BA

Location and geography: IGM Molfetta 177 IV SE. On a coastal promontory (7 m a.s.l.). NW of Bari, on a small peninsula that projects out into the sea, with a relatively deep natural inlet. The coastline is low and sandy.
Lithology: Sedimentary rocks: limestones, sandstones, clays, marls, dolomites.
Investigation: Excavation.
Function and description: Settlement. Remains of huts with post holes and of a wall belonging to a more complex structure.
Local chronology: MBA.
Aegean chronology: LH II-IIIA.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Radina, Cataldo 1998; Marazzi 1998; Princigalli 2010.

7b. Giovinazzo, Via Marco Polo, BA

Location and geography: IGM Molfetta 177 IV SE. On a coastal promontory (7 m a.s.l.). See site 7a.
Lithology: see site 7a.
Investigation: Excavation.

Function and description: Settlement. Remains of an oval structure with a 'potsherd pavement', probably belonging to an oven.
Local chronology: MBA.
Aegean chronology: LH I-IIIA.
Aegean and Italo-Mycenaean pottery: 1 fragment, in matt-painted fabric.
Archaeometric analyses: none.
Bibliography: Radina, Cataldo 1998; Marazzi 1998; Princigalli 2010.

8. Giovinazzo, San Silvestro, BA

Location and geography: IGM Bitonto 177 III NE. Sub-coastal (4 km from the coast), on a plain (70 m a.s.l.). The coastline is low and straight with few landing places. The hinterland is a large cultivated plain, characterised by olive groves.
Lithology: Sedimentary rocks: limestones, sandstones, clays, marls, dolomites.
Investigation: Excavation.
Function and description: Dolmen (Sp. Scalfanario) with tumulus and a circular antechamber that precedes an elongated rectangular funerary chamber.
Local chronology: MBA 1-2.
Aegean chronology: LH I-II.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Lo Porto 1961, 1967; Princigalli 2010.

9a. Bari, Santa Maria del Buonconsiglio, BA

Location and geography: IGM Bari 177 II NE. On a coastal promontory (4 m a.s.l.). Close to the church of S. Maria del Buonconsiglio. During prehistory the rocky promontory where the old part of the city is now located was separated from the mainland by an isthmus or lagoon. The area is characterised by rich soils. The coastline is low and nearly straight.
Lithology: Sedimentary rocks: limestones, dolomites, sandstones, clays, marls.
Investigation: Excavation.
Function and description: Settlement. An oval hut (5x4 m) with a wall made of calcareous blocks and mortar and a 'potsherd pavement'.
Local chronology: MBA, RBA, FBA, EIA.
Aegean chronology: LH II-III.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Radina 1988a, 1998, 2010a; Marazzi 1998.

9b. Bari, Santa Scolastica, BA

Location and geography: IGM Bari 177 II NE. On a coastal promontory (4 m a.s.l.). Close to the old people's home next to the Medieval church of S. Scolastica, at the northern edge of the peninsula where the old city is located. See site 9a.
Lithology: See site 9a.
Investigation: Excavation.
Function and description: Settlement. Layers dated to various phases of the Bronze and Iron Ages.
Local chronology: MBA, RBA, FBA, EIA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: none.
Bibliography: Fornaro 1988; Radina 1998, 2010a.

10a. Monopoli, Piazza Palmieri, BA

Location and geography: IGM Monopoli 190 I NO. On a wide coastal promontory with a deep natural inlet (10 m a.s.l.). The coastline is mostly low and sandy, but also indented with inlets and landings. The hinterland, a narrow plain, is delimited by low hills.
Lithology: Sedimentary rocks: limestones.
Investigation: Excavation.
Function and description: Settlement. The site, located under the modern town, is characterised by an impressive archaeological deposit with Bronze Age layers at the bottom. Remains of a hut and a firing structure with 'potsherd pavements' are dated to the MBA.
Local chronology: MBA 2-3, RBA.
Aegean chronology: LH II-IIIA.
Aegean and Italo-Mycenaean pottery: 3 fragments.
Archaeometric analyses: none.
Bibliography: Cinquepalmi 1995, 1998, 1998b; Muntoni 1998a; Princigalli 2010a.

10b. Monopoli, Via Papacenere, BA

Location and geography: IGM Monopoli 190 I NO. On a wide coastal promontory (10 m a.s.l.). See site 10a.
Lithology: See site 10a.
Investigation: Excavation.
Function and description: Settlement, located under the modern town.
Local chronology: MBA, RBA.
Aegean chronology: LH IIIB-IIIC early.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: none.
Bibliography: Cinquepalmi 1995, 1998; Carrieri, Muntoni 1998; Princigalli 2010a.

11. Egnatia, Fasano, BR

Location and geography: IGM Fasano 190 I SE. On a coastal promontory (3 m a.s.l.). The protohistoric site is on the so-called 'acropolis' of the Messapic and Roman settlement, on a small promontory between two inlets. The coastline is characterised by several inlets, while the hinterland rises rapidly.
Lithology: Sedimentary rocks: limestones.

Investigation: Excavation.
Function and description: Settlement. The site is protected by a dry-stone wall, tapered at the top, founded on solid rock. Remanins of RBA huts.
Local chronology: MBA, RBA, FBA, IA.
Aegean chronology: LH IIIA (?), LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 6 Mycenaean fragments, 1 Burnished.
Archaeometric analyses: 44 *impasto* (XRF, PE, XRD in Cinquepalmi *et al.* 2003).
Bibliography: Biancofiore 1994-1995; Cinquepalmi, Caramuta 1998; Cinquepalmi 2010.

12. Chiancudda, Cisternino, BR

Location and geography: IGM Montalbano 191 III NO. The site is located on a plateau, in the Murge hinterland, about 7 km from the coastline, on the top of a massif (167 m a.s.l.), situated on the slope of the Murge ridge.
Lithology: Sedimentary rocks: limestones.
Investigation: Excavation.
Function and description: Settlement. A Bronze Age dry-stone fortification wall, 4 m thick, was uncovered along the western edge of the plateau. Its foundations are on top of layers containing Protoapennine pottery.
Local chronology: MBA, RBA.
Aegean chronology: LH IIIA, LHIIIB-C.
Aegean and Italo-Mycenaean pottery: 12 fragments.
Archaeometric analyses: 1 Mycenaean probably imported from Peloponnese (ICP, see Chapter 4 in this volume).
Bibliography: Cinquepalmi *et al.* 2006; Cinquepalmi, Recchia 2010; Bettelli 2010b.

13. Torre Santa Sabina, Contrada Morelli, Carovigno, BR

Location and geography: IGM Castello di Serranova 191 II SO; Ostuni 191 III SE. On a coastal inlet (3 m a.s.l.) between Ostuni and Brindisi, on the terraces close to a stream. The coastline is low, partly sandy and rather indented. In the hinterland there is an extensive cultivated plain. The land is characterised by large torrent beds.
Lithology: Sedimentary rocks: limestones, sands.
Investigation: Excavation.
Function and description: Settlement. Large LBA dwellings, partially below ground level, surrounded by post holes, with irregular steps at the entrance.
Local chronology: Neolithic, RBA, FBA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 23 fragments.
Archaeometric analyses: 8 Mycenaean probably imported from Peloponnese, 5 Italo-Mycenaean, 7 *impasto* (ICP in Bettelli *et al.* 2010 and Chapter 4 in this volume).
Bibliography: Coppola, Raimondi 1995; Coppola, Cinquepalmi 1998; Cinquepalmi 2010a; Caldarola 2012.

14. Torre Santa Sabina, Tumulo, Carovigno, BR

Location and geography: IGM Castello di Serranova 191 II SO. On the coastal plain between Ostuni and Brindisi (3 m a.s.l.). See site n. 13.
Lithology: Sedimentary rocks: limestones, sands.
Investigation: Excavation.
Function and description: Burial tumulus. 25 rectangular shaft graves, covered by tufaceous slabs, which were probably part of a single mound.
Local chronology: MBA, RBA.
Aegean chronology: LH IIIA.
Aegean and Italo-Mycenaean pottery: 3 vases in tomb 12 (cup, alabastron and Matt-Painted jug) and a plain lid in tomb 5.
Archaeometric analyses: lid from Tomb 5, local (ICP in Bettelli *et al.* 2010 and Chapter 4 in this volume).
Bibliography: Lo Porto 1963a; Biancofiore 1967; Coppola, Cinquepalmi 1998; Onnis 2010.

15. Torre Guaceto, Carovigno, BR

Location and geography: IGM Castello di Serranova 191 II SO. On a coastal promontory (6 m a.s.l.) that projects out towards the S, with a large inlet. In antiquity the promontory was probably linked to the offshore islands Scogli di Apani, forming a lagoon into which a river, now called 'Canale Reale', flowed. The site lies in a vast marshy area. In the hinterland there is a plain that rises rapidly towards the hills.
Lithology: Sedimentary rocks: limestones, sandstones, sands.
Investigation: Excavation.
Function and description: Settlement. Remains of quadrangular huts with dry-stone walls and an L-shaped defensive structure (embankment), more than 180 m long.
Local chronology: MBA, RBA, FBA, IA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Guerreschi 1966; Rittatore 1967; Punzi 1968; Franco 1991-92; Scarano 2008, 2012a; Scarano *et al.* 2009, 2010; Cinquepalmi *et al.* 2010.

16. Punta le Terrare, Brindisi, BR

Location and geography: IGM Brindisi 203 I NE; Porto di Brindisi 204 IV NO. On the coast, on a small promontory inside Brindisi harbour (6 m a.s.l.). The coastline is low, sandy and straight, with few inlets.

The hinterland is an extensive cultivated plain.
Lithology: Sedimentary rocks: clays, sandstones, limestones, sands.
Investigation: Excavation.
Function and description: Settlement. Several huts with firing installations; remains of a defensive wall embankment.
Local chronology: MBA.
Aegean chronology: LH II, LH IIIA, LH IIIB.
Aegean and Italo-Mycenaean pottery: 14 fragments.
Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese, 1 Italo-Mycenaean, 5 *impasto* (INAA in Bettelli *et al.* 2010 and Chapter 4 in this volume); 24 *impasto*, 7 daub (XRF, XRD, PE in Laviano *et al.* 1995b).
Bibliography: Lo Porto 1986, 1995, 1998; Radina 1995, 1998a, 1998b; Franco 1996; Boccuccia 1998; Boccuccia *et al.* 1998; Recchia, Radina 1998; Alberti 2004; Cinquepalmi 2010b.

17. Rocavecchia, Melendugno, LE
Location and geography: IGM Melendugno 214 I NE. On a coastal promontory (6 m a.s.l.), N of Otranto. The coastline is low, rocky and indented.
Lithology: Sedimentary rocks: limestones, clays, marls, conglomerates, sands.
Investigation: Excavation.
Function and description: Settlement. Monumental fortification wall with complex gates, dated to the Middle, Recent and Final Bronze Ages. Large rectangular structures with post holes and storage rooms. Inside one of the rectangular structures, dated to the FBA, clay altars and remains of cult activity have been found, as well as two metal hoards. Some of the objects are of Aegean typology; four gold discs are decorated with sun patterns.
Local chronology: MBA, RBA, FBA, IA.
Aegean chronology: LH II, LH IIIA, LH IIIB, LH IIIC, Submycenaean (?).
Aegean and Italo-Mycenaean pottery: About 2000 fragments, some of which belong to restorable pots.
Other Italian mixed products: Grey, *dolia.*
Archaeometric analyses: 1 Matt-painted, 1 Burnished, 2 Minyan, 18 Mycenaean probably imported from the Peloponnese, Central Greece and West Crete, 17 Italo-Mycenaean, 4 Grey, 4 *dolia*, 2 basins, 3 Protogeometric, 11 *impasto*, 2 various (ICP, PE, SEM in Guglielmino *et al.* 2010 and Chapter 4 in this volume), pigment analysis (SEM, see Chapter 5 in this volume).
Bibliography: Guglielmino 1996, 1999, 2002, 2003, 2005, 2005a; Guglielmino *et al.* 2006; Guglielmino, Pagliara 2006, 2010; Pagliara 2002, 2003, 2005; Pagliara, Guglielmino 2005; Pagliara *et al.* 2007, 2008; Scarano 2010, 2012.

18a. Otranto, Cantiere Mitello, LE
Location and geography: IGM Otranto 215 III NO. On a coastal promontory with two inlets where the River Idro flows into the sea, along the E side of the 'canale d'Otranto' at the boundary between the Adriatic and Ionian Seas. The high, sheer coastline gives way to an extensive plateau in the hinterland. The Bronze Age settlement is located under the Medieval town of Otranto; remains came to light at various spots during building works. Cantiere Mitello is located on the southern slope of the hill (20 m a.s.l.).
Lithology: Sedimentary rocks: limestones, clays, dolomites.
Investigation: Excavation.
Function and description: Settlement. Remains of structures, probably habitation units with beaten earth floors, post holes and ditches dated to two different phases of the FBA.
Local chronology: FBA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 5 fragments.
Archaeometric analyses: none.
Bibliography: Orlando 1994, 2002.

18b. Otranto, Cantiere 2, LE
Location and geography: See Site 18a. Cantiere 2 is located at the eastern slope of the hill, 150 m from Cantiere 3.
Lithology: See Site 18a.
Investigation: Excavation.
Function and description: Settlement. Remains of structures excavated in the rock.
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH IIIB, LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese (INAA, see Chapter 4 in this volume).
Bibliography: Orlando 2002.

18c. Otranto, Cantiere 3, LE
Location and geography: IGM Otranto 215 III NO. See site 18a. Cantiere 3 is located 150 m south from Cantiere 2, very close to Cantiere Mitello.
Lithology: See site 18a.
Investigation: Excavation.
Function and description: Settlement. Large structure excavated in the rock, with a small corridor at the entrance.
Local chronology: RBA, FBA, IA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 10 fragments.

Other Italian mixed products: Grey, *dolia.*
Archaeometric analyses: none.
Bibliography: Orlando 1996, 2002.

18d. OTRANTO, CANTIERE 4, LE

Location and geography: IGM Otranto 215 III NO. See site 18a. Under the Medieval town of Otranto, near the church of San Pietro (15 m a.s.l.).
Lithology: See site 18a.
Investigation: Excavation.
Function and description: Settlement. Patches of hearth heavily disturbed by Byzantine graves.
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 7 fragments.
Archaeometric analyses: none.
Bibliography: Cremonesi, Benzi 1982, Benzi 1983; Orlando 1983, 2002; Melissano, Orlando1990.

18e. OTRANTO, CANTIERE 5 - VIA FACCOLLI, LE

Location and geography: IGM Otranto 215 III NO. See site 18a. Under the Medieval town of Otranto, on the SW slope of the hill (8 m a.s.l.).
Lithology: See site 18a.
Investigation: Excavation.
Function and description: Settlement. Patch of a BA-IA stratigraphy, characterised by ash and charcoal, without structural remains.
Local chronology: FBA, IA.
Aegean chronology: LH IIIB-C, LH IIIC.
Aegean and Italo-Mycenaean pottery: 8 fragments.
Archaeometric analyses: none.
Bibliography: Cremonesi, Benzi 1982; Benzi 1983; Orlando 1983; Melissano, Orlando 1990; Orlando 2002.

19a. CAPO SANTA MARIA DI LEUCA, PUNTA MELISO, Leuca, LE

Location and geography: IGM Castrignano del Capo 223 II NE. On a coastal promontory (12 m a.s.l.), at the southern end of the Salento peninsula, lying on a flat terrace below the Santa Maria di Leuca sanctuary, 100 m from the sea. The coastline is high, steep, and indented with few landing places. Seasonal streams flow into the low and sandy inlet of Leuca. The hinterland is a cultivated plateau.
Lithology: Sedimentary rocks: limestones, clays, dolomites, sands.
Investigation: Excavation.
Function and description: Settlement. Remains of 'potsherd pavements' belong to the RBA. Habitation units and a silo belong to the FBA.
Local chronology: RBA, FBA.
Aegean chronology: LH IIIC, Submycenaean (?).
Aegean and Italo-Mycenaean pottery: About 300 fragments, some of which belong to restorable pots.
Other Italian mixed products: *Dolia.*
Archaeometric analyses: 5 Italo-Mycenaean, 4 Protogeometric, 3 *impasto* (PE Boschian 1996).
Bibliography: Orlando 1990; Benzi, Graziadio 1996, 1996a.

19b. CAPO SANTA MARIA DI LEUCA, SANTUARIO, Leuca, LE

Location and geography: IGM Castrignano del Capo 223 II NE. On a coastal promontory (50 m a.s.l.) at the southern end of the Salento peninsula, it is situated in the area of the Santa Maria di Leuca sanctuary, on the terrace below the plateau at the top of the promontory of Punta Meliso, 150 m from the sea. It is probably part of the same site found immediately below, described under site 19a.
Lithology: See site 19a.
Investigation: Excavation.
Function and description: Settlement. Part of a fortified village with hearths and 'potsherd pavements' occupied from the late part of the MBA to the FBA.
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH IIIB, LH IIIC early.
Aegean and Italo-Mycenaean pottery: 5 fragments.
Archaeometric analyses: none.
Bibliography: Cremonesi 1978; Cremonesi, Benzi 1982; Orlando 1990a; Benzi, Graziadio 1996, 1996a.

20. PARABITA, MASSERIA VECCHIA, Casarano, LE

Location and geography: IGM Casarano 214 III SE. Inland, in the centre of the Salento area (12 km from the coast) and on the top of the high ground of Parabita (100 m a.s.l.), with low hills and a few streams.
Lithology: Sedimentary rocks: limestones, dolomites, clays, marls, sandstones, sands.
Investigation: Excavation.
Function and description: Settlement. The huts fill the whole crest of the high ground.
Local chronology: FBA, IA (?).
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Ciongoli 1986.

21. SCALO DI FURNO, Porto Cesareo, LE

Location and geography: IGM Porto Cesareo 213 I NE. On a coastal peninsula (3 m a.s.l.), looking onto a small inlet between Torre Chianca and Porto Cesareo. The coastline, marshy in the past, is low and sandy, with many irrigation canals and reservoirs.
Lithology: Sedimentary rocks: limestones, dolomites, clays.
Investigation: Excavation.

Function and description: Settlement. Several huts and a craft area with a kiln and several ovens, dated to the MBA. A defensive earthwork rampart with a gate and a paved street belong to the FBA. Cluster of round huts, with beaten earth floors, walls, and post holes.
Local chronology: MBA, RBA, FBA, IA.
Aegean chronology: LH IIIA, LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: 10 fragments.
Archaeometric analyses: none.
Bibliography: Lo Porto 1990; Semeraro 1996.

22a. Grotta S. Martino, Avetrana, TA

Location and geography: IGM Avetrana 203 II SO; Torre Colimena 213 I NO. Sub-coastal site (4 km from the coast), on a plain (50 m a.s.l.). Close to Avetrana in Contrada S. Martino. The coastline is low and sandy with dunes and small inlets. Along the coast there is a vast marshy area. In antiquity the cave was closer to the sea.
Lithology: Sedimentary rocks: limestones, dolomites.
Investigation: Excavation.
Function and description: Cave, with remains of settlement.
Local chronology: Neolithic, EBA, MBA, RBA, FBA, IA.
Aegean chronology: LH IIIB-C, LH IIIC.
Aegean and Italo-Mycenaean pottery: 3 fragments.
Archaeometric analyses: none.
Bibliography: Biancofiore 1967; Fisher 1988.

22b. Caverna dell'Erba, Avetrana, TA

Location and geography: IGM Avetrana 203 II SO; Torre Colimena 213 I NO. Sub-coastal site (4 km from the coast), on a plain (50 m a.s.l.). See site 22a.
Lithology: See site 22a.
Investigation: Excavation.
Function and description: Cave, with remains of settlement.
Local chronology: Neolithic, EBA, MBA, RBA, FBA, IA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 4 fragments.
Archaeometric analyses: none.
Bibliography: Puglisi 1953; Biancofiore 1967; Fisher 1988.

23. Oria, S. Cosimo della Macchia, BR

Location and geography: IGM Oria 203 III NE. Inland (30 km from the coast), on a plain (86 m a.s.l.). S. Cosimo is 5 km SE of Oria, and dominates the plain known as 'Tavoliere di Lecce'. The country is cultivated today, but was wooded in antiquity.
Lithology: Sedimentary rocks: limestones, clays, dolomites, sandstones.
Investigation: Chance discovery.
Function and description: Necropolis (?). The finds were bought by F. Lenormant, as coming from a tomb in the vicinity of S. Cosimo village.
Local chronology: context unknown.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 2 stirrup jars.
Archaeometric analyses: none.
Bibliography: Taylour 1958; Tinè, Vagnetti 1967; Biancofiore 1967; Maruggi 1993; Vagnetti 2010a.

24. Torre Castelluccia, Pulsano, TA

Location and geography: IGM Pulsano 202 II SE. On a coastal promontory (24 m a.s.l.). Close to a bay near Torre Castelluccia, 20 km S of Taranto. The coastline is high and rocky, with several small and often deep inlets that are natural landing places. Inland there is an extensive cultivated plain, crossed by a few seasonal streams with sandy beaches at the mouth.
Lithology: Sedimentary rocks: limestones, clays, marls, sands.
Investigation: Excavation.
Function and description: Settlement.
Wall with buttresses and a ditch (RBA); small rectangular huts with walls and paved or beaten earth floors, and a large apsidal house (FBA). Rock-cut chamber tombs (MBA and RBA); cremation necropolis (RBA and FBA).
Local chronology: MBA, RBA, FBA, IA.
Aegean chronology: LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: More than 30 fragments, some of which belong to restorable pots.
Archaeometric analyses: 1 Mycenaean probably imported from Central Crete or Central Greece, 2 Italo-Mycenaean, 4 *dolia*, 4 basins, 7 Protogeometric, 3 *impasto* (AAS, INAA, ICP in Jones, Levi 2002 and Chapter 4 in this volume).
Bibliography: Drago 1948, 1953; Taylour 1958; Biancofiore 1967; Fisher 1988; Gorgoglione *et al.* 1993; Gorgoglione 2002; Vagnetti 2002; Princigalli 2010b; Orlando 2012.

25a. Porto Perone, Leporano, TA

Location and geography: IGM Pulsano 202 II SO. Coastal (300 m from the coast), on the promontory of Torre Saturo (20 m a.s.l.) which projects outwards between the inlets of Porto Perone and Porto Saturo. The archaeological site is close to the coast on an extensive plain that slopes down to the sea. The high ground of Satyrion (site 25b) is probably the

acropolis of the site. The high and rocky coastline is characterised by several small and deep inlets that are natural landing places.
Lithology: Sedimentary rocks: limestones, marls, clays.
Investigation: Excavation.
Function and description: Settlement. Round huts and 'potsherd pavements' dated to the earliest phases. A fortification wall with ramparts and a ditch, apsidal huts and a complex settlement plan belong to the RBA. On the edge of the hill a rock-cut chamber tomb without grave goods, probably dates to the RBA.
Local chronology: MBA, RBA, FBA, IA.
Aegean chronology: LH I-II, LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: About 100 fragments, some of which belong to restorable pots.
Other Italian mixed products: Grey, *dolia.*
Archaeometric analyses: 1 Matt-Painted probably imported from the Peloponnese, 2 pithoi locally produced (?), 18 Italo-Mycenaean, 1 *dolium*, 4 Grey, 3 Protogeometric, 1 Greek Protogeometric or Geometric probably imported (AAS, INAA, ICP in Jones 1993a, Jones, Levi 2002 and Chapter 4 in this volume).
Bibliography: Taylour 1958; Lo Porto 1963; Biancofiore 1967; Fisher 1988; Principalli 2010c.

25b. SATYRION, Leporano, TA

Location and geography: IGM Pulsano 202 II SO. Coastal (300 m from the coast), on a promontory (25 m a.s.l.). See site 25a.
Lithology: See site 25a.
Investigation: Excavation.
Function and description: Settlement. Huts dated to the early phases of the RBA.
Local chronology: RBA, FBA, IA.
Aegean chronology: LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: About 40 fragments.
Other Italian mixed products: Grey**,** *dolia.*
Archeometric analyses: see site 25a.
Bibliography: Lo Porto 1964; Biancofiore 1967 Fisher 1988; Principalli 2010c.

26a. TARANTO, S. DOMENICO, TA

Location: IGM Taranto 202 II NO. On the coastal promontory (12-14 m a.s.l.,), where the old city of Taranto stands, in front of Scoglio del Tonno (see site n. 26b). The two Bronze Age sites were perhaps part of a single settlement. The city of Taranto is on the inner side of the large gulf, partially on a small island (old city) and partially on the mainland (new city). It lies between the Mar Grande, on the SW, bordered by the Cheradi Islands, and the Mar Piccolo on the NE, a large internal basin communicating with the outside via two channels, one natural and the other cut in the Renaissance period. The hinterland is cultivated; to the E there is the first rise of the Murge, to the S an area with saltpans and an indented coastline with inlets, and to the N hilly country gouged by ravines. The coastline is straight and sandy.
Lithology: Sedimentary rocks: limestones, clays, marls, conglomerates.
Investigation: Excavation.
Function and description: Settlement. Remains of beaten earth floors, hearths and a segment of a dry-stone wall have been found under the church of San Domenico.
Local chronology: MBA, RBA.
Aegean chronology: LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: Some fragments.
Other Italian mixed products: Grey**,** *dolia.*
Archaeometric analyses: 1 *dolium*, 1 Protogeometric, 1 *impasto* (INAA, ICP, see Chapter 4 in this volume).
Bibliography: Gorgoglione 1991, 1996.

26b. TARANTO, SCOGLIO DEL TONNO, TA

Location: IGM Taranto 202 II NO. On a coastal promontory, (10 m a.s.l.). The small terraced promontory is close to the channel between the *Mar Grande* and the *Mar Piccolo*, on the western side of the *Mar Grande* gulf. In 1899, during the harbour's development and the railway's construction, the promontory was flattened and partially cut. See site 26a.
Lithology: Sedimentary rocks: limestones, marls, clays, conglomerates.
Investigation: Excavation.
Function and description: Settlement with oval huts and a large rectangular building, 20 m in length, with at least two rooms (the larger is rectangular with an apsidal end). Metallurgical activity was practiced in an area of the settlement. Remains of a fortification wall with buttresses and a ditch.
Local chronology: Neolithic (?), MBA, RBA, FBA, IA.
Aegean chronology: LH IIIA, LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: Two figurines and more than 200 fragments, some of which belong to restorable pots.
Other Italian mixed products: Grey**,** *dolia.*
Archaeometric analyses: 5 Mycenaean probably imported from Argolid, 1 clay (WCA, PE, density and porosity measurements, DTA in De Angelis *et al.* 1960). 1 Burnished locally made, 17 Mycenaean probably imported form the Peloponnese, 14 from Rhodes, 2 from Cyprus, 3 from Central Greece (?), 10 Italo-Mycenaean, 2 coarse ware probably imported from Rhodes and Aegina and 2 locally produced,

10 Grey, 4 *dolia*, 14 *impasto*, 1 kiln (?) (AAS, INAA, ICP, PE in Jones 1986; Jones, Levi 2002 and Chapter 4 in this volume).
Bibliography: Quagliati 1900, 1900a; Säflund 1939; Drago 1940; Taylour 1958; Biancofiore 1967; Peroni 1967a; Gorgoglione 1982; Fisher 1988, Gorgoglione 2002a; Gorgoglione *et al.* 2006; Bietti Sestieri *et al.* 2010.

27. Cozzo Marziotta, Palagiano, TA.

Location and geography: IGM Palagiano 202 IV SO. Sub-coastal (2 km from the coast), on a small rise (18 m a.s.l.), close to the coast of the Lido di Chiatona, near Massafra, along the road that climbs towards the Murge. The location is close to the ancient coastline, on the alluvium of the River Lenne. The coastline is straight, low and sandy, with many dunes and marshy areas. Inland the plain is vast and cultivated. The southern part of the Murge is characterised by the presence of caves and ravines and deep grooves in the slopes.
Lithology: Sedimentary rocks: conglomerates, sands, limestones, dolomites.
Investigation: Excavation.
Function and description: Settlement.
Local chronology: MBA, RBA, FBA, IA (?).
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archeometric analyses: none.
Bibliography: Gorgoglione 1986.

BASILICATA

28. Timmari, MT

Location and geography: IGM Timmari 201 IV NO. Inland (40 km from the coast), on a plateau (306 m a.s.l.). Isolated group of plateaus, W of Matera, in a position with a commanding view of the territory. Hill country between the Bradano valley on the SW and the Gravina stream on the NE, close to the River S. Giuliano.
Lithology: Sedimentary rocks: clays, marls, sands, limestones.
Investigation: Excavation.
Function and description: Settlement distributed on a series of interconnected plateaus.
Local chronology: MBA (?), RBA, FBA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 1 fragment (unpublished).
Other Italian mixed products: *dolia.*
Archeometric analyses: none.
Bibliography: Cipolloni Sampò 1979; Bianco, Orlando 1995.

29. S. Vito, Pisticci, MT

Location and geography: IGM Pisticci 201 III SO. Inland (13 km from the coast), on a plateau with a single access point (127 m a.s.l), naturally protected and well separated from the plain, where the River Basento flows. Close to the internal hill network next to the coastline.
Lithology: Sedimentary rocks: sands, limestones, conglomerates, clays, marls.
Investigation: Survey.
Function and description: Settlement.
Local chronology: MBA (?), RBA, FBA.
Aegean chronology: LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: About 20 fragments.
Other Italian mixed products: Grey.
Archaeometric analyses: 1 Italo-Mycenaean, 2 Protogeometric (AAS, see Chapter 4 in this volume).
Bibliography: De Siena, Bianco 1982; De Siena 1986.

30. Termitito, Montalbano Ionico, MT

Location and geography: IGM Recoleta 212 IV NE. Sub-coastal (7 km from the coast), on an extensive plateau with steep slopes and a single access point (82 m a.s.l.). It lies on the E side of the River Cavone. The plateau is linked via a narrow path to a second plateau to the S, and together they form part of a series of interconnected plateaus in the hinterland of the alluvial plain of the Ionian coast that enjoy a superb view of the Gulf of Taranto and the Salento peninsula.
Lithology: Sedimentary rocks: clays, conglomerates, sands, sandstones, radiolarites.
Investigation: Excavation.
Function and description: Settlement. Three cavities excavated in the tuff rock, ovoid or rounded in plan, used as dwellings and/or storage rooms.
Local chronology: MBA, RBA, FBA, IA.
Aegean chronology: LH IIIA, LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: Several hundred fragments only partially published, some of which belong to restorable pots.
Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese, 43 Italo-Mycenaean, 3 Protogeometric, 10 *impasto* (AAS in Jones 1986 and Chapter 4 in this volume).
Bibliography: De Siena, Bianco 1982a; De Siena 1983, 1986; Vagnetti 2000-01.

31. Toppo Daguzzo, Rapolla, PZ

Location and geography: IGM Lavello 175 II SO. Inland (55 km from the coast), on a well-protected plateau with a single access point (261 m a.s.l.). Between the SW edge of the Foggia plain and the

slopes of Mt. Vulture, at the intersection of two important fluvial routes.
Lithology: Sedimentary rocks: marls, sandstones, limestones, clays; volcanic rocks: tephrites, foidites.
Investigation: Excavation.
Function and description: Settlement and necropolis. The settlement is on the slope of the hill, and two tombs (a rock-cut chamber tomb and a shaft grave) are on the acropolis, dated to the beginning of the MBA. A third tomb is dated to MBA3. During the MBA and RBA the settlement was scattered over an area of several hectares on the top and slopes of the hill. During the FBA the village was reorganised and occupied until the EIA. Storage rooms dated to the FBA have also been found.
Local chronology: Eneolithic, EBA (?), MBA, RBA, FBA, EIA.
Aegean chronology: LH IIIB-C, LH IIIC.
Aegean and Italo-Mycenaean pottery: 6 fragments.
Other Italian mixed products: *Dolia.*
Archaeometric analyses: none.
Bibliography: Cipolloni Sampò 1982, 1983, 1983a, 1986, 1986a, 1998.

CALABRIA

32. Broglio di Trebisacce, Trebisacce, CS

Location and geography: IGM Trebisacce 222 IV SO. Sub-coastal (1.5 km from the coast), on an isolated plateau (181 m a.s.l.), 12 ha wide, located SW of Trebisacce, at the confluence of the Marzuca channel and the Saraceno torrent. The area is dominated by a smaller 'acropolis' 1.5 ha wide. A smaller high ground known as the 'castle' was part of the settlement system. The site is located inland from the Sybaris gulf, in the area between the coastal plain and the foothills of the Pollino massif. The area is characterised by high ground and plateaus with steep slopes and seasonal torrents. Narrow coastal plain, low and straight coastline, without natural landing places.
Lithology: Sedimentary rocks: sandstones, limestones, conglomerates, clays, sands, chert.
Investigation: Excavation.
Function and description: Settlement. The entire acropolis and the 'castle' were inhabited from the beginning of the MBA, and the space was organized with huts on terraces; other remains include channels and large pits rich in finds. The apsidal 'central hut' (8x7 m wide) dates to the end of the RBA. During the FBA, the site is characterised by an intense development; the space was organised with several large rectangular huts and storage rooms with *dolia*, iron metalworking, and a large defensive wall, made with stones, and furnished with ramparts and a paved ditch. The defensive wall and a small storage room found on the 'acropolis' continued to be used in the Iron Age.
Local chronology: MBA, RBA, FBA, EIA.
Aegean chronology: LH IIIA, LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: More than 1000 fragments, some of which belong to restorable pots.
Other Italian mixed products: Grey, *dolia*.
Archaeometric analyses: 6 Mycenaean probably imported from Peloponnese, 2 from Central Greece (or Central Crete?), 2 Coarse ware imported, 58 Italo-Mycenaean, 55 Grey, 119 *dolia*, 34 Protogeometric and Geometric, 237 *impasto*, 16 daubs, 2 clays (AAS, INAA, ICP, XRD, PE in Jones *et al.* 1994; Levi *et al.* 1998; Levi 1999, 2002; Jones, Levi 2002a and Chapters 4 and 5 in this volume; Buxeda i Garrigós *et al.* 2003).
Bibliography: *Ric.1*; *Ric.2*; *Ric.3*; *N.Ric.; EMS*; *EMS 2*; Peroni, Vanzetti 1992; 1998; Levi *et al.* 1998; Levi 1999; Vanzetti 2000; Bettelli 2002; Moffa 2002; van Wijngaarten 2002; Peroni *et al.* 2004; Belardelli *et al.* 2005; Peroni, Vanzetti 2008.

33. Francavilla Marittima, Timpone Motta, Francavilla Marittima, CS

Location and geography: IGM Francavilla Marittima 221 II NE. Sub-coastal (10 km from the coast), on high ground (230 m a.s.l.). The site, located on a hill area near the mouth of the Raganello stream, is arranged on a series of plateaus surrounded by sheer cliffs, delimited to the S by the Raganello and to the N by the Carnevale stream. Higher hills border it, reaching up to 500-600 m a.s.l.
Lithology: Sedimentary rocks: conglomerates, clays, limestones, dolomites.
Investigation: Excavation.
Function and description: Settlement. Habitation units of the RBA and EIA, with storage facilities. To the NE is the Macchiabate plateau, where the EIA necropolis is located. The site is characterised by a continuity of occupation until the Archaic-Classical periods, with domestic and religious structures.
Local chronology: MBA, RBA, FBA, EIA.
Aegean chronology: LH IIIB.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Other Italian mixed products: Grey, *dolia.*
Archaeometric analyses: 1 *dolium*, 7 Protogeometric and Geometric, 7 *impasto* (INAA, PE in Levi *et al.* 1998a; Levi 1999 and Chapter 4 in this volume).
Bibliography: Vagnetti 1983-84; *EMS 2*, 663-8; Maaskant-Kleibrink 1974-76, 1996-97; Kleibrink 2006, 2010.

34. Torre Mordillo, Spezzano Albanese, CS

Location and geography: IGM Spezzano Albanese 221 II SO. Inland (19 km from the coast), on a

plateau with a single access point (102 m a.s.l.), on the top of high ground at the confluence of the Esaro and Coscile streams. The plateau, about 14 ha, with sheer cliffs, is naturally protected. It is in the central part of the Plain of Sybaris, surrounded by mountains rising towards the hinterland.
Lithology: Sedimentary rocks: sands, conglomerates, sandstones, limestones, clays.
Investigation: Excavation.
Function and description: Settlement. A dry-stone wall, perhaps belonging to a fortification wall of a late stage of the MBA, was found together with a fortification with embankment and a wooden enclosure located on the edge of the plateau, and datable to a late stage of the RBA. Remains of rectangular habitation units dated to the FBA. Infant burial datable to the first half of the 8th century BC. Surface finds are evidence of continuous occupation of the settlement until the 7th century BC.
Local chronology: Neolithic, MBA, RBA, FBA, EIA.
Aegean chronology: LH I-II, LH IIIA, LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: About 280 fragments.
Other Italian mixed products: Grey, *dolia*.
Archaeometric analyses: From the settlement: 4 Mycenaean probably imported, 33 Italo-Mycenaean, 14 Grey, 4 *dolia*, 3 Protogeometric and Geometric, 24 *impasto*, 1 daub, 1 various, 1 clay (AAS, ICP, XRD, PE in Jones *et al.* 1994; Levi *et al.* 1998, 1998a; Levi 1999; Jones 2001; Jones, Levi 2002a and Chapter 4 in this volume). From the IA necropolis: 14 Geometric regionally produced and 21 *impasto* locally made (XRF, XRD, PE in Carrara *et al.* 1981).
Bibliography: Colburn 1977; *EMS 2*, 717-37; Trucco, Vagnetti 2001; Jones 2001; Jones, Levi 2002; Arancio *et al.* 2010.

35. Motta di Cirò, Cirò, KR

Location and geography: IGM Cirò 231 III SO. Sub-coastal (2 km from the coast), on a naturally defended plateau (350 m a.s.l.), close to Cirò. The coastal plain has a limited width, and the hinterland rises rapidly towards the Sila Grande and Sila Greca. The coastline is more indented than the rest of the coastline of the Sibaritide, with numerous promontories and landing places.
Lithology: Sedimentary rocks: sand, conglomerates, sandstones, clays, shales, marls.
Investigation: Excavation.
Function and description: Settlement.
Local chronology: RBA, FBA.
Aegean and Italo-Mycenaean pottery: 6 fragments.
Other Italian mixed products: Grey.
Archaeometric analyses: none.
Bibliography: de La Genière 1993; Marino 1998, 1998a; Tucci 2002; Aisa, Tucci 2004.

36. Crotone, KR

Location: IGM Crotone 238 III SE; Gabella Grande 238 III NE. On a coastal promontory (23 m a.s.l.) which is occupied by the modern town, with a naturally well-defended acropolis. The overall extent of the habitable area is about 50 ha. It is an excellent landing place representing the northern border of an alternating series of large inlets and promontories; the hinterland rises rapidly towards the Sila Piccola.
Lithology: Sedimentary rocks: clays, sands, conglomerates.
Investigation: Survey and excavation.
Function and description: Settlement. Possibly organised in several groups, located on the top of the plateau of the promontory.
Local chronology: MBA, RBA, FBA, EIA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: A few unpublished fragments.
Other Italian mixed products: Grey (?), *dolia*.
Archaeometric analyses: none.
Bibliography: Marino, Festuccia 1995; Marino 1998, 1998a; Lattanzi 2004.

37. Capo Piccolo, Isola di Capo Rizzuto, CZ

Location and geography: IGM S. Leonardo di Cutro 243 IV NO. On a sheer coastal promontory (16 m a.s.l.), half-way between Le Castella and Capo Rizzuto. It is the southern limit of an alternating series of large inlets and promontories; the hinterland rises rapidly towards the Sila Piccola.
Lithology: Sedimentary rocks: clays, sands, conglomerates, sandstones, limestones.
Investigation: Excavation.
Function and description: Settlement. Part of a structure in stone and plaster; hearth; traces of metallurgical activity.
Local chronology: MBA.
Aegean chronology: LH I-II.
Aegean and Italo-Mycenaean pottery: 3 fragments.
Archaeometric analyses: 3 Mycenaean probably imported, 1 *dolium*, 1 Figulina, 7 *impasto*, 1 daub, 1 clay (AAS, INAA in Jones 1987 and Chapter 4 in this volume).
Bibliography: Lattanzi *et al.* 1987; Bianco, Marino 1991-1992; Bianco *et al.* 1999.

38. Grotta Petrosa, Palmi, RC

Location and geography: IGM Palmi 245 II SE. Coastal, on a rocky and sheer stretch of coastline, on a slope (228 m a.s.l., 150 m from the coast). Close to the modern town of Palmi, 30 km from the Messina Strait and 70 km from the Aeolian Islands.
Lithology: Sedimentary rocks: limestones, chert, marls; metamorphic rocks: gneisses, mica schists.

Investigation: Excavation.
Function and description: Cave. Two cavities were investigated: in cavity A the deposit was very disturbed, with scarce evidence of human activity. A stratigraphic sequence was partially preserved in cavity B.
Local chronology: EBA (?), MBA, RBA, FBA.
Aegean chronology: LH I-II, LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: none.
Bibliography: Tinè 2001.

39. Taureana di Palmi, Palmi, RC

Location and geography: IGM Palmi 245 II SE. Coastal (150 m from the coast), on a promontory (76 m a.s.l.), close to the modern town of Palmi, 30 km from the Messina Strait and 70 km from the Aeolian Islands. The coastline is rocky and steep.
Lithology: Sedimentary rocks: limestones, chert, marls; metamorphic rocks: gneisses, mica schists.
Investigation: Excavation.
Function and description: Settlement. Huts built with stone and mud-brick walls.
Local chronology: MBA, RBA, FBA (?).
Aegean chronology: LH IIIA.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese (ICP: see Chapter 4 in this volume).
Bibliography: Pacciarelli 2001a; Pacciarelli, Varicchio 2004; Bettelli *et al.* 2007; Agostino *et al.* 2012.

40. Punta Zambrone, Briatico, VV

Location and geography: IGM Briatico 241 III SO. On a coastal promontory on the rocky and sheer stretch of coast of the large peninsula of Tropea. The flat-topped promontory rises steeply from the sea (100 m a.s.l.): two sides slope down to the coast, while the third side connects to the coastal terrace. Close to a good landing place, between Tropea and Briatico, 55 km from the Aeolian Islands.
Lithology: Sedimentary rocks: sands, sandstones, limestones, clays; plutonic rocks: monzonites, granites, granodiorites; metamorphic rocks: gneisses.
Investigation: Survey, excavations.
Function and description: Settlement. Part of a fortification system (wall and ditch) has been investigated.
Local chronology: MBA, RBA.
Aegean chronology: LH I-II, LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 11 fragments and some more from excavation in progress.
Archaeometric analyses: 1 Italo-Mycenaean (?), 6 *impasto* (AAS: see Chapter 4 in this volume).
Bibliography: Lattanzi 1990; Pacciarelli 2001; Pacciarelli, Varricchio 1991-1992, 2004; Pacciarelli, Vagnetti 2004.

41. Grotta Cardini, Praia a Mare, CS

Location and geography: IGM Praia a Mare 220 I SO. Sub-coastal (500 m from the coast), on a slope (60 m a.s.l.) at the top of a stalagmitic terrace, in the final tunnel of a large cavity located to the side of the 'Grotta della Madonna', which opens onto the slopes of the Vingiola massif. The area by the coastline is rocky and rises up to 500 m a.s.l. and gradually drops down towards the sea. The low, sandy and linear coast is characterised by large beaches until S. Nicola Arcella, while the section to the S has a more indented profile.
Lithology: Sedimentary rocks: dolomites, limestones, conglomerates, sands, clays, marls, sandstones; metamorphic rocks: schists, calcschists, phyllites, quartzites.
Investigation: Excavation.
Function and description: Small cave 12x2.70 m, with a NE-SW orientation. One tunnel tapers away to the NE; another to the SW ends with a kind of irregular apse from which another tunnel heads westwards. Some hearths and a continuous stratigraphy from EBA to MBA.
Local chronology: EBA, MBA.
Aegean chronology: LH IIIA.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Cardini 1970; Bernabò Brea, Vagnetti 1982; Bernabò Brea *et al.* 1989.

CAMPANIA

42. Grotta del Pino, Sassano, SA

Location and geography: IGM Sala Consilina 199 III SE. Inland (40 km from the coast) in the Cilento mountain area, on the slope of Cozzo dell'Uovo (500 m a.s.l.), located on the western side of the Vallo di Diano on the west bank of the River Calore.
Lithology: Sedimentary rocks: limestones, sandstones, marls, clays, conglomerates, dolomites.
Investigation: Excavation.
Function and description: Burial cave. A large carstic cavity that reaches a depth of more than 15 m below the modern surface level. Large and deep central space, on the sides of which are partly obstructed niches of various dimensions. Access is narrow and sheer. In the southern wall of the main room there is a sort of small natural cave, almost entirely obstructed, where tens of individuals were buried over a not easily determinable timespan.

Local chronology: EBA (?), MBA.
Aegean chronology: LH I-II.
Aegean and Italo-Mycenaean pottery: More than 5 fragments.
Archaeometric analyses: 1 Matt-painted probably imported from the Peloponnese, 2 regionally produced (?), 1 uncertain, 3 *impasto* (INAA, PE in Jones, Levi 2000-01 and Chapter 4 in this volume)
Bibliography: Pellegrini, Piperno 1998; Piperno, Pellegrini 2000-01; Vagnetti *et al.* 2000-01, 188-192.

43. Grotta di Polla, Polla, SA

Location and geography: IGM Polla 199 IV SO. Inland (45 km from the coast), on a slope (31 m a.s.l.). Close to the northern end of the Vallo di Diano, on a sheer side, to the W of the town of Polla, between the mountainous areas of the Alburni and Cilento and the Apennines to the E. The River Tanagro, a tributary of the Sele, flows through a small stretch of plain that makes up the valley. In antiquity a large lake basin might have formed in the hollow of the valley.
Lithology: Sedimentary rocks: limestone conglomerates, dolomites, sandstones, marls.
Investigation: Excavation.
Function and description: Cave. The cave opens on a limestone rocky wall, comprising numerous cavities and very long tunnels. Complex stratigraphy with remains of hearths.
Local chronology: Neolithic, MBA, RBA, FBA (?).
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 2 fragments, possibly belonging to the same vase.
Archaeometric analyses: none.
Bibliography: Gastaldi 1974; Gastaldi, d'Agostino 1982.

44. Paestum, Porta della Giustizia, Agropoli, SA

Location and geography: IGM Paestum 198 III NO. Sub-coastal (2 km from the coast), in a plain, (13 m a.s.l.) at the easternmost part of the Gulf of Salerno and 9 km to the south of the mouth of the River Sele. The site's location coincides with the area where the Greek colony of Poseidonia was founded. The vast and fertile alluvial plain was marshy in the past. The present linear, low and sandy coastline has changed significantly since antiquity.
Lithology: Sedimentary rocks: travertines, limestones, marls, sandstones, clays, conglomerates, calcareous marls, dolomites; metamorphic rocks: schists.
Investigation: Excavation.
Function and description: Settlement. Materials retrieved from a later context.
Local chronology: RBA, FBA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: none.
Bibliography: Kilian 1969.

45. Montedoro di Eboli, Eboli, SA

Location and geography: IGM Eboli 198 IV NO. Inland (25 km from the coast), on a plateau (407 m a.s.l.). The acropolis, located to the NW of the modern town of Eboli, lies on a hill at the foot of Monti Picentini, which is the last part of a rocky massif, overlooking the Sele plain and the entrance of Vallo di Diano toward the sea. The landscape extends mainly into the plain, with a few hilly areas.
Lithology: Sedimentary rocks: limestones, marls, sandstones, dolomites, chert, clays, conglomerates; metamorphic rocks: schists.
Investigation: Excavation.
Function and description: Settlement. FBA huts, with patches of floors *in situ*, a few post holes and at least two hearths.
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 28 fragments.
Archaeometric analyses: none.
Bibliography: Schnapp-Gourbeillon 1982, 1986; Vagnetti 2000-01.

46. Pontecagnano, Sant'Antonio, SA

Location and geography: IGM Pontecagnano 197 I N-E. Sub-coastal (3 km from the coast), in the coastal plain, (13 m a.s.l.), to the S of Salerno not far from the River Picentino.
Lithology: Sedimentary rocks: travertines, sands, conglomerates, shales, limestone.
Investigation: Excavation.
Function and description: Settlement. RBA huts with hearths and pits, belonging to a large village.
Local chronology: RBA
Aegean chronology: LH IIIC early
Aegean and Italo-Mycenaean pottery: 1 or 2 fragments.
Archaeometric analyses: 1 Italo-Mycenaean, 4 *impasto* (ICP: see Chapter 4 in this volume).
Bibliography: Aurino 2004-2005; Bettelli, Vagnetti 2004-2005.

47. Island of Vivara, Procida, NA

Location and geography: IGM Procida 184 III NO The island belongs to the Phlegrean archipelago in the Gulf of Naples. It is located in the Ischia channel, between Procida and Ischia, and is linked to Procida via a modern bridge. In the past, Vivara would have been connected to Procida by an isthmus. The semicircular bay between Vivara and Procida is what remains of an ancient caldera, partially destroyed by marine erosion. The island has a crescent shape, with the northern part inclined toward the E where it ended with the promontory of Punta Capitello. The E and S coasts of Procida and Vivara are indented and often sheer. Vivara is comprised of a relatively flat central part that drops abruptly towards the sea, with sheer cliffs. Access to the sea is possible near the S cape (Punta di Mezzogiorno), W (Punta d'Alaca), N (Punta Capitello) and W (La Caldara).

47a. Vivara, Punta Mezzogiorno, Procida, NA

Location and geography: IGM Procida 184 III NO. Coastal site, on a narrow flat terrace overlooking the sea, located to the S end of Vivara island (20 m a.s.l.). See general description above.
Lithology: Volcanic rocks: latites, trachytes, phonolites.
Investigation: Excavation.
Function and description: Settlement, largely collapsed into the sea because of intense erosion. Remains of some huts, one of which is apsidal; remains of hearths.
Local chronology: MBA 1-2.
Aegean chronology: LH I, LH II.
Aegean and Italo-Mycenaean pottery: About 13 fragments.
Archaeometric analyses: 14 *impasto* (4 probably imported from Lipari), 3 daub (PE in Cazzella *et al.* 1997).
Bibliography: Buchner 1936-37; Taylour 1958; Cazzella *et al.* 1982; 1986, 1991; Cazzella 1983; Marazzi, Re 1983, 1985, 1986; Damiani *et al.* 1984; Marazzi, Tusa 1994; Rizio 2005.

47b. Vivara, Punta d'Alaca, Procida, NA

Location and geography: IGM Procida 184 III NO. On a high promontory (80 m a.s.l., 150 m from the sea) above a terrace located on the western part of the island, on Punta d'Alaca, overlooking the sea. See general description above.
Lithology: Volcanic rocks: latites, trachytes, phonolites.
Investigation: Excavation.
Function and description: Settlement. Habitation area largely eroded toward the sea. Thick filling layers, with archaeological materials from settlement areas located on a higher level, which had collapsed because of erosion and covered two huts and two pits rich in archaeological finds.
Local chronology: MBA.
Aegean chronology: LH I, LH II, LH IIIA.
Aegean and Italo-Mycenaean pottery: About 425 fragments, some of which belong to restorable pots.
Archaeometric analyses: 54 Mycenaean and 10 Matt-painted probably imported from the Peloponnese; 2 Mycenaean, 7 Matt-painted, 2 Burnished, 9 coarse ware uncertain; 2 Matt-painted, 2 Burnished, 3 coarse ware locals (?) (AAS in Jones 1994a and Chapter 4 in this volume).
Bibliography: Buchner 1936-37; Taylour 1958; Cazzella *et al.* 1982, 1986, 1991; Marazzi, Re 1983; 1985, 1986; Marazzi, Tusa 1994, 2001; Damiani *et al.* 1984; Damiani, di Gennaro 2003; Merkouri 2005, 2010; Rizio 2005.

47c. Vivara, Punta Capitello, Procida, NA

Location and geography: IGM Procida 184 III NO. On a high promontory (25 m a.s.l., 50 m from the sea) at the end of the Vivara ridge, about 100 m from Punta Capitello; an excellent landing place that allowed an easy berth on both sides of the isthmus. See general description above.
Lithology: Volcanic rocks: latites, trachytes, phonolites.
Investigation: Excavation.
Function and description: Settlement. Remains of a hut floor.
Local chronology: MBA.
Aegean chronology: LH II-IIIA (?).
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: none.
Bibliography: Buchner 1936-37; Taylour 1958; Cazzella *et al.* 1982, 1986, 1991; Cazzella 1983; Marazzi, Re 1983, 1985, 1986; Damiani *et al.* 1984; Marazzi, Tusa 1994; Rizio 2005.

48. Island of Ischia, Castiglione, Casamicciola Terme, NA

Location and geography: IGM Isola d'Ischia 183 II SE. Coastal, located between the port of Ischia and the site of Casamicciola on the northern coast of the island.
The volcanic island of Ischia is the largest of the Phlegrean archipelago; its coastline is indented, with stretches of plain that alternate with sheer cliffs, especially in the SE. The island's morphology is varied and uneven, scored by ditches and ravines. There are numerous thermal springs. The volcanic eruption occurred initially under sea level; afterwards, during the Quaternary, a rise in sea level caused erosion in the newly emerged part. The site of Castiglione is located on a hill of granite rock with sheer slopes on the N and W sides (40 m a.s.l.), overlooking the beach beneath. Some clay sources were identified nearby.
Lithology: Volcanic rocks: latites, trachytes, phonolites.
Investigation: Excavation.
Function and description: Settlement. Rubbish

dumps composed of ash, food remains and sherds.
Local chronology: MBA, RBA, FBA, EIA.
Aegean chronology: LH IIIA.
Aegean and Italo-Mycenaean pottery: 3 fragments.
Archaeometric analyses: none.
Bibliography: Buchner 1936-37, 1969; Taylour 1958; Gialanella 2001.

49. Afragola, NA

Location and geography: IGM Napoli 184 I SO; Aversa 184 I NO. Located in an inland plain (15 km from the sea; 10-25 m a.s.l.), between the River Clanis and the ancient River Sebeto (Piana Campana). The area, which varies in altitude, was subject to waterlogging near the rivers.
Lithology: Volcanic rocks: latites, trachytes, phonolites, foidites, tephrites and phonolithic potassic tephrites.
Investigation: Excavation.
Function and description: Settlement. Many wells have been found which probably supplied the periphery of the settlement. Several post holes, related to huts, were also discovered.
Local chronology: RBA, FBA (?).
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: About 50 fragments.
Archaeometric analyses: in progress.
Bibliography: Laforgia *et al.* 2007; Nava *et al.* 2007.

MOLISE

50. Monteroduni, Località Paradiso, IS

Location and geography: IGM Monteroduni 161 IV SE. Inland (50 km from the coast), located in the upper valley of the River Volturno, on the Tyrrhenian side of the Apennines. The site occupies a large terrace (237 m a.s.l.) overlooking the River Volturno. The area is close to hill pastures and to sheep tracks which connect the two sides of the Apennines.
Lithology: Sedimentary rocks: limestone, marls.
Investigation: Excavation.
Function and description: Settlement. Two archaeological levels were found interspersed with travertine formations. The upper level, where the Mycenaean fragment was found, probably belongs to the floor of a hut, with a hearth.
Local chronology: RBA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Other Italian mixed products: *Dolia* (?).
Archaeometric analyses: 1 Italo-Mycenaean (ICP: see Chapter 4 in this volume).
Bibliography: Cazzella *et al.* 2005, 2008; Bettelli 2006.

LATIUM

51. Casale Nuovo, Latina, LT

Location and geography: IGM Borgo Sabotino 158 II NO. Sub-coastal (5 km from the coast). The site is located in the 'Agro Pontino', an originally marshy area in southern Lazio, to the S end of the Roman countryside. In the vicinity rise Mts. Lepini and Musoni. The coast is generally low, sandy and uniform. A sandy 'tombolo' occurs near the mouth of River Astura, between the open sea and the coastal lakes Fogliano, Monaci and Sabaudia, with a coastal lagoon and a tract of dunes. The settlement lies on a small patch of high land (15 m a.s.l.) near a ford of the River Astura, not far from the mouth, overlooking a fertile alluvial plain.
Lithology: Sedimentary rocks: sands, clays; volcanic rocks: tephrites, foidites.
Investigation: Excavation.
Function and description: Settlement. Areas for the production of pottery, characterised by circular pits (perhaps for the extraction of clay), dump ditches and drainage channels. Much copper and lead slag and numerous bun ingots are evidence of metallurgical activity.
Local chronology: RBA, FBA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 6 fragments, (1 decorated, 5 plain).
Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese, 5 probable Italo-Mycenaean, 6 *impasto* (AAS in Jones, Vagnetti 1992; Jones, Levi 2004 and Chapter 4 in this volume).
Bibliography: Angle, Zarattini 1987; Angle *et al.* 1988, 1992, 1993; Jones, Vagnetti 1991, 1992; Jones 1993a; Vagnetti, Jones 1993; Angle *et al.* 2004; Bettelli *et al.* 2006.

52. Vaccina, Ladispoli, RM

Location and geography: IGM Stazione di Furbara 149 IV NO. Sub-coastal, (3 km from the coast), on a low hill in the coastal plain N of Rome, along the Via Aurelia at km 41. The landscape is characterised by very low hills and flat areas crossed by streams. Inland rises the tufaceous plateau typical of southern Etruria, such as nearby Cerveteri.
Lithology: Sedimentary rocks: sands, conglomerates, clays, marls, limestones, sandstones; volcanic rocks: latites, trachytes, phonolites, foidites, tephrites and phonolithic potassic tephrites.
Investigation: Excavation.
Function and description: Settlement. Identified by surface research carried out in the 1970s on the plateau 'Casali di Vaccina' and the flat area 'Muracce di Vaccina', the village begins on the hill

around the end of the MBA and extends down to occupy the flat area near the River Vaccina at the end of RBA, probably in relation to a landing point. Excavation has taken place on the north bank of the river revealing traces of ancient drainage and in the flat area southwest of the hill there are remains of – at least – two oval-shaped huts.
Local chronology: MBA, RBA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: About 6 fragments.
Archaeometric analyses: in progress.
Bibliography: Barbaro *et al.* 2012, 2012a.

53. Monte Rovello, Allumiere, RM

Location and geography: IGM La Farnesiana 142 I SE. Inland (15 km from the coast) on a plateau (370 m a.s.l.) in the Upper Lazio, in the area of Monti della Tolfa, which is composed of metalliferous rocks, about 3 km to the NW of Allumiere. The area is characterised by hills sited in an advantageous position, overlooking fertile valleys, and with a good view of the not too distant Tyrrhenian coast. The plateau is naturally protected, with high and sheer slopes, and emerges in the centre of a zone enclosed by a natural amphitheatre of hills, which descends with narrow fan-shaped valleys toward a plain crossed by the River Mignone.
Lithology: Sedimentary rocks: marls, clays, sands, limestones; volcanic rocks: rhyolites.
Investigation: Excavation.
Function and description: Settlement. A large rectangular hut, partly below ground level, belongs to the RBA. A smaller structure dates to the FBA. Three 'Protovillanovan' cremation necropoleis were found near the site (Poggio la Pozza, Campaccio and Forchetta di Palano).
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: 1 Italo-Mycenaean, 2 *impasto* (INAA in Bettelli *et al.* 2006 and Chapter 4 in this volume).
Bibliography: Biancofiore, Toti 1973; Vagnetti 1980, 1981, 1982, 1982c; di Gennaro 1986; Bettelli *et al.* 2006.

54. Luni sul Mignone, Blera, VT

Location and geography: IGM La Farnesiana 142 I SE. Inland, (10 km from the coast) on an isolated, naturally defended plateau (80 m a.s.l.) above the River Mignone.
Lithology: Sedimentary rocks: marls, clays, sands, conglomerates; volcanic rocks: rhyolites, trachytes, latites, phonolites.
Investigation: Excavation.
Function and description: Settlement. The excavation was conducted on the acropolis and on the nearby peaks named Fornicchio (or Monte Fornicchio) and Tre Erici. Evidence of human activity at the latter site goes back to the Neolithic and continues until the FBA, while at Fornicchio the habitation phases range from MBA to FBA. Large rectangular buildings, partly below ground level and excavated in the soft rock, in which Mycenaean sherds have been found, belonging to the MBA and RBA. The settlement continued into the subsequent FBA, and comprises aligned rectangular and oval huts. The function of a large rectangular monumental building remains uncertain.
Local chronology: Neolithic, EBA, MBA, RBA, FBA.
Aegean chronology: LH IIIA; LH III B-C
Aegean and Italo-Mycenaean pottery: 5 fragments.
Archaeometric analyses: 4 Italo-Mycenaean, 1 Mycenaean uncertain (INAA in Bettelli *et al.* 2006 and Chapter 4 in this volume).
Bibliography: Östenberg 1967; Peroni 1967; Vagnetti 1980, 1981, 1982d; di Gennaro 1982; 1986, 2004; Bettelli *et al.* 2006.

55. San Giovenale, Blera, VT

Location and geography: IGM Civitella Cesi 143 IV SO. Inland (*c.* 22 km from the coast), on a plateau with a single access point (177 m a.s.l.). The Vesca stream, which is a tributary of the Mignone, flows near the site.
Lithology: Sedimentary rocks: limestones, marls, sandstones, conglomerates, clays, evaporites; volcanic rocks: phonolites, tephrites, trachytes, latites; metamorphic rocks: shales.
Investigation: Excavation.
Function and description: Settlement. Evidence of human presence from the EBA and MBA. The plateau was entirely occupied in the RBA and FBA; a large settlement was established in the Etruscan period. Remains of some RBA habitation structures and a stone fortification of the same period were identified on the higher part of the plateau. At least two groups of cremation burials, which belong to the 'Protovillanovan' settlement, are known (Porzarago and Fosso del Pietrisco).
Local chronology: EBA, MBA, RBA, FBA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: 1 Mycenaean (?) (INAA in Bettelli *et al.* 2006 and Chapter 4 in this volume).
Bibliography: Malcus 1979, 1984; Vagnetti 1980, 1981, 1982h; di Gennaro 1986, 2004; Bettelli *et al.* 2006.

TUSCANY

56. Scarceta, Manciano, GR

Location and geography: IGM Manciano 136 IV NO. Inland site (25 km from the sea) located on a peak (*c.* 150 m. a.s.l.), sloping towards the west bank of the River Fiora. The site morphology is very rough with a sequence of rocky spurs resulting from previous landslides that have isolated plain areas and deep rock shelters.
Lithology: Sedimentary rocks: sandstones, shales, limestones, marls, clays; volcanic rocks: latites, trachytes, phonolites.
Investigation: Excavation.
Function and description: Settlement. Numerous huts belonging to the different phases of the settlement are attested, not all of which had a residential function. The settlement was re-organised in the RBA with the construction of a large dry-stone enclosure, within which a large elliptical structure with a stone base was built. This was partly re-used in the FBA as a metallurgical workshop and for the processing of other raw materials such as bone, horn, amber and glass. Remains of a second, contemporary, metallurgical installation have been discovered in another sector of the excavation.
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH III.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: 16 *impasto* (PE in Martini *et al.*1996).
Bibliography: Poggiani Keller 1999.

MARCHE

57. Treazzano di Monsampolo, Castel di Lama, AP

Location and geography: IGM Monsampolo del Tronto 133 I SO. Inland (10 km from the coast), on a plateau (140 m. a.s.l.), along a stream. The site is located in the southern hinterland of Marche near the River Fiobbo, tributary of the Tronto, which defines the border with Abruzzo.
The area is on a hill chain descending from the sides of the Apennines toward the Adriatic coast. The valley of the River Tronto runs between these hills, whose peaks rise up to 200-250m.
Lithology: Sedimentary rocks: conglomerates, clays, sands, marls, sandstones, calcareous marls, limestones.
Investigation: Excavation.
Function and description: Settlement. Part of the settlement, with numerous post holes, has been explored.
Local chronology: RBA, FBA.
Aegean chronology: LH IIIB.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese (ICP in Vagnetti *et al.* 2006 and Chapter 4 in this volume).
Bibliography: Fornarini 1979; Lollini 1982; Vagnetti *et al.* 2006; Vagnetti 2012b.

58. Cisterna di Tolentino, Tolentino, MC

Location and geography: IGM Tolentino 124 I SO. Inland, in the outskirts of the town of Tolentino (*c.* 40 km from the sea), on a barrier along the River Chienti.
Lithology: Sedimentary rocks: sandstones, clays, marls.
Investigation: Excavation.
Function and description: Settlement. The earliest occupation goes back to the MBA and was located on the top of the terrace, which is badly preserved because of heavy erosion. In the RBA the settlement also extended onto the slope of the terrace, in connection with the river. Traces of a wooden flood protection have been found. The excavated area is in contact with one of the palaeochannels; there are remains of pilework with poles and wooden platforms above which dwellings and other structures were built.
Local chronology: MBA, RBA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: About 40 fragments, some of which belong to restorable pots.
Archaeometric analyses: 14 Italo-Mycenaean, 5 *impasto* (ICP, PE in Vagnetti *et al.* 2006 and Chapter 4 in this volume).
Bibliography: Percossi *et al.* 2005; Vagnetti *et al.* 2006; Cazzella 2010a.

59. Jesi, AN

Location and geography: IGM Jesi 117 I SO. Inland (*c.* 17 km from the sea), along the Esino valley. Morphologically it looks like an elongated peninsula in a SW-NE direction, parallel to the river and high above the valley (*c.* 93 m a.s.l.) with steep slopes. In antiquity the area around the hill was surrounded by watercourses. The prehistoric site lies under the modern town of Jesi, beneath Palazzo Mestica.
Lithology: Sedimentary rocks: sands, conglomerates, clays, marls, limestones.
Investigation: Excavation.
Function and description: Settlement.
Local Chronology: Eneolithic, MBA, RBA.
Aegean Chronology: LH III, LH IIIC (?).
Aegean and Italo-Mycenaean pottery: 3 fragments.
Archaeometric analyses: 3 Italo-Mycenaean, 5 *impasto* (ICP, PE in Vagnetti *et al.* 2006 and Chapter 4 in this volume).

Bibliography: Vagnetti *et al.* 2006; Pignocchi, Landolfi 2012.

60. Ancona, Montagnolo, AN

Localization and geography: IGM Ancona 118 IV NO. Coastal, along the Adriatic coast, located on a hill slope (100 m a.s.l.) to the east of the port of Ancona. The coast in this area is high, sheer and indented, without gulfs or inlets, with the exception of the port of Ancona. The hinterland is characterised by the foothills of Monte Conero (572 m a.s.l.). The rivers are short and have irregular courses.
Lithology: Sedimentary rocks: marls, calcareous marls, clays, limestones, sandstones, conglomerates, sands, evaporites.
Investigation: Rescue excavation.
Function and description: Settlement. It was not possible to identify stratigraphy or structures, and only archaeological materials were collected.
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH IIIB, LH IIIB/C.
Aegean and Italo-Mycenaean pottery: 3 fragments.
Archaeometric analyses: 2 Italo-Mycenaean, 4 *impasto* (ICP, PE in Vagnetti *et al.* 2006 and Chapter 4 in this volume).
Bibliography: Lollini 1983; Silvestrini 1991, 2000; Vagnetti *et al.* 2006; Cardinali 2012.

VENETO

61. Frattesina, Fratta di Polesine, RO

Location and geography: IGM Lendinara 64 III SE. Inland site (*c.* 48 km from the sea) located in the eastern part of the Po valley, 16 km to the SW of Rovigo. The area is crossed by numerous rivers that flow into the Adriatic; their lower courses are almost parallel to the River Po (Adige and Adigetto to the north, Canal Bianco to the south). This zone, named 'Polesine', comprises a stretch of plain that gradually slopes down towards the coast between the Rivers Adige and Po. It is characterised by numerous water-drainage channels and drained marshes. The settlement was located on a low hill that is now almost completely levelled by floods and agricultural activity.
Lithology: Sedimentary rocks: sands, sandstones and conglomerates (alluvial deposits of the Rivers Po and Adige).
Investigation: Survey and excavation.
Function and description: Settlement. The excavations brought to light a large settlement (about 600x150 m) oriented E-W, in which at least four phases were identified. A ditch for draining flood water was identified, together with two necropoleis at Fondo Chinaglia (at Le Narde), and Fondo Zanotto. The first phase (RB/FBA1) has been identified only on the basis of materials from surveys, stored in the Rovigo museum, as the excavation has not yet reached the deepest strata; the second (FBA2) is the first firmly attested phase of the settlement, with small dwellings and a few tombs; the third phase (FBA3/EIA) is characterised by an initial stratum of sand that sealed the previous phases, above which a settlement with a larger structure was built; a few tombs also belong to this phase. Traces of a wooden enclosure and remains of a thatched roof and plaster are dated to the fourth phase (IA). The site is characterised by specialised craftsmanship especially concerning amber, ivory, glass and metalwork, showing its interrelation with long-distance and local networks.
Local chronology: RB-FBA, FBA, EIA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: 2 Italo-Mycenaean, 18 *impasto*, 4 daub, 2 various (AAS, INAA, PE in Jones, Vagnetti 1991, 1992; Jenkins *et al.* 1999; Jones *et al.* 2002 and Chapter 4 in this volume).
Bibliography: Bellintani, Peretto 1972; Bellintani *et al.* 1968; Bellintani 1973; Negroni Catacchio 1972; Nava 1973; Rittatore Vonwiller 1975; Bietti Sestieri 1973, 1975, 1975-80, 1976-77, 1977, 1979, 1982, 1984, 1990, 1990a, 1997, 2008, 2010; De Min, Bietti Sestieri 1979; Anzidei, Bietti Sestieri 1984; De Min, Gerhardingher 1986; Salzani 1987, 1989a, 1990-91; De Guio 1991, 1995; Jones, Vagnetti 1991, 1992; Jones 1993a; Vagnetti 1993, 1993a, 1994, 1996; Bellintani P. 1992, 2000; Arenoso Callipo, Bellintani 1994; Bellintani *et al.* 2006; Bettelli, Vagnetti 1997; Pearce 2000; Jones *et al.* 2002; Bellintani, Stefan 2009.

62. Lovara, Villa Bartolomea, VR

Location and geography: IGM Castagnaro 63 II NE. Inland site (80 km from the coast), between the Rivers Tartaro and Adige, along the eastern border of the Valli Grandi Veronesi basin, not far from the River Po.
Lithology: Sedimentary rocks: sands, sandstones and conglomerates (alluvial deposits of the Rivers Po and Adige).
Investigation: Excavation.
Function and description: Settlement. Two phases of settlement, separated by a thick alluvial deposit. The first occupation is dated to the RBA, the second to the advanced IA. The RBA settlement covers an area of 10-12 ha with distinct occupation phases. Defensive works have been identified: a simple wooden enclosure at the beginning and a more complex system with ditches and banks later. Seven rectangular huts, with posts along the walls, beaten

floors and clay hearths.
Local Chronology: RBA, IA.
Aegean Chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 2 fragmentary closed vessels.
Archaeometric analyses: 2 Italo-Mycenaean, 6 *impasto* (ICP, PE in Salzani *et al.* 2006 and Chapter 4 in this volume).
Bibliography: Salzani *et al.* 2006.

63. Fabbrica dei Soci, Villa Bartolomea, VR

Location and geography: IGM Castagnaro 63 II NE. Inland site (80 km from the coast) located in the eastern part of the Po valley, which is crossed by rivers flowing directly into the Adriatic, such as the Brenta, Adige and Piave; in their lower course they flow almost parallel to the Po. The site is located in an area crossed by numerous irrigation and drainage canals.
Lithology: Sedimentary rocks: sands, sandstones and conglomerates (alluvial deposits of the Rivers Po and Adige).
Investigation: Survey and excavation.
Function and description: Settlement. The village is of 'terramare' type, outlined by an embankment and a ditch into which a watercourse flows. Four different phases have been identified: a first phase, known as 'terramara piccola', in which the settlement was located on top of the natural embankment of the canal. In the second and third phases the 'terramara' was extended ('terramara grande'): the site comprised at least 44 huts, a storage area, a craft production area and a gateway; it was abandoned in the final phase, following a series of alluvial processes. The nearby necropolis of Franzine Nuove was probably connected to the site.
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 4 fragments.
Archaeometric analyses: 2 Mycenaean probably imported from the Peloponnese or western Greece, 2 Italo-Mycenaean, 4 *impasto*, 1 Apennine *impasto*, 1 daub, 2 clays (INAA, PE in Jenkins *et al.* 1999, Jones *et al.* 2002; Cannavò, Levi 2009 and Chapter 4 in this volume).
Bibliography: Salzani 1977, 1988; De Guio *et al.* 1989, 1990; Malgarise 1989-90; Tozzi, Harari 1990; Balista *et al.* 1990-91; Balista, De Guio 1990-91; De Guio 1991, 1995, 1995a; Vagnetti 1993a, 1996; Bagolan *et al.* 1997; Bettelli, Vagnetti 1997; Jones *et al.* 2002.

64. Fondo Paviani, Legnago, VR

Location and geography: IGM Valli Grandi Veronesi 63 II NO. Inland site (*c.* 80 km from the coast) situated in the eastern part of the Po valley and close to the Ponte delle Bocche in a low-lying flat area; this area is intensively cultivated and crossed by numerous irrigation and drainage canals.
Lithology: Sedimentary rocks: sands, sandstones and conglomerates (alluvial deposits of the Rivers Po and Adige).
Investigation: Survey and excavation.
Function and description: Large settlement with 'terramara' structures with an embankment and a ditch. Four habitation phases have been identified: the first phase consisted of pile dwellings; the embankment and ditch belong to the second; an expansion of the site occurred between the second and third phases, including an irrigation system, canals and communication routes and perhaps a double-gate; the third phase of the settlement no longer consisted of pile dwellings; the site was abandoned in the fourth phase; some traces of activity before an alluvial stratum sealed the site. A Bronze Age necropolis has been identified *c.* 600 m to the NW.
Local chronology: MBA, RBA, FBA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: About 67 fragments.
Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese or western Greece, 3 Italo-Mycenaean, 10 *impasto, 2* Apennine *impasto* (INAA, ICP, PE in Jenkins *et al.* 1999, Jones *et al.* 2002, Cannavò, Levi 2009) and Chapter 4 in this volume); analyses in progress show several other Italo-Mycenaean (Bettelli *at al.* in press) and 3 local Apennine *impasto* (Cupitò *et al.* in press).
Bibliography: Fasani, Salzani 1975; Salzani 1976, 1976a, 1996; Vagnetti 1979, 1982a, 1993a, 2012a; Traina 1983; Malgarise 1989-90; Tozzi, Harari 1990; De Guio *et al.* 1990, 1992; De Guio 1991, 1995; Vagnetti 1996; Bagolan *et al.* 1997; Balista, De Guio 1997; Balista *et al.* 1997, 1998; Bettelli, Vagnetti 1997; Jones *et al.* 2002; Bettelli, Cupitò 2010; Cupitò, Leonardi 2010.

65. Castello del Tartaro, Cerea, VR

Location and geography: IGM Valli Grandi Veronesi 63 II NO. Inland site (*c.* 90 km from the sea) situated in the eastern part of the Po valley.
Lithology: Sedimentary rocks: sands, sandstones and conglomerates (alluvial deposits of the Rivers Po and Adige).
Investigation: Survey and excavation.
Function and description: Settlement. Four principal phases have been identified: the first characterised by a settlement of pile dwelling type, preceding the construction of the embankment; the second and third phases characterised by the

construction of a rectangular embankment; the fourth phase is marked by the site's abandonment. Outside was a system of drainage canals. A necropolis located nearby was probably connected with the settlement.
Local chronology: MBA-RBA.
Aegean chronology: LH III (?).
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: 1 Italo-Mycenaean, 4 *impasto*, 1 daub, (INAA, PE in Jenkins *et al.* 1999; Jones *et al.* 2002 and Chapter 4 in this volume).
Bibliography: Salzani 1989; Tozzi, Harari 1990; De Guio 1991, 1995; Vagnetti 1993a, 1996; Bagolan *et al.* 1997; Balista, De Guio 1997; Bettelli, Vagnetti 1997; Balista *et al.* 1998; De Guio *et al.* 1999; Jones *et al.* 2002.

66. Terranegra, Legnago, VR

Location and geography: IGM Valli Grandi Veronesi 63 II NO. Inland site (80 km from the coast) in the eastern Po valley, between the Rivers Tartaro and Adige, not far from the River Po, near Legnago.
Lithology: Sedimentary rocks: sands, sandstones and conglomerates (terraced alluvial deposits).
Investigation: Survey and excavation.
Function and description: Settlement. Two phases, separated by a thick alluvial deposit, have been identified. The first occupation is dated to the RBA, the second to the advanced IA. The RBA settlement was surrounded by an embankment and a ditch, possibly connected to a stream. Rectangular huts, with wooden posts along the walls. Drainage canals define the habitation area.
Local Chronology: RBA, IA.
Aegean Chronology: LH III (?).
Aegean and Italo-Mycenaean pottery: 2 fragments (?). The technology of the fragments is ambiguous and doubts have been expressed about their relevance to the Bronze Age (Malnati 2004).
Archaeometric analyses: 2 Italo-Mycenaean (?), 6 *impasto* (ICP, PE in Salzani *et al.* 2006 and Chapter 4 in this volume).
Bibliography: Malnati 2003; Salzani *et al.* 2006.

67. Crosare di Bovolone, Bovolone, VR

Location and geography: IGM Bovolone 63 IV NE. Inland site (*c.* 90 km from the sea) in the eastern Po valley, originally on a spur along the east bank of the River Menago. A canal derived from the river surrounded the settlement giving the impression that it was located on an island.
Lithology: Sedimentary rocks: sands, sandstones and conglomerates (terraced alluvial deposits).
Investigation: Excavation.
Function and description: Settlement. Rectangular dwellings, with canals, wells and fences and wooden enclosures. A MBA and RBA necropolis, not far from the settlement, has been known since the 19th century.
Local Chronology: RBA, FBA.
Aegean Chronology: LH IIIA2-B1, LHIIIB-C.
Aegean and Italo-Mycenaean Pottery: 4 fragments.
Archaeometric analyses: 4 Italo-Mycenaean, 7 *impasto*, 4 Apennine *impasto* (ICP, PE in Salzani *et al.* 2006; Cannavò, Levi 2009 and Chapter 4 in this volume).
Bibliography: Salzani *et al.* 2006.

68. Montagnana, PD

Location and geography: IGM Montagnana 64 IV SO. Inland site (60 km from the sea) located in the eastern part of the Po valley, to the east of the River Adige and to the SE of Colli Euganei. The site lies immediately E of the medieval wall of Montagnana in the area of Borgo S. Zeno. Numerous drainage and irrigation canals cross the area.
Lithology: Sedimentary rocks: sands, sandstones and conglomerates (alluvial deposits of the River Adige), limestones, marls; volcanic rocks: basalts, trachytes, andesites.
Investigation: Survey and excavation, following some chance finds.
Function and description: Settlement. The inhabited area is large, and three principal phases have been identified: the first phase (MBA-RBA) with traces of habitation structures with post holes, small drainage-pipes and low foundations for a wooden superstructure; the second phase (FBA-IA1) is characterised by rectangular structures with central hearths and a workshop area for the production of ceramics, metal objects and for working bone and horn. The site was abandoned in the third phase (IA) following a flood of the Paleo-Adige. Funerary areas with inhumation and cremation burials, most of which dated to FBA, have been identified in various nearby zones.
Local chronology: MBA, RBA, FBA, EIA
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: 1 Italo-Mycenaean (AAS, INAA, PE in Jones, Vagnetti 1991, 1992; Jenkins *et al.* 1999; Jones *et al.* 2002 and Chapter 4 in this volume).
Bibliography: De Min, Bietti Sestieri 1979; Bietti Sestieri 1982; De Guio 1991, 1995; Jones, Vagnetti 1991, 1992; Vagnetti 1993a, 1994, 1996, 1998; Bettelli, Vagnetti 1997; Bianchin Citton *et al.* 1998; Jones *et al.* 2002.

SICILY

69. Mulinello di Augusta, Cozzo Monaco, Augusta, SR

Location and geography: IGM Melilli 274 IV SE. Sub-coastal (*c* 1.5 km from the coast). The eastern coastline of Sicily from Capo S. Croce in the N to Capo Murro di Porco (Plemmyrion) in the S forms an ample gulf characterised by large and small inlets suitable as natural landing places. The coastal zone is flat and crossed by numerous rivers which are sometimes partially navigable. The site is located in the northern part of this area on a small rocky hill with steep slopes, accessible only from the east. The site overlooks a loop in the River Mulinello and the plain of Megara to the S.

Lithology: Sedimentary rocks: limestones, conglomerates; volcanic rocks: basalts.

Investigation: Excavation.

Function and description: The necropolis comprises over twenty rock-cut chamber tombs with vaulted ceilings (known as tholoi), excavated into the rock side above the River Mulinello. The necropolis began in the Bronze Age; some tombs were reused in the Classical period and later. The necropolis was probably related to a settlement situated on the summit of the hill to the E of the loop in the river.

Local chronology: MBA, RBA.

Aegean chronology: LH IIIA.

Aegean and Italo-Mycenaean pottery: 1 piriform jar and 1 fragment from a kylix.

Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese (ICP in Jones, Levi 2004a and Chapter 4 in this volume).

Bibliography: Orsi 1893a, 1902; Taylour 1958; Tinè, Vagnetti 1967; Marazzi, Tusa 1976; Tomasello 1995-96.

70. Thapsos, Penisola di Magnisi, settlement, SR

Location and geography: IGM Belvedere 274 II NO. The Magnisi peninsula is located on the eastern coast of Sicily, at the centre of the gulf delimited by the Augusta peninsula to the N and by Syracuse to the S. The gulf comprising these two promontories is very indented, and rich in inlets that form natural landing places. The Magnisi peninsula, a rocky tongue *c.* 2 km long x 800 m wide, flat and only a few metres a.s.l, is connected to the mainland by a sandy and narrow isthmus, creating two inlets, of which at least the southern, which is deeper, constitutes an excellent natural harbour. The settlement area is located on the peninsula.

Lithology: Sedimentary rocks: limestones, conglomerates.

Investigation: Excavation.

Function and description: The remains of two lines of fortifications have been found along the N-S axis of the peninsula at the highest point a.s.l.. The southernmost is 200 m long, curved, and has six semi-circular towers that are a maximum of 5 m long and are placed 19 m from each other; the external face of the defensive wall is made of small, irregular and roughly worked blocks. It is dated to the Castelluccio culture and should be related to a small village on the western coast of the peninsula which was perhaps used as a landing place. The second fortification line was found immediately to the N of the previous one, is rectilinear and is *c.* 300 m long; it is aligned NW-SE and seems to follow the *falaise* which dominates the area of the prehistoric settlement in proximity to the isthmus. The date of the structure is still uncertain, but it may relate to the same phase as the settlement and thus to the Middle and Late Bronze Ages.

The settlement, which is located in the area of the peninsula nearest to the isthmus, was in continuous use between the 14th and 12th centuries BC. It controlled the two landfalls on either side of the isthmus. The first phase is marked by huts of local architectural tradition, mostly circular in plan but also of a more irregular form; the pottery belongs to the Thapsos culture and, in some cases, to the Maltese *Borg-in-Nadur* culture. Remains of the second phase, datable to the 13th-12th centuries BC, are concentrated in the central area of the settlement. These structures are rectangular multi-roomed units looking into an internal paved court and delimited by roads; their size is very regular (*c.* 9x5 m), closed to the outside, furnished with a single entrance to the court, and in one case with a well. The few remains of the third phase, datable between the 11th and 9th centuries BC, are mostly located in the central part of the settlement. They show substantial changes in the settlement: the principal axis of the roads changes, as well as the orientation of the buildings, which overlap the previous ones without maintaining any connection with them. The finds of this phase are related to the Cassibile culture in Sicily, the Ausonian I and II on Lipari and the Torre Galli necropolis in Calabria.

Local chronology: EBA, MBA, RBA, FBA.

Aegean chronology: LH IIIA, LH IIIB.

Aegean and Italo-Mycenaean pottery: Few fragments, still unpublished.

Archaeometric analyses: None.

Bibliography: Bernabò Brea 1970, 1990; Voza 1970; 1972, 1973, 1976-77, 1992; Marazzi, Tusa 1976; D'Agata 1997; Castellana 2002; van Wijngaarten 2002.

71. Thapsos, Penisola di Magnisi, necropolis, SR

Location and geography: See site 70.

Lithology: See site 70.

Investigation: Excavation.
Function and description: The necropolis occupies a large part of the peninsula: a large area in the northern part, a cluster in the centre, and another to the S. More than 335 tombs were identified, many of which are on eroded slopes facing the sea, and were therefore full of water. Most of them are rock-cut or shaft-tombs with one or more chambers, often with side niches and tholos-shaped ceilings; the entrance is via a shaft or short corridor. At least 21 tombs are *enchytrismoi*, and are grouped on the slopes of a small valley in the central part of the eastern coast; most of the burials, deprived of grave goods, are within pithoi that were deposited in small cavities in the bedrock, and are covered with pebbles and earth like small tumuli. Besides local pottery, the grave goods found in the rock-cut tombs include Mycenaean (LH IIIA-B), Cypriot (Base Ring II Ware and White Shaved Ware) and Maltese materials (*Borg-in-Nadur*).
Local chronology: MBA, RBA.
Aegean chronology: LH IIIA, LH IIIB, LC II.
Aegean and Italo-Mycenaean pottery: 34 Mycenaean vases and several fragments; 3 Cypriot vessels (2 Base Ring, 1 White Shaved).
Archaeometric analyses: 8 Mycenaean probably imported from the Peloponnese, 24 *impasto*, 1 daub (ICP, PE in Jones, Levi 2004a and Chapter 4 in this volume).
Bibliography: Cavallari 1880; Orsi 1895; Gentili 1951; Taylour 1958; Sandars 1961; Bernabò Brea 1970, 1990; Voza 1970, 1972, 1973, 1976-77, 1992; Marazzi, Tusa 1976; Tomasello 1995-96, 2004; D'Agata 1997; Castellana 2002; Militello 2004.

72. Pantalica, Sortino, SR.

Location and geography: IGM Sortino 274 III NO. Inland site (12 km from the coast), located in the hinterland of Augusta, in an area characterised by numerous hills rich in permanent and seasonal watercourses. The archaeological site is located *c.* 300 m to the S of the modern centre of Sortino, on an elongated rocky outcrop oriented EW with large terraces and sheer walls on the N, E and S sides. The Cava Grande stream, which flows to the N, and the River Anapo to the S and E (which is the largest of the area, and eventually flows into the 'Porto Grande' in Syracuse) pass by the base of the outcrop.
Lithology: Sedimentary rocks: limestones; volcanic rocks: basalts.
Investigation: Excavation.
Function and description: Five necropolis areas have been identified on the rocky and sheer slopes that surround the site: the North-West, the great North, the South, the Cavetta, and the Filiporto. Chronologically, they belong to the different phases of the local RBA and FBA, from the Pantalica Nord-Caltagirone culture to the Finocchito culture. The tombs are rock-cut with one or more chambers, circular or quadrangular in shape, served by a single entrance, often with an antechamber. The North necropolis, which is the largest and belongs to the earlier phase, includes more than 1500 tombs excavated in the rock and largely looted. On the top of the peak is the *Anaktoron*, a monumental Bronze Age building, reused in the Byzantine period (9th century AD), surrounded by a fortification wall.
Local chronology: RBA, FBA, IA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 1 juglet.
Archaeometric analyses: None.
Bibliography: Orsi 1889, 1889a, 1899, 1913; Gentili 1956; Peroni 1956; Müller-Karpe 1959; Tinè, Vagnetti 1967; Bernabò Brea 1968, 1973, 1990; Vagnetti 1968a, 2004; Castellana 2002; Tanasi 2004.

73. Buscemi, Contrada Maiorana, SR

Location and geography: IGM Buccheri 273 II NE. Inland site (36 km from the coast), located on a plateau with sheer sides, about 2 km from Buscemi. South-eastern Sicily is characterised by the presence of low mountains and small plateaus, and is crossed by many watercourses running eastwards. The area in which this site is located is delimited to the S by the course of the River Anapo and is crossed by many of its tributaries.
Lithology: Sedimentary rocks: sands, limestones, conglomerates, chert.
Investigation: Chance find in 1950.
Function and description: Chance find of a rock-cut chamber tomb that was, possibly, part of a larger group of burials.
Local chronology: MBA, RBA.
Aegean chronology: LH IIIB.
Aegean and Italo-Mycenaean pottery: 1 stirrup jar.
Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese (ICP in Jones, Levi 2004a and Chapter 4 in this volume).
Bibliography: Gentili 1951; Taylour 1958; Tinè, Vagnetti 1967; Bernabò Brea 1990.

74. Floridia, Contrada Tabaccheddu, SR

Location and geography: IGM Solarino 274 III NE. Inland site (*c.* 13 km from the coast), 2 km to the S of the River Anapo, in a flat area on the northern border of the modern village of Floridia, in the vicinity of road 124. The area is bordered to the N by the hill zone of Mt. Climiti which reaches a mean altitude of about 400 m.
Lithology: Sedimentary rocks: limestones, conglomerates, clays, sands.

Investigation: Excavation**.**
Function and description: The necropolis includes at least three rock-cut chamber tombs. The existence of other tombs, destroyed by agricultural work and found completely empty, is also attested. The three known rock-cut tombs have a circular chamber with a shaft entrance, side niches and, in one case, benches around the perimeter.
Local chronology: MBA.
Aegean chronology: LH IIIA2-B.
Aegean and Italo-Mycenaean pottery: 1 alabastron.
Archaeometric analyses: none.
Bibliography: Orsi 1909; Taylour 1958; Tinè, Vagnetti 1967; Marazzi, Tusa 1976.

75. Cozzo del Pantano, Siracusa, SR.

Location and geography: IGM Siracusa 274 II SO. Near coastal site, a few km to the SW of Syracuse, *c.* 3 km from the coast. Cozzo del Pantano is a low, elliptical hill with a flat summit about 1 km long, which overlooks the marshy area of the Pantano. It is not far from the natural landing place of the 'Porto Grande' of Syracuse.
Lithology: Sedimentary rocks: sands, limestones, conglomerates, clays.
Investigation: Excavation.
Function and description: The necropolis is located along the northern and southern slopes of the hill; some tombs were also scattered on the north-western side. The rock-cut tombs (about 70), generally looted in antiquity, have an antechamber, a circular or quadrangular chamber with some niches excavated into the walls and benches along the perimeter. The ceiling's profile varies from almost rectilinear to curvilinear or ogival (tholos). Some tombs were re-used in the Classical period. The settlement was probably on the top of the plateau, on the surface of which several Bronze Age sherds, stones and bronze fragments were retrieved.
Local chronology: MBA, R/FBA, Archaic, Classical.
Aegean chronology: LH IIIA.
Aegean and Italo-Mycenaean pottery: 1 kylix.
Archaeometric analyses: none.
Bibliography: Orsi 1889b, 1893; Taylour 1958; Sandars 1961; Tinè, Vagnetti 1967; Marazzi, Tusa 1976; Tomasello 1995-96; Tanasi 2005a; Tedesco 2012.

76. Matrensa, Siracusa, SR

Location and geography: IGM Siracusa 274 II SO. Sub-coastal (*c.* 3 km from the coast). The archaeological area is located to the S of the mouth of the River Anapo, in a flat area to the W of the Maddalena peninsula in proximity to Torre di Milocca. On the coast, a few hundred metres to the S of the site, there is a natural landing place.
Lithology: Sedimentary rocks: limestones, conglomerates, clays, sands.
Investigation: Chance discovery followed by excavation.
Function and description: The necropolis, which is no longer visible, comprised six or seven rock-cut chamber tombs or tholos tombs excavated in the plateau between Torre di Milocca and the road between Syracuse and Noto. The entrance to the tombs is via a shaft; the chambers are usually circular with niches and low side benches. In some cases, a small antechamber is located between the entrance and the chamber.
All the tombs, except one, had been completely looted by the time of their excavation.
Local chronology: MBA.
Aegean chronology: LH IIIA.
Aegean and Italo-Mycenaean pottery: 2 piriform jars.
Archaeometric analyses: none.
Bibliography: Mauceri 1877; Furtwängler, Loeschcke 1886; Orsi 1889b, 1903; Arias 1936-37; Bernabò Brea 1953-54, 1990; Taylour 1958; Sandars 1961; Tinè, Vagnetti 1967; Marazzi, Tusa 1976; Vagnetti 1999a.

77. Siracusa, Greek city area, SR

Location and geography: IGM Siracusa 274 II SO
Lithology: Sedimentary rocks: limestones, conglomerates, clays, sands.
Investigation: Excavation.
Function and description: Bronze age tomb (Thapsos culture), 50 m. S of the Altar of Hieron, on the slopes of the Temenite hill. Seven skulls and remains of some skeletons.
Local chronology: MBA
Aegean chronology: LH IIIA2, LC II.
Aegean and Italo-Mycenaean pottery: 2 Mycenaean alabastra, 1 Cypriot Base Ring II juglet.
Archaeometric analyses: none.
Bibliography: Wilson 1987-88; Voza 1993-94, 1289; Graziadio 1997, 684; Vagnetti 2001a.

78. Madre Chiesa, Licata, AG

Location and geography: IGM Licata 271 II NE. Sub-coastal (4 km from the coast). The settlement lies on a slope in the foothills overlooking the Gaffe plain, on the border with the territory of Palma di Montechiaro. It is a large and fertile natural basin, protected by sheer rocky sides, open towards the nearby landing place of Torre di Gaffe. Numerous cavities, interpreted as rock-cut chamber tombs and shaft tombs of Castelluccio type, have been identified along the rocky sides.

Lithology: Sedimentary rocks: limestones, marls, chert, evaporites, clays; metamorphic rocks: schists.
Investigation: Excavation.
Function and description: Some circular huts of the Thapsos culture were found above the Eneolithic levels. In the best preserved example (hut 1), the superstructure would have been supported by a wooden framework comprised of four posts situated in the centre of the structure. An enclosure of stones of sub-circular shape was identified immediately to NW of the area of the huts, and interpreted by the excavator as the boundary of a sacred area comparable to the similar structures at Monte Grande (site 79). Some domestic structures of the Thapsos culture were also discovered within the enclosure.
Local chronology: Eneolithic, MBA, RBA, FBA, EIA.
Aegean chronology: LH IIB-IIIA.
Aegean and Italo-Mycenaean pottery: 2 Mycenaean fragments and 3 plain fragments of uncertain classification.
Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese (INAA: Chapter 4 in this volume).
Bibliography: Castellana 1990, 1993a, 1997, 1999, 2000, 66-133, 2002, 119-125.

79. Monte Grande, Palma di Montechiaro, AG

Location and geography: IGM Monte Grande 271 IV SE. Coastal, on a hill (267 m a.s.l.) with steep cliffs, overlooking a long stretch of the coastal strip, including the hinterland of Agrigento and the Bay of Porto Empedocle.
Lithology: Sedimentary rocks: limestones, chert, evaporites, clays, marls, sands; metamorphic rocks: schists.
Investigation: Excavation.
Function and description: The hill overlooks the sea to the S and W; its sides are less steep towards the SE and open into a fan-shape, creating two large platforms, Baffo Superiore and Pizzo Italiano – which constitute the summit of the plateau – where the archaeological structures are located. Large circular enclosures, built in megalithic technique, were interpreted by the excavator as part of a sacred area. Minor enclosures and votive (?) materials, in some cases associated with hearths, have been found within them. Some stone structures, interpreted by the excavator as areas for working sulphur,were found near the enclosures. Traces of further Eneolithic dry-stone enclosures have been identified on a lower plateau (Baffo Inferiore), with evidence of possible cult activity in the form of anthropomorphic clay figurines. Another area of investigation is located halfway between the latter area and the plateau of Baffo Superiore (Baffo Calcarone); there, some dry-stone structures of uncertain chronology were interpreted as working areas connected with of sulphur.
Local chronology: Eneolithic, EBA, MBA.
Aegean chronology: LH I-II.
Aegean and Italo-Mycenaean pottery: Several undiagnostic painted and plain fragments have been attributed in part to Aegean fabrics.
Archaeometric analyses: 1 Mycenaean, 3 Matt-painted, 3 Burnished probably imported from Attica, 38 *impasto* (INAA, SEM-EDAX, PE: Chapter 4 in this volume).
Bibliography: Castellana 1990, 1993, 1997, 1998, 1999, 2000, 2002.

80. Milena, Monte Campanella, CL.

Location and geography: IGM Montedoro 267 II NO. Inland site (50 km from the coast) located in Central Sicily to the W of Caltanissetta at the confluence of the Rivers Platani and Salito-Gallo d'Oro. The territory, which extends to the S of the villages of Milena and Bonpensere, is characterised by hills (400-600 m. a.s.l.) and extended plateaus. Monte Campanella (662 m a.s.l.) overlooks Serra del Palco to the W (see site 81); the plateau is of circular shape with three peaks on the top; the slopes incline towards the NE and drop abruptly to the S and W.
Lithology: Sedimentary rocks: clays, sands, evaporites, marls.
Investigation: Excavation.
Function and description: Four rock-cut tombs were explored on the SW side of Monte Campanella, and one on the N-NE slopes. Weathered material, deriving from the looting of the tombs, was found on the slope.
Local chronology: MBA (?), RBA.
Aegean chronology: LH III B-C.
Aegean and Italo-Mycenaean pottery: Two fragmentary closed vessels (krater and amphora) from tholoi A and B.
Archaeometric analyses: 1 Mycenaean probably imported from Central Crete, 1 Italo-Mycenaean, 12 *impasto* (AAS in Jones, Vagnetti 1991, 1992 and Chapter 4 in this volume; INAA, XRF, XRD, PE in Troja *et al.* 1996).
Bibliography: De Miro 1968; Vagnetti 1968; 1994; La Rosa 1979, 1982, 1984-85, 1985, 1986; Petix 1984; D'Agata 1986; Tomasello 1986; La Rosa, D'Agata 1988.

81. Milena, Serra del Palco, CL.

Location and geography: IGM Montedoro 267 II NO. Inland site (50 km from the coast) located in Central Sicily on a hill sloping towards the W, in a

saddle which leads to Monte Campanella (see site 80).
Lithology: Sedimentary rocks: clays, sands, evaporites, marls.
Investigation: Excavation.
Function and description: Settlement. Traces of possible floors of huts and a few remains of walls. Dump of materials of the EBA, MBA, RBA and also traces of a late Archaic settlement. The most recent strata contained Late Roman and Byzantine material. The architectural features are insufficient to allow the reconstruction of any of the huts, although some of the wall segments are curvilinear. The MBA settlement on Serra del Palco seems to be earlier than the rock-cut chamber tombs found at Monte Campanella. A Neolithic site has been identified nearby at Mandria.
Local chronology: Neolithic, EBA, MBA, RBA.
Aegean chronology: LH IIIA.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: *Impasto* from Neolithic to Iron Age (INAA, ICP, XRF, XRD, PE in Troja *et al.* 1996).
Bibliography: La Rosa, D'Agata 1988; La Rosa 1997, 1999.

82. Cannatello, Agrigento, AG

Location and geography: IGM Agrigento 271 IV NE/ Monte Grande IV SE. The site, *c.* 2 km from the coast and a few km E of Agrigento, lies in a flat area (51 m a.s.l.) between the Cannatello stream to the W, the River Naro to the E and the coast. The area, especially to the S, is now partially occupied by illegal buildings. The best preserved part of the ancient settlement is to the NE.
Lithology: Sedimentary rocks: sands, conglomerates, clays, marls, evaporites; metamorphic rocks: schist.
Investigation: Excavation.
Function and description: Settlement. Remains of eight huts and a hoard of bronze weapons were discovered at the beginning of the 20th century. A. Mosso subsequently identified structures belonging to a MBA village, associated with material of the Thapsos culture and with a probable Mycenaean sherd. A fortification wall and numerous structures were identified during an excavation carried out in the 1990s, when three phases of occupation were detected. Large portions of a huge fortification wall (maximum width 8.70 m) were brought to light, which delimited a circular space of *c.* 70 m diameter. In several places the wall is composed of two adjacent parts, with casemates on the inside (in the first phase) and a gate in the external face (in the second phase). Ten stone huts were found in the area investigated (*c.* a third of the site), some of which had been repaired several times. The huts were of either perfect circular form or rectangular, and can be attributed to three phases: three huts to phase 1, eight to phase 2 and two to phase 3. In the second phase, some rectilinear walls delimited internal parts of the village, and large pits, filled with animal bones, were discovered below the hearths in some of the circular huts. Pottery of Aegean type seems to relate mainly to phase 1.
Local chronology: MBA, RBA.
Aegean chronology: LH IIIA, LH IIIB.
Aegean and Italo-Mycenaean pottery: Several dozens of Mycenaean sherds, of mainly closed shape, only partially published. Cypriot pottery of White Slip II type; Cypriot pithoi with wavy grooved decoration.
Archaeometric analyses: 2 coarse stirrup jars from Central Crete (PE in Day, Joyner 2005); 8 Mycenaean probably imported from the Peloponnese, 1 from Central Crete and 1 from the Cyclades, 2 pithoi from southern Cyprus, 4 *dolia* (2 from Sardinia), 18 *impasto* (3 from Malta and 1 from Sardinia), 1 daub (ICP, PE: Chapter 4 in this volume).
Bibliography: Orsi 1897, 1907; Rizzo 1897; Mosso 1906, 1907; Bernabò Brea 1958; Buchholz 1959; Vagnetti 1968; Deorsola 1996; De Miro 1996, 1999; Tusa 1997a; Vagnetti 2001; Lo Schiavo *et al.* 2009, 135-138.

83. Marina di Agrigento, AG

Location and geography: IGM Agrigento 271 IV NE. The territory of Agrigento is located on the southern coast of Sicily. The coast between Punta Grande to the W and Punta Bianca to the E has a slightly indented profile with large inlets separated by small promontories which, in conjunction with the mouth of a river, offer natural landing places. The hinterland is characterised by low hills, rich in torrent beds.
Lithology: Sedimentary rocks: evaporites, clays, marls, sands, conglomerates, limestones.
Investigation: Acquired on the antiquities market.
Function and description: The exact provenance of a Mycenaean piriform jar, acquired by Orsi and said to be from 'Marina di Girgenti', is unknown; it is therefore possible to suppose that it originated from a necropolis in the coastal area (Porto Empedocle? S. Leone? Cannatello?).
Local chronology: context not known.
Aegean chronology: LH IIIA.
Aegean and Italo-Mycenaean pottery: 1 piriform jar.
Archaeometric analyses: 1 Mycenaean probably imported from Peloponnese (INAA: Chapter 4 in this volume).
Bibliography: Orsi 1906; Taylour 1958; De Miro 1968; Marazzi, Tusa 1976; Tusa 1997a, 186, V.57.

84. Erbe Bianche, Campobello di Mazara, TP

Location and geography: IGM Campobello di Mazara 265 I NO. Sub-coastal (5.5 km from the

coast) on the outskirts of the village of Campobello di Mazara, not far from Santo Monte.
Lithology: Sedimentary rocks: sands, conglomerates, limestones, clays, evaporites.
Investigation: Excavation.
Function and description: Settlement. Numerous huts of two distinct typologies were found, both attributable to the Thapsos culture. The first type has a circular perimeter, with large post holes excavated into the bedrock; portions of floors have been identified on the inside. The second type of hut is partially underground, excavated in the limestone bank for more than one metre in depth, with projecting walls and an elongated oval perimeter. Mycenaean sherds come from two different huts.
Local chronology: MBA, RBA (?).
Aegean chronology: LH IIIA.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: none.
Bibliography: Tusa 1993-1994, 1997; Ingoglia *et al.* 2012.

85. Milazzo, ME

Location and geography: The Milazzo peninsula, close to Messina, has an elongated shape in a S-N direction. It is separated from the hills bordering the Tyrrhenian side of Mts. Peloritani by a low plain (isthmus) *c.* 6 km wide. The peninsula with a mainly flat summit is bounded on three sides by steep cliffs, the highest of which reaches an altitude of 132 m a.s.l.
Lithology: Sedimentary rocks: sands and conglomerates, clays, marls; metamorphic rocks: granitoid gneisses.
Investigation: Excavation.
Function and description: Settlement. Traces of the Bronze Age sites have been found in various spots under the modern urban area, in the isthmus and in the portion of the plain at the junction with the isthmus. The best preserved portion of the Bronze Age settlement has been discovered in the area of 'Viale dei Cipressi'. Large dwellings with stone walls have been found, starting from the Capo Graziano period. In the isthmus zone there is an important cremation necropolis dating to the FBA. A MBA necropolis is located in the so-called 'Sotto Castello' area.
Local chronology: Eneolithic, EBA, MBA, RBA, FBA.
Aegean chronology: Undetermined.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: 2 Protogeometric, 3 *dolia*, 14 *impasto* (XRF, XRD, PE in Levi *et al.* 1999).
Bibliography: Tigano *et al.* 1994; Levi *et al.* 2003; Tigano 2009.

86. Island of Ustica, Villaggio dei Faraglioni, PA

Location and geography: IGM Ustica 249 IV NE. Coastal, near the northern point of the island, named 'Gorgo Salato', on a low terrace facing the Faraglione (Scoglio del Colombaro), after which the village is named. The island of Ustica, rising from the Tyrrhenian Sea, 69 km N of Palermo, is related to the Aeolian archipelago on account of its volcanic origin on the Salina-Alicudi alignment. The island has a sheer and indented coastline and a rocky hill range in the centre that separates the plains located to the N and S. Watercourses, springs, water tables, and drinkable water are totally lacking.
Lithology: Volcanic rocks: basalts, trachytes; sedimentary rocks: limestones.
Investigation: Survey and excavation.
Function and description: Settlement. About 20 huts of the MBA village were completely excavated, but the presence of *c.* 300 habitation units has been proposed. The huts, oval or rounded-quadrangular in shape and of different dimensions, are located in a cluster next to each other, and seem to share some walls; some open space had the function of courtyards. A N-S road was identified together with narrower and shorter perpendicular streets. The village is protected to the W and S (facing the internal part of the island) by a long double-faced fortification wall, *c.* 250 m long, with small towers, interpreted as buttresses. Traces of a building with an elongated rectangular plan were detected and defined as a 'fortezza'. At least four phases of occupation were identified. The upper part of a Mycenaean stirrup jar might suggest continuity in settlement until the RBA. A necropolis was identified outside the fortification wall, at the S-E corner of the terrace on which the site is located. It comprises 22 tombs excavated into the bedrock, but should originally have had at least 100 units, probably largely destroyed by marine erosion; the tombs were oval, U-shaped, or irregular in plan.
Local chronology: MBA, RBA (?).
Aegean chronology: LH III.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: 1 plain Italo-Mycenaean (?) (ICP: Chapter 4 in this volume).
Bibliography: Mannino 1970, 1978, 1979, 1982, 1991; Romano, Sturiale 1971; Tusa 1976-77, 1980-81, 1997a; Holloway 1991, 1992, 2003; Holloway, Lukesh 1991, 1992, 1995, 1996, 2001; Procelli 2006.

87. Island of Filicudi

Location and geography: IGM Isola di Filicudi e di Alicudi 244 III NO. Island of the Aeolian or Lipari archipelago to the N of Sicily, oval in shape, and 5.3 km long by 3 km wide. It has a principal volcanic cone (Mt. Fossa delle Felci) which reaches 774 m a.s.l., and two minor cones: Torrione, which has a flat surface (280 m) and Montagnoli di Pecorini (333 m) to the S. The Capo Graziano peninsula, situated towards the SE end of the island, extends for 500 m and ends with a high cone with sheer sides (a Montagnola indeed), connected to the rest of the island by a flat isthmus. Numerous shipwrecks have been identified on the seabed off Capo Graziano.

87a. Filicudi, Montagnola di Capo Graziano, Lipari, ME.

Location and geography: IGM Isola di Filicudi e di Alicudi 244 III NO. Coastal promontory (174 m a.s.l.) of the Capo Graziano peninsula, situated towards the SE end of the island and connected to the rest of the island by a flat isthmus.
Lithology: Volcanic rocks: basalts, andesites.
Investigation: Excavation.
Function and description: The principal excavation has been carried out on an ample terrace about 100 m a.s.l.; the terrace now has a crescent shape with a maximum width of 30 m and length of 100 m. The soil would not have been terraced during the BA; the huts of the village probably extended onto the slope as well. The settlement, which comprised oval and sub-circular shaped huts, must have been very large and have included over a hundred huts (26 excavated).
Local chronology: MBA.
Aegean chronology: LH I, LH II, LH IIIA.
Aegean and Italo-Mycenaean pottery: 82 fragments, some of which belong to restorable pots.
Archaeometric analyses: about 50 *impasto* from Piano del Porto and Montagnola are mainly locally made, few are imported from Lipari (PE, SEM, EMPA, ICP-MS in Williams 1991; Martinelli *et al.* 2010; Brunelli *et al.* 2013).
Bibliography: Bernabò Brea 1952; Taylour 1958; Cavalier 1966; Bernabò Brea, Cavalier 1966, 1977, 1991; Cavalier, Vagnetti 1983, 1986; Vagnetti 1991, 1994.

87b. Filicudi, Montagnola di Capo Graziano-Anfratti, Lipari, ME.

Location and geography: IGM Isola di Filicudi e di Alicudi 244 III NO.
Lithology: Volcanic rocks: basalts, andesites.
Investigation: Excavation.
Function and description: A necropolis under rock shelters on the slope of Montagnola, on which the Bronze Age settlement was located. The rock shelters were used for collective (?) inhumation burials.
Local chronology: MBA.
Aegean chronology: LH.
Aegean and Italo-Mycenaean pottery: 5 fragments.
Archaeometric analyses: none.
Bibliography: Bernabò Brea 1952; Taylour 1958; Cavalier 1966; Bernabò Brea, Cavalier 1966, 1977, 1991; Cavalier, Vagnetti 1983, 1986; Vagnetti 1991, 1994.

87c. Filicudi, offshore Capo Graziano, Lipari, ME.

Location and geography: IGM Isola di Filicudi e di Alicudi 244 III NO. Mycenaean sherds were retrieved from the sea, to the N side of the promontory, in the area between the sandbank and the Lava delle Macine.
Lithology: Volcanic rocks: basalts, andesites.
Investigation: Chance find.
Function and description: The sandbank of Capo Graziano caused the sinking of numerous ships in antiquity, as demonstrated by several shipwrecks, mainly of the Roman period, identified in the surrounding water. The upper part of a Mycenaean stirrup jar, not related to any particular shipwreck, was retrieved underwater. It has also been proposed that the vessel fell into the sea as a consequence of the erosion of the rocky slopes of the Montagnola, upon which the necropolis of the settlement of Capo Graziano was located (see 87b).
Local chronology: context unknown.
Aegean chronology: LH III.
Aegean and Italo-Mycenaean pottery: upper part of a stirrup jar.
Archaeometric analyses: none.
Bibliography: Bernabò Brea, Cavalier 1966, 1977, 1985; Vagnetti 1991.

88. Island of Salina

Location and geography: IGM Isola di Salina 244 IV SO.
Salina, belonging to the Aeolian or Lipari archipelago, is 26 km long and consists of two large volcanic massifs that are united at the base; the eastern massif culminates in the large crater of the Fossa delle Felci (962 m a.s.l.) which is the highest peak of the Aeolian Islands, while the western massif, of more recent formation, culminates in the Monte dei Porri (859 m a.s.l.). Numerous valleys, around 200 m a.s.l, are located in the saddle between the two massifs. The coastline of the island is mainly high and sheer; a seasonal stream crosses it and flows into the sea by a short stretch of low coast.

88a. Salina, Serro dei Cianfi, Santa Marina, ME

Location and geography: IGM Isola di Salina 244 IV SO. Coastal site, located on high ground by the Serro dei Cianfi, a low hill (105 m a.s.l.) to

the N of the Valle del Castagno; the latter, located between the massif of Mt. Fossa delle Felci and Mt. Rivi, represents the deepest rift of the eastern coast.
Lithology: Volcanic rocks: andesites, trachytes.
Investigation: Excavation.
Function and description: A probable settlement situated on the summit of a low hill, which had a relatively short life (C. Graziano and Milazzese) and is completely eroded. Excavation was limited to the investigation of the dumps, which comprised upper layers of mainly Milazzese phase fills, while rubbish dumps of the Capo Graziano culture were identified further down. Mycenaean sherds were found in both the fills and rubbish dumps.
Local chronology: MBA.
Aegean chronology: LH II, LH IIIA.
Aegean and Italo-Mycenaean pottery: 10 fragments.
Archaeometric analyses: none.
Bibliography: Bernabò Brea, Cavalier 1968, 1977; Marazzi, Tusa 1976.

88b. Salina, La Portella, Santa Marina, ME

Location and geography: IGM Isola di Salina 244 IV SO. Coastal plateau (1 km from the coast), with a single access point (583 m a.s.l.). The well-defended site is located on a narrow crest that drops abruptly towards the E coast of the island, just N of Santa Marina; the site looks towards the eastern side of Serro del Capo, a rocky spur that stretches out from Mt. Rivi towards the NE, dividing the territory of Santa Marina from that of Malfa.
Lithology: Volcanic rocks: andesites, trachytes.
Investigation: Excavation.
Function and description: Settlement. Ten circular huts, belonging to a village of the Milazzese culture, were partially excavated on a steep slope, forming terraces at different level. The village was probably destroyed by fire; a destruction level seals the habitation phase of the huts.
Local chronology: MBA.
Aegean chronology: LH IIB-IIIA.
Aegean and Italo-Mycenaean pottery: 1 fragmentary Mycenaean piriform jar; 2 fragments of a Cypriot pithos.
Archaeometric analyses: from Portella: 2 pithos fragments probably imported from southern Cyprus, 14 *impasto* (some, mainly of Apennine style, non-Aeolian) (PE, ICP in Williams 1991; Levi, Jones 2005; Williams, Levi 2008 and Chapter 4 in this volume); Neolithic pottery from Rinicedda (Williams, Levi 1995).
Bibliography: Bernabò Brea, Cavalier 1956, 1968, 1977; Marazzi, Tusa 1976; Williams 1991; Martinelli 2005, 2010.

89. Island of Lipari

Location and geography: IGM Isola di Lipari 244 III NE. Largest island of the Aeolian or Lipari archipelago having a surface area of 37.6 sq km. Essentially mountainous, its coasts were formed or covered by unconsolidated limestone pumice. The physical aspect of the island has changed notably since antiquity on account of the emission of an enormous amount of pumice in the Medieval period, which was followed by an obsidian flow. The beaches surrounding the island in the past have progressively disappeared due to heavy erosion and have been replaced by new ones formed by the discard of the modern pumice industry. In particular, the entire bay of Lipari was surrounded by beaches that favoured maritime activities.

89a. Lipari, Castello, ME

Location and geography: IGM Isola di Lipari 244 III NE. Coastal promontory (44 m a.s.l.). The acropolis of Lipari is located on an isolated flat-topped rock with sheer walls that projects into the sea, thus creating two inlets: Marina Lunga to the N and Marina Corta to the S. It was therefore a natural fortress with a single access point on the N side.
Lithology: Volcanic rocks: rhyolites, andesites; sedimentary rocks: clays, sands.
Investigation: Excavation.
Function and description: Excavations conducted on the acropolis revealed an uninterrupted cultural sequence from the Neolithic to the Roman period. There is evidence of settlement throughout the Bronze Age from the advanced Capo Graziano period to the Ausonio II period. At least 22 partially subterranean oval huts and a silo have been excavated from the Capo Graziano settlement, while 20 huts, generally oval in shape (apart from a horseshoe-shaped hut and a polygonal hut) belong to the Milazzese culture (Middle Bronze). The huts of this level apparently suffered a violent destruction (by fire?). Only one habitation level is documented for the Ausionio I (Recent Bronze) which comprised large oval huts (four of which have been excavated) and a quadrangular building, destroyed by fire. Another settlement, dated to Ausonio II, with rectangular structures, was built above the ruins of the previous one.
Local chronology: Neolithic, Eneolithic, EBA, MBA, RBA, FBA.
Aegean chronology: LH I-II, LH IIIA, LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: 1 figurine and more than 300 fragments, some of which belong to restorable pots.
Other Italian mixed products: 1 fragment of Grey

ware necked jar.

Archaeometric analyses: 9 Mycenaean probably imported from the Peloponnese, 1 pithos uncertain, 5 Nuragic-type fragments imported from Sardinia (ICP, PE: Chapter 4, in this volume); about 250 Bronze Age *impasto* mainly locally made (PE, SEM, EMPA, ICP-MS in Williams 1980; Brunelli *et al.* 2013); in the Ausonian period local production of *impasto* and *piumata* with imported Sicilian clays and Protogeometric imports (PE in Williams, Levi 2008); about 200 Neo-eneolithic samples of various wares locally made and imported (PE in Williams 1980; Williams, Levi 1995, 2001, Triolo *et al.* 2013; synthesis in Levi, Williams 2001.).

Bibliography: Bernabò Brea 1952, 1952a, 1979; Bernabò Brea, Cavalier 1956, 1977, 1980; Taylour 1958, 1980; Marazzi, Tusa 1976; Williams 1980; Vagnetti 1982g; Bietti Sestieri 1980-81; Cavalier, Vagnetti 1984; van Wijngaarten 2002.

89b. Lipari, Contrada Diana, ME

Location and geography: IGM Isola di Lipari 244 III NE. The flat and fertile area of 'Contrada Diana' is located at the foot of the 'Castello', where the modern village of Lipari developed after the Medieval period. Neolithic, Bronze Age, Classical and Hellenistic remains have been found in systematic and occasional archaeological research.

Lithology: Volcanic rocks: rhyolites, andesites; sedimentary rocks: clays, sands.

Investigation: Excavation.

Function and description: Settlement? Bronze Age (Capo Graziano and Milazzese) remains have been identified in the area of the Classical necropolis. A settlement and some cremation burials were attributed to the Capo Graziano period. A stray Mycenaean fragment was found in trench XXXI in the area of the Classical necropolis.

Local chronology: Neolithic, EBA, MBA.

Aegean chronology: LH IIB-IIIA1.

Aegean and Italo-Mycenaean pottery: 1 fragment.

Archaeometric analyses: 34 Eneolithic fragments from Acropolis, Contrada Diana and Piano Conte locally produced and imported (PE in Triolo *et al.* 2013).

Bibliography: Bernabò Brea, Cavalier 1960, 1994, 1998; Vagnetti 2001b.

89c. Lipari, Castellaro Vecchio, ME

Location and geography: IGM Isola di Lipari 244 III NE. On a coastal plateau (1 km from the coast, 300 m a.s.l.), the site is located in the NW of the island on the Castellaro plateau, in a commanding and easily-defended position with a view across the sea to Salina. The Castellaro torrent starts nearby and flows into the sea by Punta Palmeto.

Lithology: Volcanic rocks: rhyolites, andesites; sedimentary rocks: clays, sands.

Investigation: Survey and excavation.

Function and description: Many finds of the Capo Graziano culture have been retrieved in the near-surface levels, together with much stone that collected in mounds on the sides of the field. A scattered settlement of huts may have occupied the entire plateau.

Local chronology: Neolithic, MBA.

Aegean chronology: LH.

Aegean and Italo-Mycenaean pottery: 2 fragments.

Archaeometric analyses: see site 89a.

Bibliography: Cavalier 1979; Williams 1980; Williams, Levi 1995.

90. Island of Panarea, Capo Milazzese, Lipari, ME

Location and geography: IGM Isole di Panarea e di Basiluzzo 244 I NO. Coastal promontory (21 m a.s.l.). The island of Panarea has an almost elliptical shape with a surface area of 2.5 sq km and is surrounded by numerous reefs and islets (Basiluzzo, Spinazzola, Dattilo *etc.*). The island consists of a rocky, homogenous massif that rises abruptly from the sea to the W, reaching 420 m a.s.l. at Pizzo del Corvo. The wild and rugged landscape is characterised by deep ravines with rocky sides; the cliffs are high and sheer. The archaeological settlement extends across three natural rocky terraces on the promontory of Punta Milazzese at the extreme SE cape of the island. The terraces drop straight into the sea. In antiquity they must have been connected to each other via two saddles and by a brief isthmus *c.* 10 m wide. The promontory was a natural fortress that could be easily defended with a barrier.

Lithology: Volcanic rocks: andesites.

Investigation: Excavation.

Function and description: Settlement. The archaeological complex excavated on the first low hill includes a probable fortification wall and 21 huts built close to one another so as to create narrow passageways between them. The oval-shaped huts were often characterised by an external courtyard or were encircled within a pseudo-rectangular enclosure. Only one hut has a rectangular plan, and it is located at some distance from the others. Two more oval huts were excavated at the far end of the third low hill, and numerous others were identified but not excavated due to the terrain threatened by marine erosion and landslides. The settlement had a relatively short life and was destroyed by either fire or another sudden and violent event, as the archaeological materials were found *in situ* immediately beneath the collapsed roofs of the huts.

Local chronology: MBA.
Aegean chronology: LH IIIA.
Aegean and Italo-Mycenaean pottery: More than 30 fragments, some of which belong to restorable pots.
Archaeometric analyses: 11 *impasto* from Punta Milazzese probably imported from Lipari or from the mainland (PE in Williams 1991, Williams, Levi 2008).
Bibliography: Bernabò Brea 1947, 1947a, 1951, 1976-77; Bernabò Brea, Cavalier 1956, 1968, 1977; Taylour 1958; Marazzi, Tusa 1976.

91. Island of Stromboli, Contrada San Vincenzo, Lipari, ME

Location and geography: IGM Isola di Stromboli 244 I SE. Stromboli is the northernmost island of the Aeolian archipelago, only 60 km from Tropea on the coast of Calabria. The prehistoric settlement of San Vincenzo is located in the eastern part of the island near the modern town of Stromboli, on a coastal plateau (between 40 and 100 m a.s.l) well protected by steep slopes towards the valley; its current size is about 6 ha. It is one of the few flat and elevated areas formed during the eruption of Neostromboli, called the Cone of San Vincenzo. The village is therefore located in a strategic position overlooking maritime routes north-east of the archipelago and with a view ranging from the Straits of Messina to the Phlegrean Islands.
Lithology: Volcanic rocks: andesites.
Investigation: Excavation.
Function and description: Settlement. Excavation has revealed an organization of dwellings arranged on large artificial terraces contained by stone walls downstream. In the various trenches, circular and oval huts built in stone have been found. Some stone wall, pavements and various types of hearts are also well preserved.
Local chronology: Late Neolithic, EBA, MBA.
Aegean chronology: LH I-II.
Aegean and Italo-Mycenaean pottery: 11 fragments.
Archaeometric analyses: 57 *impasto* locally made or imported mainly from other islands (PE, SEM, EMPA, ICP-MS in Brunelli *et al.* 2013); *impasto* and historical pottery imported from surrounding areas (PE in Ferranti *et al.* 2012; Levi *et al.* 2013).
Bibliography: Cavalier 1981; Bettelli *et al.* 2010, 2011; Rattighieri *et al.* 2010; Levi *et al.* 2011, 2012; Forte *et al.* 2012; Ayala *et al.* in press; Martinelli, Levi 2013; Renzulli *et al.* 2013.

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92. Orosei area, NU.

Location and geography: IGM Orosei 501 IV. Exact location uncertain. The area is in the region of Baronie in the NE of Sardinia, close to the sea, which here has a low, linear and sandy coast. Coastal lagoon near the mouth of the Cedrino stream. The hinterland is characterised by the Cedrino coastal alluvial plain at the foot of the isolated limestone mass of Mt. Tuttavista (806 m a.s.l.).
Lithology: Sedimentary rocks: conglomerates, sandstones, limestones, chert, dolomites; volcanic rocks: basalts, rhyolites; plutonic rocks: granites; metamorphic rocks: paragneisses, phyllites, quartzites; migmatites.
Investigation: The sherds, which were delivered to the Soprintendenza Archeologica for the province of Sassari and Nuoro in 1976, are the result of a clandestine action probably carried out in the hinterland of Orosei.
Function and description: Unknown.
Local chronology: context unknown.
Aegean chronology: LH IIIB.
Aegean and Italo-Mycenaean pottery: 13 fragments.
Archaeometric analyses: 13 Mycenaean probably imported from the Peloponnese (AAS, PE in Jones 1986a; Jones, Day 1987 and Chapter 4 in this volume).
Bibliography: Lo Schiavo, Vagnetti 1980; Vagnetti 1982e, 1994; Vagnetti, Jones 1988; Jones, Vagnetti 1991; Re 1998.

93. Nuraghe Nastasi, Tertenia, NU

Location and geography: IGM Tertenìa 541 II. Coastal. The nuraghe is located on a small hill facing the sea in the centre of the Sàrala hollow, in the southern part of the Ogliastra historical region, between the Gennargentu massif to the N and Salto di Quirra to the S. The region is characterised by massifs over 800 m high which descend slowly to the coastline, where a few narrow coastal plains such as Sàrala can be found.
Lithology: Sedimentary rocks: sandstones, limestones, dolomites, marls; plutonic rocks: granites; metamorphic rocks: phyllites.
Investigation: Excavation.
Function and description: Nuraghe with a complex plan consisting of a central tower and a bastion, which includes a tower and two turrets.
Local chronology: FBA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Cannas 1964, 1972; Basoli 1978; Lo Schiavo, Vagnetti 1980; Lo Schiavo 1982, 1990b; Re 1998.

94. Nuraghe Arrubiu, Orroli, NU

Location and geography: IGM Orroli 540 II. Inland site about 50 km from the coast. The nuraghe

is located on the commanding Taccu Pizzinnu plateau (500 m a.s.l.), characterised by sheer sides to the N and E, and even steeper on the dyke of the River Flumendosa. It overlooks the middle course of the river, controlling an ancient ford. From a geographical point of view the area is part of the vast basalt plateau of Pran'e Muru, in the southern zone of the Sarcidano historical region. The Mulargia artificial lake is located to the S of the plateau, while a slightly descending hill zone opens to the W, towards the Marmilla hills.
Lithology: Sedimentary rocks: conglomerates, sands, sandstones, marls, limestones, dolomites, clays, radiolarites; volcanic rocks: basalts; metamorphic rocks: gneisses, schists.
Investigation: Extensive survey and excavation.
Function and description: Nuraghe consisting of a central tower encircled by five towers interconnected to each other by a huge bastion with an internal courtyard of irregular pentagonal shape. The nuraghe is encircled by an outer wall with seven towers and three courtyards. Five more towers belong to the second outer wall. Three huts were found in the western part of the nuraghe, one of which was of remarkable dimension. The complex was constructed during the 14th century BC and remained in use until the 9th century BC.
Local chronology: MBA3, RBA, FBA, EIA.
Aegean chronology: LH IIIA2.
Aegean and Italo-Mycenaean pottery: 1 alabastron, made up of many fragments scattered over a vast area.
Archaeometric analyses: 1 Mycenaean probably imported from the Peloponnese, 4 *impasto* (AAS in Jones, Vagnetti 1991, 1992; Jones 1993 and Chapter 4 in this volume).
Bibliography: Lo Schiavo 1990, 1990a; Jones 1993, 1993a; Lo Schiavo, Vagnetti 1993; Vagnetti 1994; Re 1998; Lo Schiavo, Villani 2001; Cossu *et al.* 2003.

95. Su Nuraxi, Barumini, CA

Location and geography: IGM Tuili 539 I. Inland site, about 60 km from the coast. The nuragic complex at Barumini is located in the fertile Marmilla region, in central-southern Sardinia. The area is characterised by groups of hills and small plateaus (average altitude *c.* 250 m a.s.l). The basalt plateau of the Giara di Gésturi rises to the N of Barumini. The foothills of the Sarcidano massif begin to the NE.
Lithology: Sedimentary rocks: sandstones, limestones, marls, conglomerates, clays, sands; volcanic rocks: basalts; plutonic rocks: granites; metamorphic rocks: schists.
Investigation: Surveys and excavation.
Function and description: Archaeological complex consisting of a quadrilobate nuraghe with a tower, a central courtyard and a spring-water well, surrounded by an outer wall with five towers. Village composed of single-roomed huts. The central tower or 'mastio' has three floors with domed chambers. The quadrilobate structure is entirely surrounded by a massive double-curtain wall, 2 m thick. Different building phases have been identified: a) construction of the central tower and the outer wall (advanced MBA-RBA, *c.* late 15th-early 13th centuries BC); b) construction of the curtain wall and an enlargement of the outer wall (late RBA-FBA 12th century BC).
Local Chronology: MBA, RBA, FBA, IA.
Aegean chronology: LH IIIC.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Other Italian mixed products: 1 red-lustrous sherd, of suspected Aegean manufacture, is more likely of Phoenician origin.
Archaeometric analyses: none.
Bibliography: Lilliu 1946, 1949, 1952-54; Ferrarese Ceruti 1979, 1980, 1981; Vagnetti 1982b; Corretti 1985; Lo Schiavo *et al.* 1985; Re 1998; Santoni 2001.

96. Nuraghe Corti Beccia, Sanluri, OR.

Location and geography: IGM Sanluri 547 I. Inland site (about 38 km from the coast), located in the Marmilla historical region in the upper Campidano, on the NE border of a large plain which extends NW-SE from Oristano to the Cagliari gulf.
Lithology: Sedimentary rocks: marls; volcanic rocks: andesites.
Investigation: Rescue excavation.
Function and description: Very badly preserved single-tower nuraghe, with only three courses of masonry, surrounded by substantial remains of a settlement.
Local chronology: RBA, FBA.
Aegean chronology: LH III.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Ugas 1982, 1987a.

97. Monte Zara, Monastir, CA.

Location and geography: IGM San Sperate 557 IV. Inland site (20 km from the coast), located on the slope of a hill (225 m a.s.l.). The area is located in the Campidano plain, which extends NW-SE from Oristano to the Cagliari gulf.
Lithology: Sedimentary rocks: conglomerates, marls, sandstones, clays, limestones; volcanic rocks: trachytes, andesites.
Investigation: Excavation.
Function and description: Large nuragic settlement consisting of 41 structures (circular, rectangular) and storage pits, located in an area inhabited since the Neolithic and Eneolithic periods. The Bronze

Age settlement seems to belong to the RBA and FBA, while a large megalithic enclosure can be dated to the beginning of the IA.
Local chronology: Neolithic, Eneolithic, RBA, FBA, EIA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 4 fragments.
Archaeometric analyses: none.
Bibliography: Ugas 1987, 1992, 2001; Re 1998; Soro 2011.

98. Nuraghe Antigori, Sarroch, CA

Location and geography: IGM Pula 566 III. Coastal site (about 800 m from the coast), located in the extreme S of Sardinia, on a low hill (100 m. a.s.l.) with a commanding view of the Cagliari gulf. The gulf is characterised by a linear and sandy coast and a narrow coastal plain, delimited by a hill zone belonging to the mountain range culminating with Mt. Nieddu (1041 m). The hills of the metalliferous area of the Sulcis and the massifs of Mt. Is Laccumeddas (601 m) are immediately behind the nuragic complex. Various springs and seasonal streams flow eastwards from the highlands that overlook the site.
Lithology: Volcanic rocks: andesites, basalts; plutonic rocks: granites; metamorphic rocks: schists, phyllites, quartzites.
Investigation: Excavation.
Function and description: Nuragic complex composed of a fortification with five circular towers and walls that encircle half of the hill's summit; the natural cliff to the SW-NW sides completes the natural defence of the site. Tower C is well preserved, with two floors. The domed roof of the lowest floor survives intact.
Local chronology: RBA, FBA, EIA.
Aegean chronology: LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: About150 fragments, some of which belong to restorable pots.
Archaeometric analyses: 14 Mycenaean probably imported from the Peloponnese, 2 from Central Crete, 6 from West Crete, 30 Italo-Mycenaean, 2 fragments of Cypriot Base Ring type (origin uncertain), 3 pithoi (1 from Central Crete, 1 from southern Cyprus, 1 local), 7 *impasto* (AAS, PE in Jones 1986; Jones, Day 1987; Jones, Vagnetti 1991, 1992 and Chapter 4 in this volume).
Bibliography: Ferrarese Ceruti 1979, 1980, 1981, 1982a, 1983, 1985, 1986; Ferrarese Ceruti *et al.* 1987; Lo Schiavo 1986; Vagnetti, Jones 1988; Bernardini 1991; Relli 1994; Vagnetti 1994; Forci, Relli 1995; Re 1998; AA.VV. 2011.

99. Nuraghe Domu s'Orku, Sarroch, CA

Location and geography: IGM Pula 566 III. Coastal site (100 m from the coast) on the northernmost spur of a plateau that projects towards the sea. The site is located on the western side of the Gulf of Cagliari, along the northern foothills of Mt. Arrubiu (262 m a.s.l.) on the border between the regions of Campidano and Iglesiente, a hill zone that belongs to the mountain range culminating with Mt. Nieddu (1041 m). The coastal plain of Pula develops to the S of Mt. Arrubiu, with a linear and sandy coast.
Lithology: Volcanic rocks: andesites, trachytes; plutonic rocks: granites; metamorphic rocks: schists, phyllites, quartzites.
Investigation: Excavation.
Function and description: Bilobate nuraghe, so-called 'a tancato', with a longitudinal addition and two towers placed on the same axis, connected by a central courtyard. The room inside the earlier tower, 3.75 m in diameter, has a domed ceiling and a staircase 4.5 m from the floor. The additional part of the fortress has a tower on the same axis as the earlier one and two huge transversal walls which enclose the first tower, creating a quadrangular courtyard.
Local chronology: RBA, FBA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 7 fragments.
Archaeometric analyses: 2 Mycenaean probably imported from Central Crete, 3 Italo-Mycenaean (AAS, PE in Jones, Day 1987; Jones, Vagnetti 1991, 1992 and Chapter 4 in this volume).
Bibliography: Taramelli 1926; Lilliu 1962; Ferrarese Ceruti 1982, 1985; Ferrarese Ceruti *et al.* 1987; Re 1998.

100. Nuraghe Is Baccas, Sarroch, CA

Location and geography: IGM Pula 566 III. Coastal site, located on the low hills which overlook the coastal plain.
Lithology: Volcanic rocks: andesites, basalts; plutonic rocks: granites; metamorphic rocks: schists, phyllites, quartzites.
Investigation: Survey.
Function and description: Nuraghe Is Baccas seems to be part of a settlement system composed of five nuraghi, having a commanding view of the lower fertile plain and the sea in the distance.
Local chronology: RBA, FBA, IA.
Aegean chronology: LH IIIB, LH IIIC.
Aegean and Italo-Mycenaean pottery: 2 fragments.
Archaeometric analyses: none.
Bibliography: Botto, Rendeli 1998; Soro 2011.

101. Nora, Pula, CA

Location and geography: IGM Pula 566 III. Coastal promontory to the S of the Gulf of Cagliari,

characterised by a stretch of coastal plain with a linear and sandy coastline (10 m a.s.l.). The Nora promontory is a part of the Pula plain, located in the southern Sulcis, and delimited by a hill zone belonging to the mountain area culminating with Mt. Nieddu (1041 m). The massif of Mt. Cresia (864 m) is to the W of the site. The coast is characterised by promontories and bays, with sandy and pebble beaches.
Lithology: Volcanic rocks: andesites, basalts; plutonic rocks: granites; metamorphic rocks: schists, phyllites, quartzites.
Investigation: Survey and excavation.
Function and description: Traces of human occupation on the promontory go back to the nuragic period and can be dated at least to the RBA. Phoenicians settled in the area as early as the 8th century BC. The site continued to be used in the Punic, Roman and Byzantine periods at least until the 6th century AD. LH IIIB-C sherds were retrieved from the so-called Macellum, which was recently re-interpreted as an *insula*.
Local chronology: RBA (?)
Aegean chronology: LH IIIB.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Patroni 1904; Pesce 1972; Rossignoli *et al.* 1994; Bondì 2000; Botto *et al.* 2000; Soro 2011, fig. 11 (upper piece).

102. Tharros, Cabras, OR.

Location and geography: IGM Capo San Marco 528 III. Coastal site with two landing places, at the end of the Sinis peninsula along the W coast of Sardinia, at the N end of the Oristano gulf (10 m a.s.l.). The Sinis peninsula is characterised by a large plain that faces the sea. The facing coast is low and linear, and rich in large ponds and small lakes.
Lithology: Sedimentary rocks: conglomerates, sandstones, sands, marls, clays, limestones; volcanic rocks: basalts.
Investigation: Excavation.
Function and description: The promontory was probably settled in the Bronze Age. In particular, the nuraghe Su Muru Mannu is located in the area where the town of Tharros was later built. The Phoenician town developed between the 9th and 8th centuries BC, and became Punic in the 6th century BC.
Local chronology: RBA, FBA, IA.
Aegean chronology: LH IIIA2-B.
Aegean and Italo-Mycenaean pottery: 1 Mycenaean fragment and other painted sherds of uncertain classification.
Archaeometric analyses: none.
Bibliography: Acquaro *et al.* 1981, 1982, 37- 51; 1983, 49-70; Vagnetti 1982b; Bernardini 1989; Ridgway 1989; Re 1998.

103. Duos Nuraghes, Borore, NU

Location and geography: IGM Macomèr 498 III. Inland site (30 km from the coast) located in Central-western Sardinia, on the Abbasanta plateau which stretches in a SW-NE direction between the Marghine range and the Mandrolisai granite plateau. The area of the site, crossed by seasonal streams and rich in water springs, slowly descends NW-SE from 400 to 350 m a.s.l.
Lithology: Volcanic rocks: basalts.
Investigation: Excavation.
Function and description: Nuraghe with two towers, 10 m distant from one another, perhaps linked by a wall, which is only partially preserved. Tower A has been extensively excavated. Traces of an enclosing wall and of a village, in which seven huts of the nuragic period have been identified.
Local chronology: MBA, RBA, FBA, IA.
Aegean chronology: LH IIIB-C.
Aegean and Italo-Mycenaean pottery: 1 fragment.
Archaeometric analyses: none.
Bibliography: Webster 2001.

2.3. Updating

In this short paragraph under the entry 'Additions' are briefly mentioned some recent and substantially unpublished discoveries of Aegean-type pottery from sites not included in the Gazetteer. Under the entry 'Exclusions' we explain why some finds, taken into account in previous bibliographies, have not been mentioned or discussed here.

a. Additions

In **Calabria**, at the inland site of San Sosti (Chiesa del Carmine, CS), overlooking the Tyrrhenian Sea, two Mycenaean fragments probably of local manufacture, are reported among the remains of RBA and FBA occupation (Marino, Papparella 2008).

In **Campania**, in the location Castelluccia (Battipaglia, SA) located on a fluvial terrace of the River Tusciano, remains of BA huts have been discovered during rescue excavations along the highway. A few Aegean-type sherds have been found in a pit together with BA pottery (Scarano 2011).

An important BA inland site in **Marche** region is Moscosi (Cingoli, MC), located in the in the valley of River Musone. The site was settled from an advanced phase of the MBA to the beginning of the FBA. In re-examining the finds two fragmentary juglets and two more sherds, possibly Italo-Mycenaean, were identified (Sabbatini, Silvestrini 2005; Sabbatini *et al.* 2009).

In **Sicily** and the adjacent islands, excavations at Monte San Paolillo, within the city of Catania, remains of a MBA settlement with an oval hut (Thapsos culture) were uncovered. Two Mycenaean fragments, one painted and one plain, are reported and illustrated (Tanasi 2010).

On the Island of **Filicudi** (Lipari, ME) new excavations have been carried out at the site of Filo Braccio located on the low area of the island at the foot of the Montagnola di Capo Graziano (see site 87a). A group of BA huts and other structures, belonging to an early phase of the Capo Graziano culture, were excavated in 2009. A fragment of wheel-made painted pottery, archaeologically undiagnostic, is reported among the finds (Martinelli, personal communication; on the excavation see Martinelli *et al.* 2010; Martinelli, Levi 2013).

In south-eastern **Sardinia**, at the site Medau is Lais (Tratalias, CA), a Mycenaean-type painted fragment came to light during an intensive survey. Abundant RBA local pottery suggests that a Nuragic settlement existed in the area (Usai, Lo Schiavo 2009, 278; Soro 2011, fig. 13).

b. Exclusions

Exclusions mainly concern Sicily and Sardinia. Recent systematic excavations in the BA village of Mursia on the island of Pantelleria, between the southern coast of Sicily and Tunisia, have brought to light important indications of the role of the island in the BA international Mediterranean network, but no clear evidence of Aegean-type pottery (Marazzi, Tusa 2005).

Some pottery finds from Sardinia have been included in the past in the list of Mycenaean imports from the Aegean. Among them a sherd from Pozzomaggiore and one from Nuraghe Sant'Imbenia (both in the area of Alghero, SS) have been analysed (see Chapter 4 in this volume). While the first one could be an import from the Peloponnese, an Aegean origin for the second one seems unlikely. The doubts about the chronology of the Pozzomaggiore sherd, which were discussed by Lo Schiavo and Vagnetti (1986), have suggested excluding the site from the Gazetteer. The same doubts concern the sherds from Sulky-Sant'Antioco whose archaeological characterisation seems to suggest a Levantine origin, even if of possible remote Mycenaean inspiration (Bartoloni 2008, fig. 1; Soro 2011, fig.14). A fragmentary bowl with a wish-bone handle of Cypriot type from San Sperate-S. Sebastiano (CA) has been considered as an import from Cyprus of the Cypro-Geometric period (Ugas 1993). Pending a thorough publication of the context and of its chronological setting, the site has not been included in the Gazetteer.

CHAPTER 3

BUILDING A COMPARATIVE CHRONOLOGY BETWEEN ITALY AND THE AEGEAN IN THE LATE BRONZE AGE

Marco Bettelli, Lucia Alberti

The Aegean-type pottery found in the Bronze Age settlements and burials of the Central Mediterranean (i.e. peninsular Italy and the adjacent islands) offers the opportunity to correlate the phases of the Italian and the Aegean Bronze Ages. This possibility has been taken into consideration since the very beginning of research in this field, but the discovery of new sites, the publication of stratigraphic excavations, and the progressive refinements in the knowledge of the Italian archaeological *facies* of our interest and in the study of Mycenaean and other Aegean ceramics allow a more detailed examination of the evidence to be made. Moreover these developments provide the basis for a more subtle comparative chronology of the two areas.

This section represents the completion of a previous work by the authors on the same subject, published in *Emporia* (Alberti, Bettelli 2005)[1].

3.1. Aegean-type pottery from Central Mediterranean stratified contexts

Marco Bettelli, Lucia Alberti

The sites under scrutiny are: Vivara - Punta Mezzogiorno (47a); Vivara - Punta d'Alaca (47b), settlement strata; Lipari - Acropoli (89a), Capo Graziano, Milazzese, Ausonio strata; Filicudi - Montagnola di Capo Graziano site (87a); Panarea - Punta Milazzese site (90a); Punta Le Terrare (16); Masseria Chiancudda (12); Rocavecchia (17); Broglio di Trebisacce (32); Torre Mordillo (34).

3.1.1. Middle Bronze Age (MB)

The levels investigated at **Vivara – Punta Mezzogiorno** belong to the very beginning of the Italian MB (Protoapennine *facies*, Damiani 1995). The stratified Mycenaean pottery mainly dates to LH I, with only a single specimen from LH IIA (Panichelli, Re 1994, 208-210, figs. 12:127-131, 13:132-134; Jung 2006, 88-89, Abb. 7), and there are a few Capo Graziano sherds which were imported from the Aeolian Islands (Cazzella, Moscoloni 1994, 107-116, fig. 3:B-D).

The habitation levels at **Vivara – Punta d'Alaca** belong to MB2 (probably the initial phase) (Damiani 1995; Damiani, di Gennaro 2003); among the numerous Mycenaean sherds discovered so far, only very few are datable to the LH I period, while the majority of the finds have LH II parallels (Panichelli, Re 1994, 199-208, figs. 8-12; Merkouri 2005, pls. CLIII-CLVII) (Fig. 3.1:1, 5-6). One fragment decorated with a pattern that has been interpreted as an FM 18 Mycenaean flower (Panichelli, Re 1994, fig. 9:102) has been assigned to LH IIIA1 but is not, in fact, diagnostic. This kind of floral motif is never located so high on the shoulder as it is on this specimen. In fact, the preserved part of the motif could be better

[1] Credits for illustrations are indicated in captions. As already stated in the 2005 contribution, the authors are particularly grateful to Lucia Vagnetti and Penelope Mountjoy for kindly providing copies of some original drawings.

interpreted as coming from a necklace motif (FM 64), which would be more at home at the bottom of the neck. The stipple decoration on sherd 104 should not make it later than LH IIB (Panichelli, Re 1994, fig. 9:104). Another fragment recently published from the 1986-1998 excavations at Punta d'Alaca (Merkouri 2005, 615, tav. CLIV:1) belongs to the shoulder of a closed shape with net decoration FM 57. According to Merkouri, it could be the shoulder of a piriform jar FS 31 with a diaper net motif (Fig. 3.1:11). If so, it should be the most recent fragment of the series and it could be dated to LH IIB-IIIA1; it should be noted that this sherd comes from the 'mixed' levels which cover the 'settlement' levels dated to MB2. A true MB3 settlement area is attested at **Vivara – Punta Capitello**. A LH IIIA chronology has been proposed for the two sherds from the site (Taylour 1958, 8, tav. 8:d, e; Marazzi 1994, 60, fig. 3:a, b).

The comparative approach works well in the **Aeolian Islands**, where there are large excavated settlements with long stratigraphic sequences. Lipari, for example, is perhaps the only known case with an uninterrupted Mycenaean ceramic sequence that is almost completely published (Taylour 1980). Other settlements that were inhabited for only a single phase – for example **Panarea** (Taylour 1958, 44-47, pl. 7; Bernabò Brea, Cavalier 1968, 57-132) – bring together Aeolian pottery, Mycenaean pottery and other fabrics characteristic of the Italian mainland.

At **Filicudi** (Vagnetti 1991) both the painted Mycenaean pottery and the Matt-Painted ware datable to LH II have been found only in the Capo Graziano context (beginning of the Italian MB)[2]. The few imported sherds that can be dated to LH IIIA1 belong to a later MB context (the so-called Milazzese phase): such contexts are either pure or contain a very few or residual Capo Graziano sherds.

The δ III hut on the Acropolis at **Lipari** belongs to a Capo Graziano context. Numerous sherds of open and closed shapes dating to LH/LM I-II have been discovered within this hut (Bernabò Brea, Cavalier 1980, 220-223; Cavalier, Vagnetti 1984, tav. III) (Fig. 3.1:2). A problematic exception is a supposed kylix base of huge dimension that is decorated with bands, and so ought to be no earlier than LH IIIA (Cavalier, Vagnetti 1984, tav. III: 17). However, a LM II kylix with a base of similar size and profile, but monochrome, has been found at the Temple Tomb at Knossos.[3] In our opinion this Lipari sherd, considering the chronological homogeneity of the ceramic assemblage, could be an atypical older piece, a different kind of base altogether or simply an intrusive sherd.

Furthermore, by internal cross-referencing of other Aegean wares, an interesting cross-dating emerges between the Capo Graziano and the Protoapennine complexes (MB1-2). This consists of a number of cups or bowls with rounded body related to the Middle Helladic manufacturing tradition (burnished or plain) found in the Capo Graziano levels of Lipari, in the Protoapennine levels of Vivara, and at Punta Le Terrare and Rocavecchia in Puglia (see below).

Finally, there is the Milazzese phase. At **Filicudi** the huts that belong to this period produce Mycenaean pottery datable to LH IIIA1 (Vagnetti 1991). At **Panarea**, where the settlement on the Milazzese promontory lasted only during the eponymous phase, Apennine pottery is associated with Mycenaean IIIA1 sherds, for example in hut XVI (Alberti, Bettelli 2005, pl. CXXIV:5-6) (Fig. 3.2:12). At **Lipari** LH IIIA1 – for example, from hut γ XIX, VIII external area (Alberti, Bettelli 2005, pl. CXXIV:7-8) – and LH IIIA2 sherds – for example, from hut γ III (Alberti, Bettelli 2005, pl. CXXIV:9-10) – are also amply attested. Both phases are associated with typical Apennine ceramics (Bernabò Brea, Cavalier 1980, 163-215) (Fig. 3.2:15-17).

Coming to Apulia, the settlement of **Punta Le Terrare** has good stratigraphy. In the deepest

[2] A single example, from hut IV, belongs to a goblet and dates to a later period (LH IIIA1) (Vagnetti 1991, fig. 2d); however, this piece was retrieved during the cleaning of the superficial level and was therefore out of context. In this regard it is important to stress the presence, in levels above the floor, of two sherds belonging to the Milazzese *facies* (late MB), as the Mycenaean specimen should be related to these later sherds.

[3] We thank Dr. Eleni Hatzaki for this information.

levels of trench 1966, belonging to the earliest phases of the site (MB1-2), a sherd belonging to an open vessel that was originally published as being a stipple-decorated cup (Franco 1996, 1562-1570, tav. I:6; Boccuccia 1998, 175-177, fig. 477). We suspect, however, that what we are looking at is not stipple decoration FM 77, but a simple slip with incrustation. Moreover, the profile and the internal decoration of the sherd are far closer to those of LM II goblets with a single decorative motif (Alberti 2004; Alberti, Bettelli 2005, pl. CXXIII:7-9) (Fig. 3.1:14).

Some fine orange-burnished ceramics (Franco 1996, tav. II: A-F) have been recovered in the lower levels of another trench.[4] Their fabric and profile are close to a piece from a Capo Graziano context at Lipari, associated with LH/LM I-II pottery.[5] Such an association is comparable with the context known at Punta Le Terrare (Alberti, Bettelli 2005, pl. CXXIII:13-14, 16).

Less problematic in date are the Mycenaean sherds found in the so-called middle and upper levels of the settlement (possibly MB3, see *infra*), namely a FS 77 jar with stipple decoration FM 77 and one or two piriform jars with a diaper net motif FM 57, both LH IIIA1 or 2 in date (Franco 1996, tav. I:5-7; Alberti, Bettelli 2005, pl. CXXIV:1-4) (Fig. 3.2:8-10). It is important to note that the fragment of a piriform jar was found together with a local *impasto* rim with Apennine decoration; the problems related to the local MB chronology will be discussed below.

Regarding the important settlement of **Rocavecchia** in southern Salento, the available publications, although not entirely complete, report having found MB levels in numerous sectors of the excavation in addition to the fortification wall from the same period (Scarano 2012, 31-39). In the trenches excavated along the front inside of the wall in postern D, two apparently MB levels have been identified. A slightly earlier level lies directly on the bedrock; the excavators date it to "at least the MB2" (Protoappenine phase 2). A later level dates to MB3 when the wall of this initial phase of the site was destroyed (Guglielmino 2003; Scarano 2012, 32-35). The same period is represented by **phase I** in **trench X 2005** (Pagliara e*t al.* 2007, fig. 8; Scarano 2012, 35-37), although this does not seem to have produced any Aegean sherds.

In the excavation carried out in postern D, some Aegean pottery was found within the stratigraphic sequence. Some Mycenaean vessels and other pottery with Middle Helladic features were found in the lower levels (Guglielmino 2003, 91-93, figs. 1-4; Jung 2006, 94-101, Abb. 9, Taf. 3:1-3; Scarano 2006, 133, footnote 6) (Fig. 3.1:7-9). The necked vase with matt-painted decoration (**RO34**, Fig. 3.1:8) does not exhibit specific elements for a precise dating, but it does find good comparisons with examples from Lipari and Filicudi, both discovered in contexts dating to the second phase of the Capo Graziano period (Alberti, Bettelli 2005, tav. CXXIII:10-12). The chronology of the Mycenaean pottery refers to LH IIB-IIIA1; in particular the goblet with a hanging rock pattern decoration, imported from the northern Peloponnese (Guglielmino *et al.* 2010, 273, n. 37, fig. 3.8:37) (**RO37**, Fig. 3.1:9), finds comparisons with examples that could date back to the LH IIIA1 (Mountjoy 1999, 263, n. 70, from Sparta-Menelaion).

Few lustrous painted sherds have been found in the layers related to the burning of the fortification wall. They are datable to LH IIIA, and most likely to its latest phase (Guglielmino 2005a, tav. CLXV:1-2, 5; Jung 2006, 94-101, Abb. 9, Taf. 3:5-7; Guglielmino 2012, 346-347, ns. 184-186) (Figs. 1:12-13, 2:2). A kylix stem decorated with lines and bands comes from the destruction levels of the monumental gate. According to Guglielmino it could be dated to LH IIIA2 (Guglielmino 2012, 347, n. 187).

Another important sherd comes from a context in which local materials is pertinent to a later moment of MB (MB3) (Guglielmino 2005, 306, II.181, 2009a, 489; Jung 2006, 94-101, Taf. 3:8). It is a

[4] We thank Dr. Giulia Recchia for this information.

[5] Hut δIII, external northern area, Bernabò Brea, Cavalier 1980, 223, n. inv. 7911, tav. CLII:4; Cavalier, Vagnetti 1984,143-154, tav. IV:4.

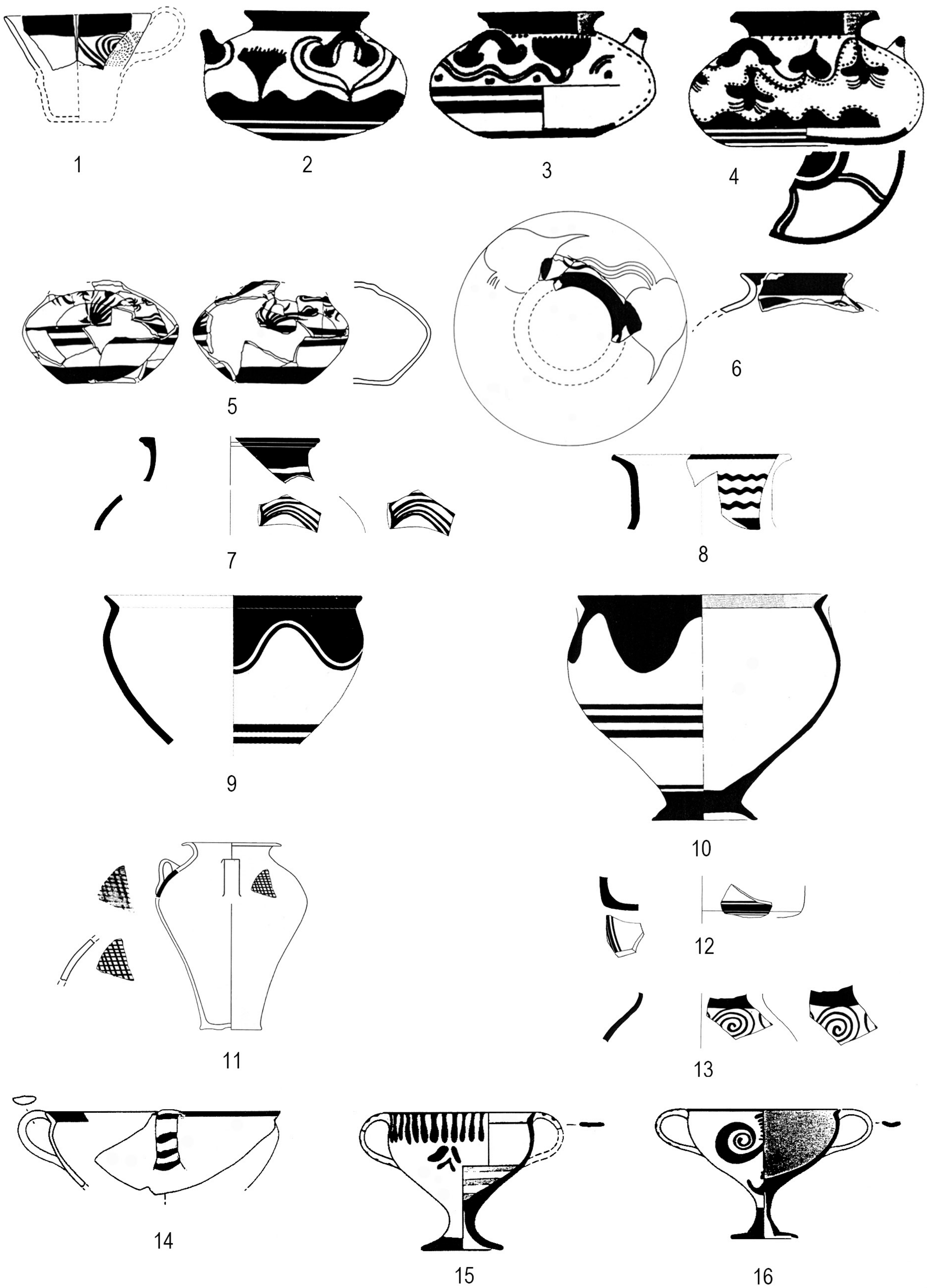

Fig. 3.1. LH I-LH IIIA1 pottery from MB1 and MB2 contexts in the Central Mediterranean, with Aegean comparisons: Vivara (1, 5, 6, 11) (after Panichelli, Re 1994, figs. 12:128, 9:93-94; Merkouri 2005, pl. CLIV:1); Lipari (2) (after Vagnetti 1982g, tav. XLIV:2); Argolid (3-4) (after Mountjoy 1999, figs. 13:32, 17:77); Rocavecchia (7-9, 12-13) (after Guglielmino 2005a, pl. CLXV:a, 1, 3, 5; Guglielmino *et al.* 2010, fig. 8:37); Laconia (10) (after Mountjoy 1999, fig. 86:70); Punta Le Terrare (14) (after Franco 1996, tav. 1:6); Knossos (15-16) (after Popham 1984, pl. 158:2, 16). (1:4; 11 not to scale).

Fig. 3.2. LH/LM IIIA pottery from MB3 contexts in the Central Mediterranean, with Aegean comparisons: Rocavecchia (1, 2) (after Guglielmino 2005a, pl. CLXV:a2, c3); Chiancudda (3, 6) (after Bettelli 2010b, 330-331, figs. 10, 14); Argolid (4-5); Melos (7) (after Mountjoy 1999, figs. 24:148, 166; 368:94); Punta Le Terrare (8-10) (after Franco 1996, tav. I:4-5, 7); Rhodes (11) (after Mountjoy 1999, fig. 401:6); Panarea (12) (after Alberti, Bettelli 2005, pl. CXXIV:5); Kos (13); Thessaly (14) (after Mountjoy 1999, figs. 442:11; 335:46); Lipari (15-17) (after Alberti, Bettelli 2005, pl. CXXIV:7-9); Kos (18) (Mountjoy 1999, fig. 444:29). (1:4).

cup of Late Minoan type (**RO74**, Fig. 3.2:1), that in terms of both form and decoration can be easily linked to LM IIIA2 north-central Cretan production, with precise comparisons coming especially from Knossos (Popham 1970, fig. 3.2:1; 1984, pl. 173:27-28). The only difference is represented by the internal plain surface, since in Crete this type of cup is generally coated solidly on the inside. Despite this difference, which could be due to particular tastes of the users, the integration of decoration and form – exact copy of Minoan models – is in contrast with the analytical results (repeated twice) that indicate a local production (Guglielmino *et al.* 2010, 274-275, n. 74, fig. 10:74; *infra*). Thus, in this case we have a locally produced object, but without the strong elements of hybridization that characterise other Italo-Mycenaean productions,[6] making plausible the hypothesis that skilled artisans came from Crete.

As previously mentioned, the excavators suggest that the indigenous pottery related to the destruction phase of the MB fortification at Rocavecchia – which are numerous and well preserved in postern C (Guglielmino 2003, fig. 5; Pagliara 2005, tav. CLXI:b; Scarano 2006, 133, tav. 1:1; 2011; 2012, 377-383) – are typologically pertinent to the so-called Salentine *facies* of the end of the MB (Fig. 3.3A). A crucial point is the definition of the archaeological *facies* referable to MB3 in south-central Apulia. The most recent developments in this sector of studies show the very slight spread of the incised decorations of the Apennine style. In addition some ceramic types, characteristic of the area, should be recognised in this chronological moment, like the carinated bowls with ring-handles decorated with plastic appendices at the top (Recchia, Ruggini 2009; Recchia 2010). Some authors define this horizon, both chronologically and culturally, as *facies* of Punta Le Terrare (Recchia, Ruggini 2009; Recchia 2010, 78). The contexts used for defining this *facies* – Rissieddi, Le Pazze, Porto Perone (layer *e*, Quagliati middle level), Punta Le Terrare (medium and upper levels), Torre Guaceto, Isole Apani, Egnazia (lev. IV), Giovinazzo-Piazza S. Salvatore (lev. IV) and via Marco Polo, Monopoli - Piazza Palmieri (lev. IV) and via Papacenere (trench C), Scalo di Furno (Mesoapennine layer) (Scarano 2006, 143) – are mostly the same as those that, according to other scholars (Damiani 1995), should characterise the so-called Protoapennine 2b horizon, a period evidently preceding MB3. Differing opinions have been voiced on the one hand by the scarcity of incised geometric decorations of the Apennine style, which elsewhere is considered to be the primary indicator of this phase; and on the other, by a lack of contexts in which the entire sequence of the MB and beyond can be observed, also in association with Aegean ceramics.

More recently such a gap has been filled by the data published from Rocavecchia, and further evidence from other sites in the region, such as **Masseria Chiancudda**, a settlement that has Aegean-type pottery but lacks a long stratigraphic sequence (Cinquepalmi, Recchia 2010). In this settlement, located in the Murge area, a large section of the fortification wall dating to the MB has been discovered (Cinquepalmi, Recchia 2010, figs. 5-6). A zone that was apparently used for collective activities was excavated deep down in an area immediately inside the wall datable to the *facies* of Punta Le Terrare. Discovered in association with the indigenous pottery are some Aegean-type sherds (not yet analysed): six (Cinquepalmi, Recchia 2010, 220; Bettelli 2010b, 330-331, nn. 17.11-16) from levels representing the area's final phase of use and one coming from an earlier floor, again from the same chronological period (Cinquepalmi, Recchia 2010, 220; Bettelli 2010b, 330, n. 17.10). Both the sherds coming from the earlier context and those of the terminal use layers can be dated with good confidence to LH IIIA (Fig. 3.2:3, 6).[7] The date of Masseria Chiancudda seems consistent with that

[6] A different perspective is expressed in Guglielmino *et al.* 2010, 275.

[7] The first one is a shoulder of a closed vessel with monochrome decoration, probably referring to widely diffused types during LH IIIA1 and IIIA2 in the Peloponnese and Central Greece. Cfr. Mountjoy 1999, figs. 21:123, 24:148, 165-166, 26:179, 27:185 (Argolid), 87:77, 88:89-90 (Laconia), 187:129 (Attica), 289:19, 291:44, 292:46-47 (Phokis). Among others, clearly recognisable are a sherd of a closed piriform vessel decorated with a curvilinear pattern, presumably spiral-

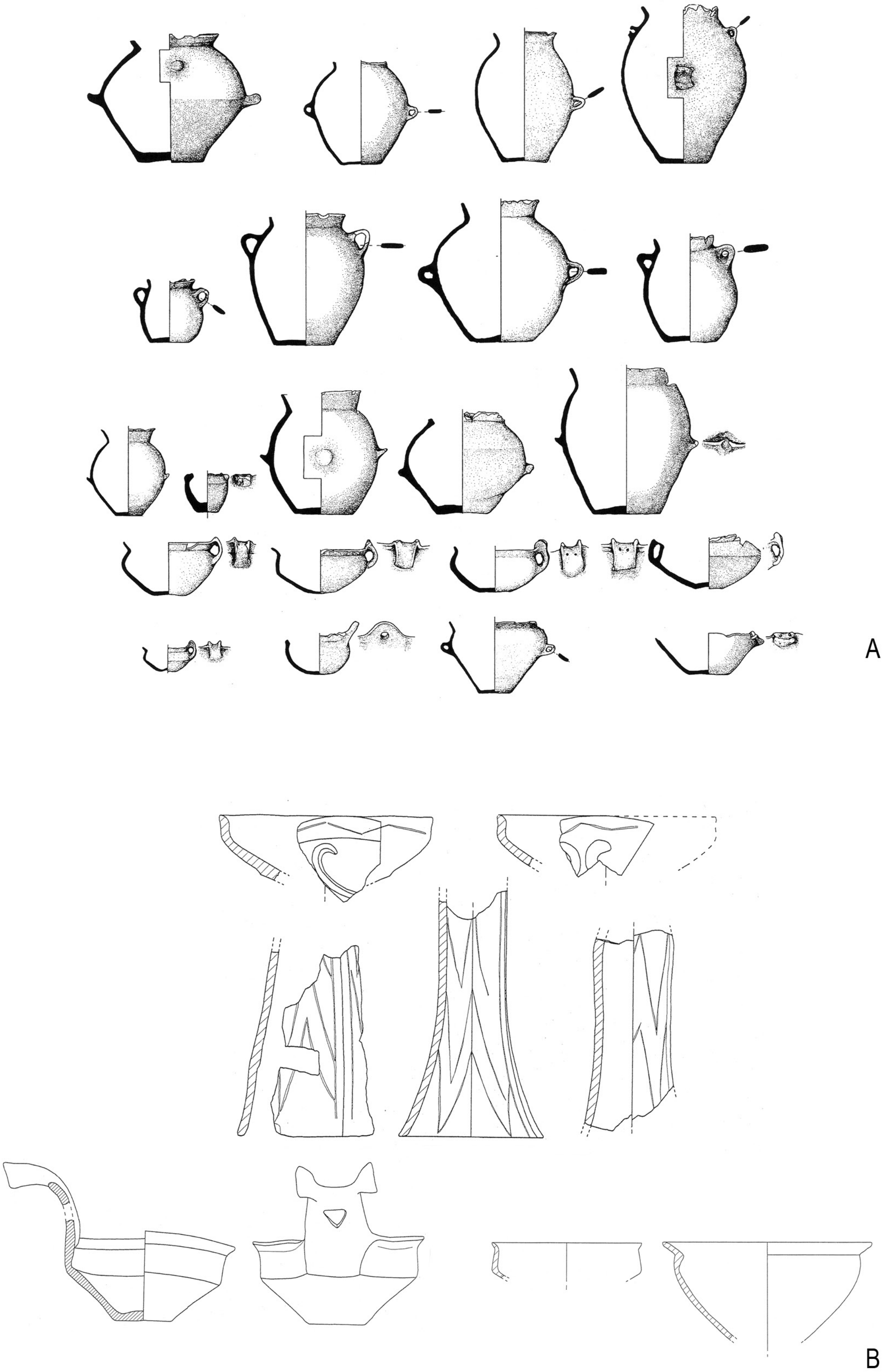

Fig. 3.3. *Impasto* pottery from MB3 contexts in the Central Mediterranean: A: Rocavecchia, postern C, Punta le Terrare *facies* (after Guglielmino 2003, fig. 5); B: Salina-Portella, pottery of Milazzese *facies* and MB3 peninsular style (after Martinelli 2005, figs. 75:7-9, 81, 83:1, 84:1). (A 1:10, B 1:8).

of Rocavecchia. LH IIIA Aegean-type pottery and local pottery exhibiting elements belonging to the so-called *facies* of Punta Le Terrare have been discovered together from both sites.

At this point an overlap of the Punta Le Terrare *facies* and LH IIIA seems clear at different sites of south-central Apulia. Such parallels are visible at Punta Le Terrare as well as at Masseria Chiancudda and Rocavecchia. Even if it is not entirely correct to date the indigenous contexts on the basis of exotic pottery, through the observation of the stratigraphies it does appear reasonable to identify at least two moments of time in the MB in this region of southern Adriatic Italy: an earlier one, contemporary with the diffusion of Mycenaean pottery primarily datable to LH II, and a later one, parallel to the circulation of Mycenaean ceramics of LH IIIA.

As shown earlier, it is especially thanks to the spread of LH IIIA pottery in Milazzese contexts of the Aeolian Islands and the presence there of both local and imported 'Apennine' pottery (Levi, Jones 2005) that chronological parallels can be established between MB3 on the Italian peninsula and the whole LH IIIA. It appears reasonable to propose also a similar sequence of comparative chronology for south-central Apulia, even though a truly Apennine horizon is very little evident, making very difficult the possibility of establishing a *cross-dating*. Anyway, decorated pottery following this style sporadically appears in contexts pertinent to the *facies* of Punta Le Terrare, both at Rocavecchia, postern D, and in the upper layers of Punta Le Terrare, as well as at Porto Perone, layer e (Scarano 2006, tav. 1:1; Boccuccia 1998, 181:10.026; Radina 1998, 207:10,106, 10.110, 10.111, 208:10.112; Recchia, Radina 1998, 193:10.056, 195:10.067; Lo Porto 1963, 301-313, figs. 25-26). Evidently, the attempts to adopt the Apennine style were not very successful in this part of southern Italy, which maintained strong local preferences in the elaboration of pottery types. Despite this, it appears that during the previous part of the MB (MB2) a certain taste for incised decoration develops, although following rather roughly repetitive decorative schemes (Recchia, Ruggini 2009, 35-36; Scarano 2006) and in some respects similar to the contemporary aspects of the Capo Graziano pottery of the Aeolian Islands.

As may be noted, we have avoided in this discussion any reference to absolute chronology, even though radiometric dates are available from the discussed sites. This is because it would seem prudent to work first on the possibility of constructing relative comparative chronologies, looking to keep separate the two types of dating methods. About the *facies* of Punta Le Terrare, the possibility of identifying an internal chronological sequence was proposed (Recchia, Ruggini 2009, 38). Some typological characteristics considered less developed could be present in contexts contemporary to phase I of sounding X at Rocavecchia, radiometrically dated between the end of the 15th and the middle of the 14th century BC (Pagliara *et al*. 2007, 356-357; Scarano 2011; Calcagnile *et al*. 2012), while other much more advanced traits could be present in the upper levels of Punta Le Terrare and Monopoli. In terms of the Mycenaean pottery, as previously mentioned, sherds that can generally be dated to LH IIIA are present in all of the contexts at issue.

A problematic element should be added to this apparently clear picture: very few Mycenaean sherds are present in Protoapennine contexts (MB2) of Vivara-Punta d'Alaca and Rocavecchia with possible LH IIIA1 dates (Fig. 3.1:9, 11).[8] These sherds could suggest that LH IIIA1 pottery could have started to circulate in the Central Mediterranean already in a late Protoapennine phase and that consequently the passage from MB2 to MB3 took place at some moment during LH IIIA1.

shaped, on the shoulder. Cfr., for example, Mountjoy 1999, fig. 108:32 (Messenia), 142:9 (Achaia), 184:92 (Attica), 335:46 (Thessaly); Alberti, Bettelli 2005, pl. CXXIV:5 (Panarea). These types also belong to a LH IIIA1 or IIIA2 horizon. Another fragment from this group is an open form, a cup or a kylix, decorated with an early version of FM 53 wavy line. Cfr. Warren 1983, 69, fig. 22 bottom right (Knossos, LM IIIA2); Mountjoy 1997, 289:27, fig. 9:27 (Troy VIg, LH IIIA1, with a different version of the wavy line); Mountjoy 1999, figs. 368:94 (Melos, LH IIIA2), 408:55 (Rhodes, LH IIIA2); Watrous 1992, 63:1061, 89:1552, 90:1569, pll. 25:1061, 39:1552, 1569 (cups from Kommos, LM IIIA and IIIA-B).

[8] Cfr. *supra*. Merkouri 2005, 615, pl. CLIV:1; Guglielmino *et al.* 2010, 273, n. 37, fig. 8:37.

3.1.2. Recent Bronze Age (RB)

Broglio di Trebisacce and Torre Mordillo, both of which are located in the Plain of Sybaris, and again Rocavecchia in Apulia, are the sites that will be considered in detail in this section as they have been excavated most recently, contain good stratigraphic sequences, and are quite extensively published.

Before evaluating the ceramic sherds that have been considered as most diagnostic according to stratigraphy and typology, it is necessary to consider the role of the Plain of Sybaris in connection with the Aegean and Mediterranean networks. As Broglio di Trebisacce shows, a local production of Aegean-style pottery developed at this site. This local tradition used formal and decorative Aegean elements that were freely re-elaborated and re-assembled in ways that often created wholly new types, such as the so-called 'Broglio-type jar' (here Type 27, see Chapter 6 in this volume). This pot is unattested in the Mycenaean repertoire and, although it presents some similarities with analogous but smaller shapes that were produced on Crete, it seems also to imitate some closed shapes in *impasto* ware that are typical of the indigenous local production. The decorative motifs located on the shoulder of this type of jar are frequently of Cretan tradition and cover a large time span that starts in LM IIIA. However, these motifs appear mostly on open shapes (cups, goblets, bowls) and their adoption on closed shapes at Broglio is therefore possibly due both to the particular taste of the local purchasers and to the activity of local potters.[9] So, in making a chronological correlation between this area and the Aegean, it is necessary to consider that the Aegean-type pottery made in the Plain of Sybaris was like a provincial production, and it is necessary to underline a certain creative autonomy in the re-elaboration of shapes and decorative motifs. Rocavecchia also shows numerous elements of connection with Crete (Guglielmino 2009a), even though they are expressed in different ways as compared to the Plain of Sybaris. Rocavecchia presents a higher quantity of objects imported from Crete, as well as greater similarities to Late Minoan types in the local production.[10]

Broglio di Trebisacce

According to the chronology recently proposed by Isabella Damiani, in this settlement the only level that shows a series of local *impasto* types clearly lacking late elements within RB is layer **D West 3 lower** (Damiani 2010, 417). Several datable Aegean sherds come from this layer, such as a closed vessel locally produced with a Hybrid Flower FM 18 pattern typical of LH IIIB (Vagnetti, Panichelli 1994, tav. 74:5a-i; Jung 2006, 120, Abb. 13:7) (**A18**, Fig. 3.4:6); an imported plain closed vessel, possibly an amphora (**A23**, **A24**), could also be dated to LH IIIB (Vagnetti, Panichelli 1994, 395, tavv. 73:13, 74:2). A monochrome closed vessel, also imported (**A48**, Fig. 3.4:1), has been the subject of a controversial chronological classification. According to Vagnetti, this pot should date to LH IIIB (Vagnetti, Panichelli 1994, 395), but R. Jung instead suggests it should date to the beginning of LH IIIC, pointing out an affinity with an example from Aigeira that is also monochrome but of a clearly different shape (Jung 2006, 120, Abb. 13:11; Jung 2007, 205, fig. 1:4) (Fig. 3.4:3). To confirm a 'high' chronology for this piece, in other words closer to the classification proposed by Vagnetti, are a series of closed, monochrome vessels from Laconia and Phokis, datable to LH IIIA2, some of which are very close in shape to the one from Broglio (Mountjoy 1999, figs. 87:77, 291:44, 292:46; Mountjoy 2008, 303, figs. 6.3:3028-3029; 374, fig. 6.38:3677) (Fig. 3.4:2).

Other problematic fragments from this important context, that Damiani dates to the beginning rather than to an advanced moment of the RB (Damiani 2010, 418), include the shoulder of an Italo-

[9] There are also closed shapes with similar patterns; see, for example, a couple of vases from Chania, Preve 2011, 170-171, figs. 5-6.

[10] See for example the Late Minoan type of cup decorated with whorl-shells cited in the previous paragraph (Guglielmino *et al.* 2010, 274-275, n. 74, fig. 10:74).

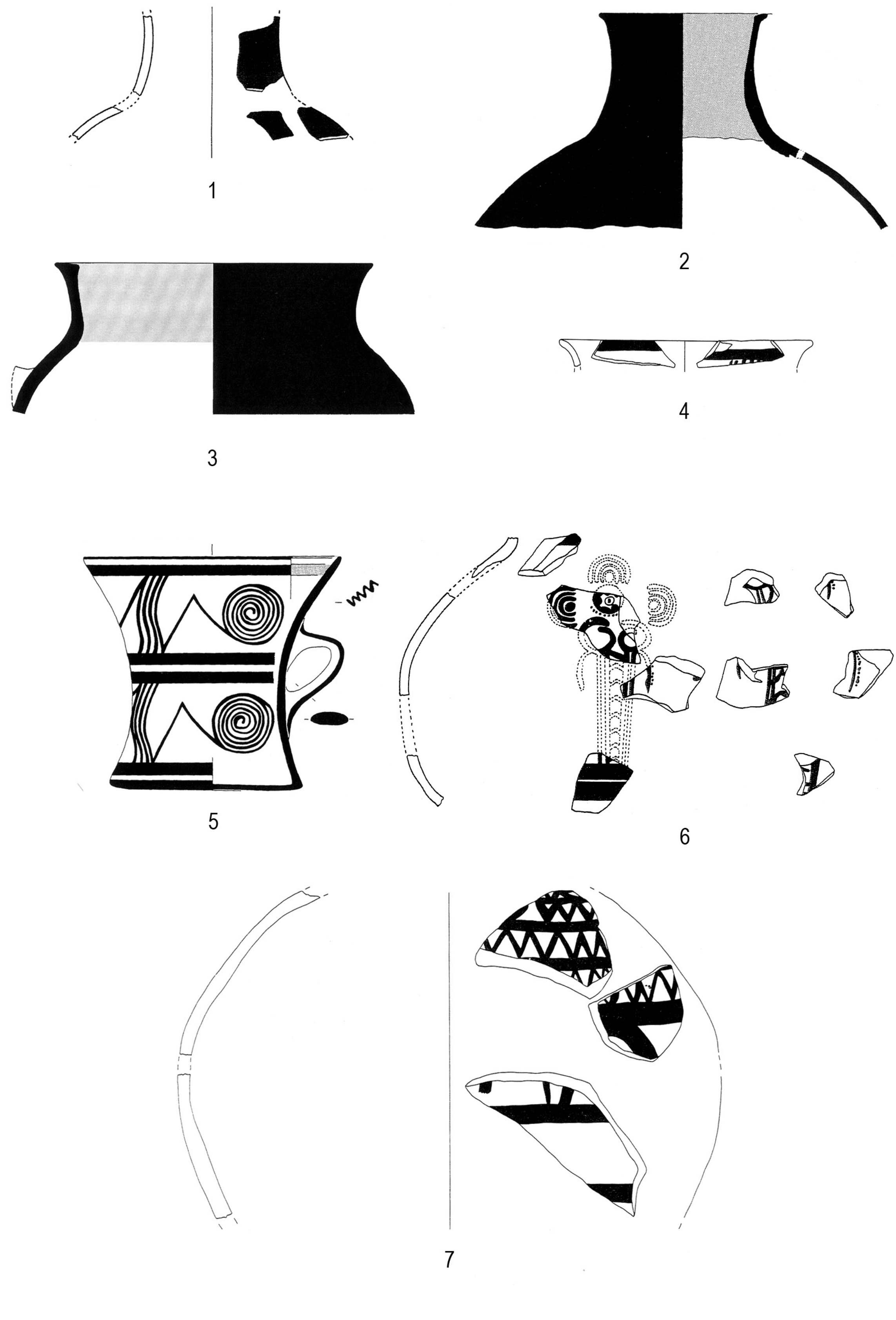

Fig. 3.4. LH IIIB pottery from Broglio di Trebisacce RB contexts, with Aegean comparisons: Broglio di Trebisacce (1, 4, 6-7) (after Vagnetti, Panichelli 1994, tav. 73:5, 74:5a-i, 77:1); Laconia (2) (after Mountjoy 1999, fig. 87:77); Aigeira (3) (after Jung 2006, Taf. 7:1); Argolid (5) (after Mountjoy 1999, fig. 35:259). (1:4).

Mycenaean closed vessel with a pictorial decoration (turtles?) that unfortunately is incomplete (Vagnetti, Panichelli 1994, tav. 74:4a-b) (**A20**). Recent studies by Vagnetti have proposed similarities with LH IIIC middle and late examples from Phokis based on the decoration and, possibly, the shape (Vagnetti 2000-01, 2006). This chronology, however, does not fit well with that of the contextual source of the pot (Jung 2006, 120, Abb. 13:10). The absence of 'little legs' around the body of the animal identified here as a turtle and also the type of hatching on the body should be considered here. In contrast, observations made by the same scholar in the first publication of the piece could be more valid (Vagnetti, Panichelli 1994, 395), which instead interprets it as a schematic rendering of a bird's body in a style that is attested starting from LH IIIA (for example Vermeule, Karageorghis 1982, 82-83, 102-104, VIII:19-20, IX:96, 101, 107; Güntner 2000, 86-87, tav. 38:10-11).[11] Such an interpretation could be further supported by the presence of the beginning of a vertical element that branches off towards the bottom from one of the two oval forms using a rather thick brushstroke, which could refer to one of the two legs of the standing animal. If the interpretation of the piece suggested here is correct, it would certainly not be in contradiction with the chronology of the layer from which it was excavated.

Coming from the filling of a pit obliterated by lower layer 3 is the rim of an open form, probably a mug, that could date to LH IIIA2 or IIIB depending on whether the decoration is read as curved stripes or triglyph (Fig. 3.4:4). In both cases the stratigraphic position of the piece is not inconsistent with either the associated local pottery or the characteristics of the layer above (*EMS*, 65; Vagnetti, Panichelli 1994, 395, tav. 73:5; Jung 2006, 121, Abb.13:12; Catling 2009, 257, fig. 299:A223). In summary, the Aegean sherds, both imported and local, discovered in layer **D West 3 lower** and those below it appear to date within LH IIIB. Their association with *impasto* pottery types pertaining to an initial phase of RB (RB1) constitutes a good element for establishing a chronological parallel between the two horizons.[12]

Things seem to change in the layer above: **D West 3**. In fact, in addition to the large number of Aegean pots found here with dates that range from LH-LM IIIA to LH-LM IIIB (Vagnetti, Panichelli 1994, tavv. 75:7, 15; 76:1-2), is a fragment of a deep-bowl that R. Jung classifies in a convincing way as belonging to LH IIIC early (Vagnetti, Panichelli 1994, tav. 75:12; Jung 2006, 119, Abb. 13:6, Taf. 4:1, 2007, 204-205, fig. 1). This sherd is therefore the most recent of the excavated material from this level. The problem regards the dating of the layer in question. At the time of the excavation report's publication the authors proposed a probable chronology at a 'non advanced' moment of RB (RB1) (*EMS*, 65). Damiani in her latest research proposes a dating to RB2 for this layer at Broglio (Damiani 2010, 416-418). Such a low chronology would also make understandable the presence in the same level of a peculiar painted wheel-made vessel of probable local production[13] (Vagnetti, Panichelli 1994, tav. 77:1) (Fig. 3.4:7). It recalls in its decoration patterns and arrangement common to *impasto* types of an advanced stage of RB along a large part of Adriatic and Ionian Italy, such as with the 'Protogeometric' style pottery already present in the levels of Ausonio I at Lipari (Bettelli 2008, fig. 5).

It is important to note that if the phase sequence proposed by Damiani is correct, the proposal of Jung would be weaker, at least in terms of the Mycenaean pottery, according to whom the passage from RB1 to RB2 would have occurred within early LH IIIC (Jung 2006, 125, Abb. 24). On the other hand, such a possibility remains feasible on the basis of some cross-dating among the wheel-made Grey ware with Aegean comparisons in Italian RB contexts and Italian style HBW present in Greece, some of which have already been mentioned by Jung (2006, 203, Taf. 7:6). But only the complete publication of the RB levels

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[11] See also a cup fragment from a context in Kommos with LM IIIA2 and IIIB wares. The outer surface is decorated with a cross-hatched 'leaf' motif as defined by Watrous. It is not possible to exclude that this is part of a pictorial scene, unless we want to consider it as a variant of the 'hatched loop' decorative motif that is of earlier diffusion (Watrous 1992, 67:1134, pl. 27:1134).

[12] Cfr. also Damiani 2010, 418.

[13] If sample A43 belongs to this vessel, as it probably does (*infra*, Fig. 3.4.72).

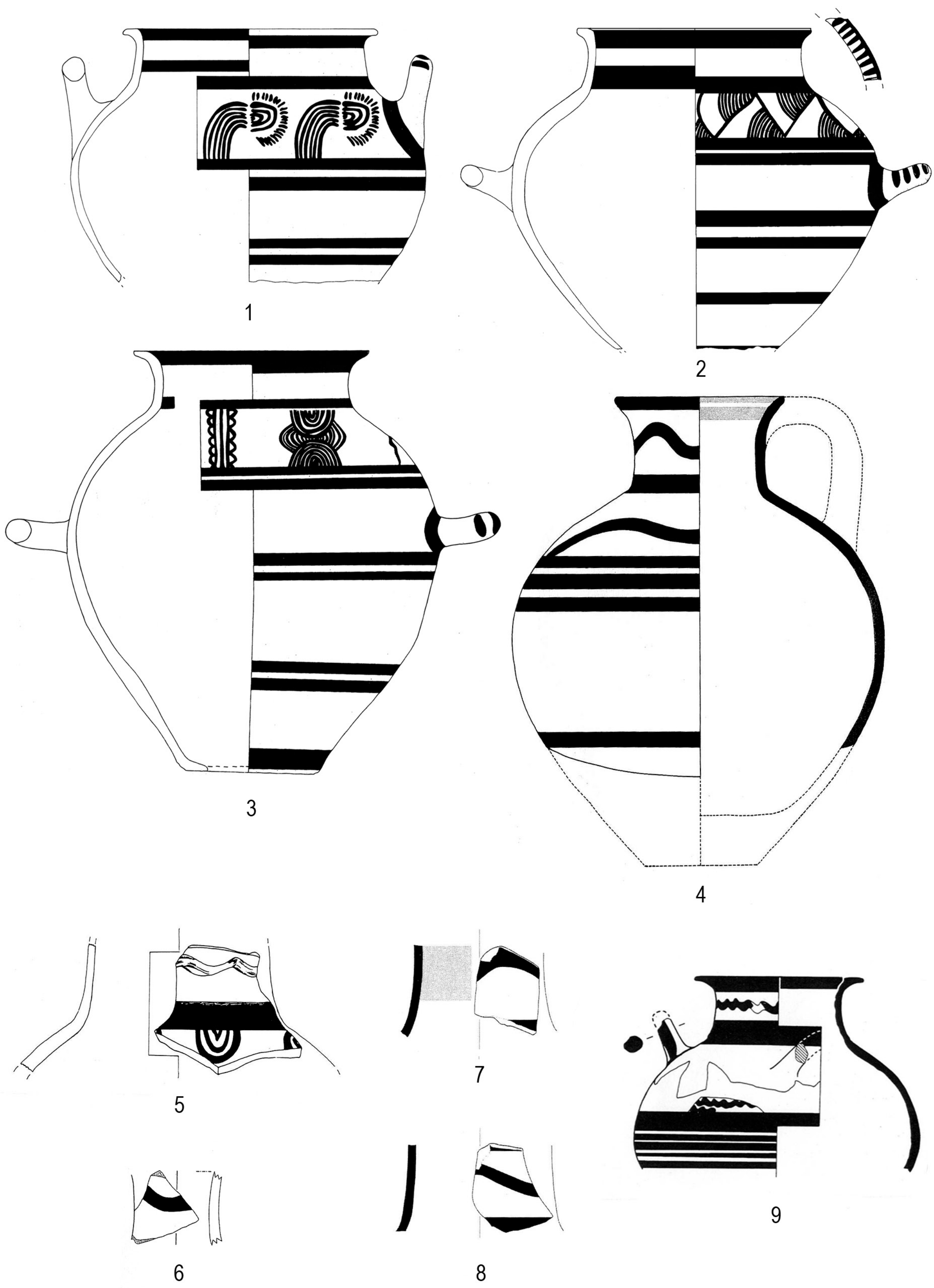

Fig. 3.5. LH/LM IIIB-IIIC early pottery from Broglio di Trebisacce RB contexts (1-3) (after Vagnetti 1984, tavv. 46:3, 48:2, 49:3). Closed vessels with neck decorated with wavy line from Chania (4) Broglio di Trebisacce (5), Tiryns (6), Rocavecchia (7-8), Kommos (9) (after Hallager 2003, fig. 3b; Vagnetti 1984, tav. 49:2; Stockhammer 2009, fig. 4:1; Guglielmino 2009, fig. 4:3, 5; Rutter, Van de Moortel 2006, pl. 3.62:56e/12. (1-3 1:6, 4-8 1:4, 9 not to scale).

of important settlements with Aegean-type pottery, such as Rocavecchia, can clarify this issue.

The important context of Broglio's so-called '**central house**' in **trench D**, which dates to a late phase of the RB (RB2) (Vagnetti 1984, 1984a; *Ric. 3*; *N.Ric.*; *EMS*; Castagna 2004; Damiani 2010, 416-417), is the most significant context as it contained a large number of Mycenaean and Italo-Mycenaean sherds, some of which could be joined to form almost complete pots. The Aegean-type pots retrieved from the floor of the hut or within the superimposed levels related to the abandonment of the structure, and those that were found in adjacent sectors – in levels that can be considered earlier or contemporary to the hut (Moffa 2002, 122-124, figs. 70-71) – are mainly locally made, with some imports. The majority of them date between LM IIIB (Vagnetti 1984, tavv. 46:3, 48:1-2) (**A13**, **A8**, **A1**, Fig. 3.5:1-2) and LH IIIC early (Vagnetti 1984, tav. 49:3) (**A9**, Fig. 3.5:3). It is important to highlight the presence of a sherd of a necked jar in layer 1b – a level immediately on top of the structure floor – that presents a decorative *wavy line* on the neck similar to some examples from Rocavecchia (cfr. *infra*), and a series of hanging semicircles on the shoulder (Vagnetti 1984, tav. 49:2) (Fig. 3.5:5, 7-8). The position of the wavy line on the closed vessel's neck is not common in Mycenaean pottery; such examples are found in Crete on alabastra, jugs, amphoras or amphoroid kraters dated between LM IIIA and LM IIIC (Fig. 3.5:4, 9).[14] This pattern can also be observed both in the eastern Aegean and in the Argolid.[15] In the Greek mainland pottery decorated with wavy lines on the neck become typical in LH IIIC late (Stockhammer 2009, 346), even if according to Ch. Podzuweit and P. Stockhammer there are secure examples from the lower citadel of Tiryns already in LH IIIC advanced (Stockhammer 2009, 346, 349, fig. 4:1) (Fig. 3.5:6). Based on the Cretan affinity of much of the imported and local pottery of Broglio and, as will be seen, also at Rocavecchia, it could be argued that such pots are of a Late Minoan rather than continental ancestry, weakening the hypothesis of their low chronology within IIIC. While this is perfectly reasonable, it should also be said that there are some authors who now consider the end of LM IIIB and the beginning of LM IIIC to overlap on one side with LH IIIC early and on the other with LH IIIC middle (Hallager 2007, 196, tav. 1; Jung 2006, 124, 164, n. 1151). Thus, even if a Cretan ancestry were to be confirmed for the vases considered here, they could not be dated with certainty to the beginning of LH IIIC.

An additional element for the dating of the later phases of the RB comes from levels **2A** and **2B** of **trench D West** and level **1** of **trench D East**. This consists of some closed vessels – both imports and local products – decorated on the shoulder with antithetic spirals which are commonly found during LH IIIC middle through later phases, as already pointed out by Jung (Vagnetti, Panichelli 1994, tavv. 72:3, 77:2, 79:5, 13; Jung 2006, 112-114, Abb. 12:1-2, 5, 7, Taf. 4:5-6, 5:1-2; Jung 2007, 207-208, fig. 2:1-4). This particular version of the decorative motif FM 50 (antithetic spiral pattern) appears in Crete in LM IIIB (Raison 1968, pl. XV), while on the mainland it becomes typical in LH IIIC middle (Mountjoy 1999, fig. 42:329). One of these pots has been shown to be a local product (**A47**, Fig. 3.6:1). Therefore if one considers the strong Cretan influence that characterises the Italo-Mycenaean material at the site, and in particular those from these contexts, it does not seem correct to date these sherds within LH IIIC middle without some hesitation (for a discussion about this topic see also Jung 2007, 207). On the contrary, another pot from this series, imported from the Peloponnese (**A40**, Fig. 3.6:2), could confirm a LH IIIC middle chronology.

One additional import from this group of strata contemporary with the 'central house' can be dated to LH IIIC, possibly middle, because of the decoration organised on two registers and the type of motifs (Vagnetti, Panichelli 1994, tav. 72:5; see *infra*, **A51**, Fig. 3.6:3). The motif of filled tongues FM 19

[14] Rutter, Van de Moortel 2006, 528:56e/12, pl. 3.62:56e/12, 539:58b/3, pl. 3.66:58b/3; Hallager, Hallager 2000, pll. 42:84-P0721, 71-P0880; 43:70-P0544; Hallager, Hallager 2003, pls. 60:73 P0165, 84 P0629, 61:84 P1308, 70 P0951; Jung 2006, 164.

[15] Mountjoy 1999, fig. 463:15 from Kalymnos; Stockhammer 2009, 349, fig. 4:1 from Tiryns.

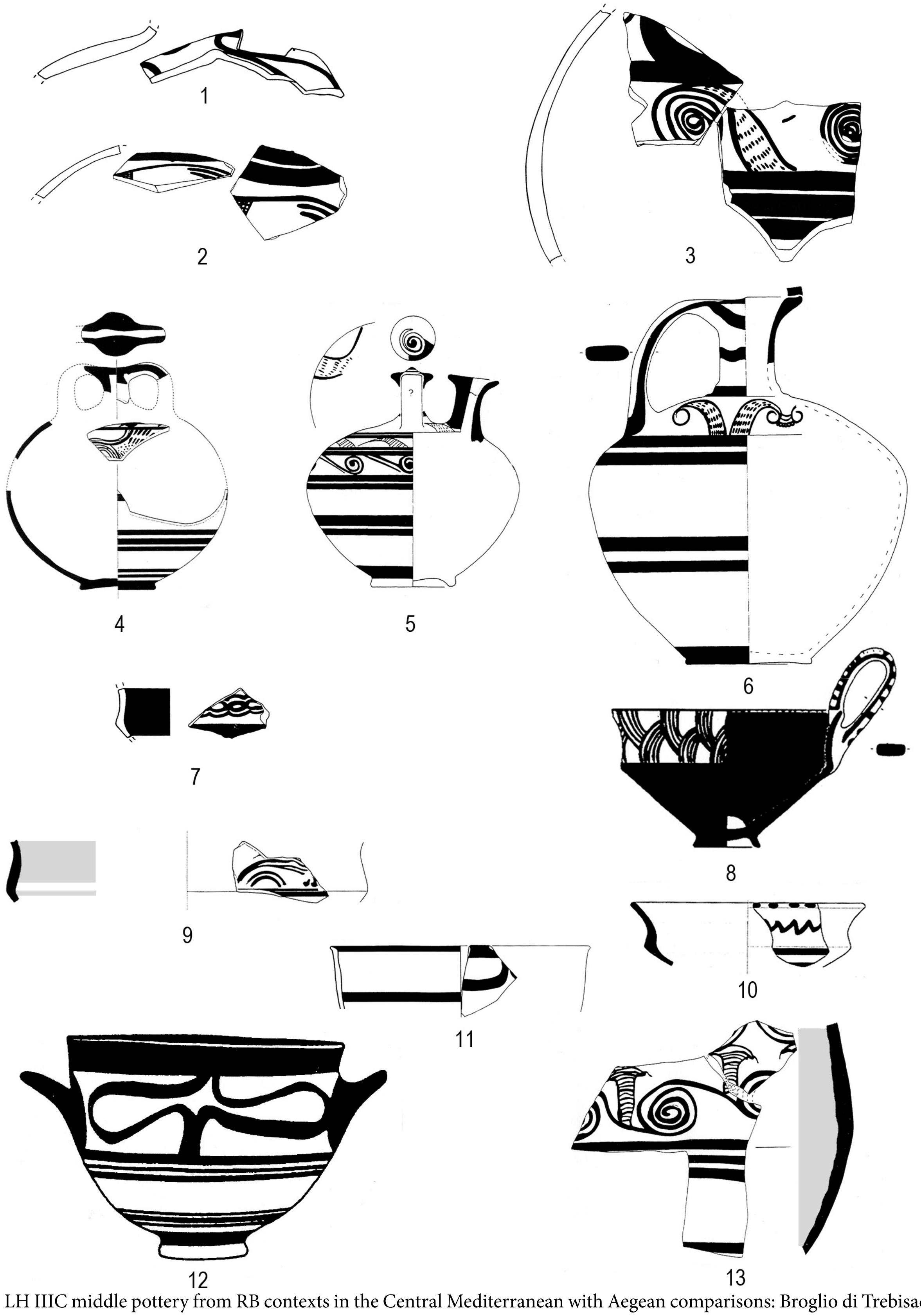

Fig. 3.6. LH IIIC middle pottery from RB contexts in the Central Mediterranean with Aegean comparisons: Broglio di Trebisacce (1-3); Rocavecchia (4, 9-10); Torre Mordillo (7, 11) (after Vagnetti, Panichelli 1994, tavv. 72:3, 5, 79:5; Pagliara *et al.* 2007, fig. 16:III.45, IV.48; Pagliara *et al.* 2008, fig. 14:II.1; Vagnetti 2001c, figs. 96:46, 99:103); Naxos (5); Rhodes (6); Argolid (8) (after Mountjoy 1999, figs. 389:47; 427:180; 48:359); Lefkandi (12) (after Alberti, Bettelli 2005, pl. CXXIV:16); krater from Kalapodi decorated with upstanding papyrus (13) (after Jacob-Felsch 1996, Taf. 23:19). (1:4, 12 not to scale).

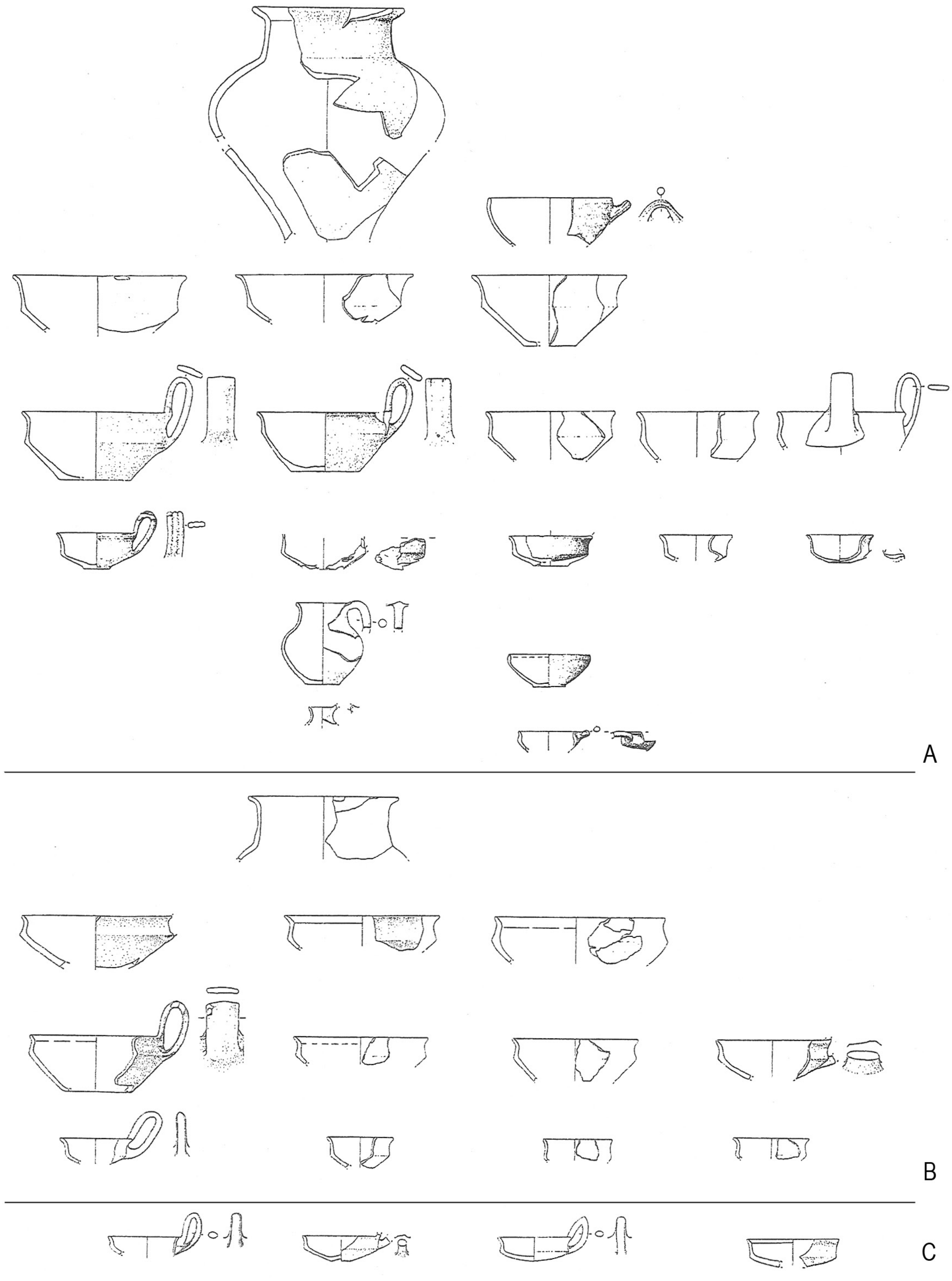

Fig. 3.7. RB Grey ware and *impasto* pottery, with possible tableware-sets, from 'Central House' at Broglio di Trebisacce: A. Grey ware; B-C. *Impasto* (after Castagna 2004, fig. 2). (1:10).

that end in a sort of spiral appears on the belly of a LH IIIC middle stirrup jar from Aplomata-Naxos (Mountjoy 1999, fig. 389:44). The particular version of the filling of rows of vertical bars is used on a jug from Rhodes dated to LH IIIC early-developed and, according to P. Mountjoy, it is a LM IIIC motif (Sackett *et al.* 1965, figs. 10e, 9y).[16] During LM/LH IIIC the relationship between Crete and Rhodes intensifies, at least from the point of view of the pottery. Motifs and decorative styles established in Crete are exported to Rhodes, where they stimulate a rich local production. This is the case, for example, of the Octopus Style that is created for the first time in Crete during LM IIIB, and during LM IIIC early spreads to various areas in the Aegean and also to Rhodes, where archaeometric analyses have confirmed the presence of Cretan octopus stirrup jars (Jones 1986a, 503). The decoration of the vessel from Broglio with the spiral motif filled with hatching seems to fall into this decorative tradition, even if the analytical results propose a different origin.

Torre Mordillo

At Torre Mordillo Aegean-type pottery is present in both the RB and FB layers. Coming from both contexts are materials that clearly date to LH IIIC middle (Vagnetti 2001c, 299-327, in particular 323-326). A Mycenaean sherd in one late RB level which belongs to a possibly local carinated cup FS 240 (**TM83**, Fig. 3.6:7) could be assigned to a later phase, supposedly advanced, of LH IIIC middle (Vagnetti 2001c, figs. 99:103, 102:103; Podzuweit 1983, Abb. 13:13; Mountjoy 1999, fig. 48:359; Jung 2006, 132-133, Abb. 17:13, Taf. 7:4). In another RB level that contains some earlier sherds but not later intrusions, a big deep bowl, or rather a small krater, has been found. This krater, locally produced (**TM6**, Fig. 3.6:11), is decorated with a motif that seems to derive from FM 50 and resembles types attested in the 2a phase of Lefkandi (LH IIIC advanced).[17]

R. Jung also mentions a fragment of a semiglobular cup FS 215-216 with a large band preserved on the body from a RB2 context, which could be dated to LH IIIC advanced (Vagnetti 2001c, fig. 96:52; Jung 2006, 134, Abb. 17:11, Taf. 7:5).

Lipari -Ausonio I

In her recent work on the Subapennine (RB) in south-central Italy, Damiani (2010, 410) proposed a possible classification in at least two phases of Ausonio I.

RB1
- Hut βIV first and second layer;
- Hut βV original and secondary layer;
- Hut βXIII raised layer;
- Hut βXII stone-paved layer.

RB2
- Hut βV third layer;
- Hut βV fire (fourth raised layer);
- Hut βIV dromos, layer and burnt layer, cuts 5-7;
- Hut βIV, dromos, area BM8 (materials collected after the removal of stone-paved layer BM8);
- Hut βIV, dromos, stone-paved layer;
- Northeastern area of hut βIV, underneath the drain of the Cardo II, burnt layer of the Ausonio I, cut 3;

[16] Cfr. also a fragment from Porto Perone with similar decorative pattern, Lo Porto 1963, fig. 55:4.

[17] Vagnetti 2001c, 307, fig. 96:46; Mountjoy 1999, 38-55, t. 2; Deger-Jalkotzy 2003, 67; Jung 2006, 126-127, Abb. 15:1, for a different interpretation of the fragment.

Hut βVII, βVIII, βIX, burnt layer Area CO, cuts 10-12, stone-paved layer inside hut βVII;
Area north of hut αII, material dated to Ausonio I.

Among the contexts that are attributed to the two phases of RB, there are not many containing Aegean-type pottery; even fewer contain materials of clearly identifiable typology and chronology. In terms of the group of contexts considered to be earlier (RB1), the only significant sherd comes from the neck of a closed shape, maybe an amphora or a jug. Taylour initially dated this piece to LH IIIB (Taylour 1980, 811, n. 269, tav. CXCI:c, CXCIII:c), but the thickened shape of the rim allows for a more appropriate dating within LH IIIC (Mountjoy 1986, figs. 171, 178; Jung 2006, 141, Abb. 19:4, 143). Unfortunately, a kylix sherd from the first layer of the dromos of hut βIV, found stratigraphically underneath RB2 levels, does not offer strong evidence for a precise correlation between the early phase of the RB and LH IIIB, even though a dating to LH IIIB previously seemed plausible (Damiani 2010, 418). In fact, Mycenaean sherds that can be dated to LH IIIC were unearthed in the same levels(Taylour 1980: 813, cat. 285, tav. CXCI:m).

Regarding the group of strata considered more recent (RB2), among the materials recovered from the Ausonio levels between hut βV and βIV, there are residual sherds of Milazzese style wares and an Apennine sherd, but the majority of the pieces are Ausonio I. A possible krater decorated with upright papyrus (Taylour 1980, tav. CXCI:a; Vagnetti 1982o, tav. XLV:1) has been traditionally dated to LH IIIA, primarily because of the shape and some characteristics of the decoration. It should, however, be mentioned that a krater has been found at Kalapodi, although of a different type, decorated with a very similar upright papyrus from a LH IIIC stratum (Jacob-Felsch 1996, Taf. 23:19) (Fig. 3.6:13). Such a chronology could be perfectly coherent with the dating of the Lipari stratum, that of RB2, even though residual elements dating to the end of MB are present, among which this fragment could also be possibly included.

Rocavecchia

The recent publications of important excavation reports from this site allow for the evaluation of Aegean-type pottery within their own contexts of provenance, as well as their association with local *impasto* pottery and, in some cases, significant bronzes (Pagliara *et al.* 2007; 2008). The MB-FB sequence, beginning from at least the destruction phase of the earliest wall, can be observed in **trench X 2005**.

Phase I of this trench, as mentioned above, should be relative to a late phase of MB (MB3). As already explained, there are no wheel-made and painted sherds from these layers, but, on the basis of other observations, these levels could be dated to the time of the destruction of the MB wall, that in other areas of the site contained LH/LM IIIA Aegean pottery.

The following phase (**phase II**) presents some local pottery shapes that, based on recent studies by Damiani (2010, figs. 62-63), already date to a more advanced moment of RB (RB2). These consist of a cup with marked carination, very curved neck, and distinct everted rim (Pagliara *et al.* 2007, fig. 9:II.2); vertical, raised handles that are tapered and circular in section (Pagliara *et al.* 2007, fig. 9: II.5-6 and maybe II.3); tongue handles with a thin elongated outline, similar to the ones from Lipari that Damiani considers to be of RB2 date (Pagliara *et al.* 2007, fig. 9:II.4; Damiani 2010, 403-404, fig. 69:G4); decorations with grooves and 'dots' forming angular motifs similar to the so-called 'protovillanovan' style (Pagliara *et al.* 2007, fig. 9:2.13). Coming from levels attributed to precisely this phase is the neck of a closed, Aegean-type pot; the particular shape of the rim recalls *amphorae* or jugs very common during LH IIIC, not far from the above-mentioned sherd from an Ausonio I level at Lipari (cfr. *supra*) (Fig. 3.8:1-8).

Phase III is characterised by cups and bowls with a marked carination (Pagliara *et al.* 2007; fig.

9:III.1-3); necked cups north-Adriatic in shape (Pagliara *et al.* 2007, fig. 9:III.6); vertical rod handles with horns on top (Pagliara *et al.* 2007, fig. 9:III.9); grooved decorations on the handles and walls of the vessels (Pagliara *et al.* 2007, fig. 9:III.20-22). The dating of this group of sherds to RB2 is confirmed by the presence of a fibula with a leaf-shaped arch (Pagliara et *al.* 2007, fig. 17:III.42), a type datable to the same chronological horizon (Carancini, Peroni 1999, tavv. 27:29; Damiani 2010, fig. 64:5-6). In this case, we also find Aegean-type pottery associated with the local material. Included among these are a large sherd of a closed pot decorated with panelled pattern (Pagliara *et al.* 2007, fig. 16:III.46), following a scheme that recalls that of an analogous sherd from Pontecagnano (Bettelli, Vagnetti 2004-2005, figs. 12:D3, 14, here sample **PON1**) and another from Torre Castelluccia (Fisher 1988, fig. 38:249), both possibly dating to the beginning of LH IIIC. Also significant is a carinated cup painted on the interior and decorated on the external walls above the carination (Pagliara *et al.* 2007, fig. 16:III.45); this last characteristic is typical of cups FS 240 in LH IIIC advanced (French 2007, 178, fig. 1; Mountjoy 2007, fig. 3:4) (Fig. 3.8:9-13).

Phase IV is more difficult to date because the local ware presents characteristics that are chronologically ambiguous, as is also the case, to a certain extent, of the bronzes. Regarding the pottery, there are cups with raised strap handles decorated with grooves (Pagliara *et al* 2007, fig. 12:IV:12-14, 24-25); carinated cups and bowls also with marked carination and sometimes decorated with grooves (Pagliara *et al.* 2007, fig. 12:IV:12-21) and, above all, large carinated cups with high-slung strap handles (Pagliara *et al.* 2007, fig. 12:IV:9-10, perhaps 22-23). A certain number of bowls are present with rims that are more or less inverted (Pagliara *et al.* 2007, fig. 12:IV.27-28, 29-30). The associated bronzes consist of three violin-bow *fibulae*. Of these, the complete one has two swellings towards the extremities of the arch, while the arch itself is thick in diameter and presents two raised points at the closure and apparently towards the center.

According to some scholars (Carancini, Peroni 1999; Damiani 2010, 394-395), one of the most useful elements for identifying the passage from the terminal phase of the RB to the beginning of the FB is the degree of opening of the arch above the catch-plate of the violin-bow fibula. In fact, those from the beginning of the FB present a markedly raised arch. In this case such a characteristic does not seem to exist and, as a whole, the Rocavecchia fibula (Pagliara *et al.* 2007, fig. 17:IV.1) recalls a similar example from the Gualdo Tadino hoard and fits with the type *"con arco a due noduli leggermente convesso e ingrossato"* identified by Carancini and Peroni, who date it to a late phase of RB (Carancini, Peroni 1999, 18, 57, n. 38, tavv. 27:38, 29). The poor condition of the other two published *fibulae* (Pagliara *et al.* 2007, fig. 17:IV.2, 5) does not allow for very precise observations; one fragment surely pertains to a violin-bow simple or with swellings, while the second one, a twisted violin-bow to judge by the space between the arch and the catch-plate, it is unlikely that it was raised. In terms of the pottery, characteristics of the previous phase definitely persist, even if the well-preserved cup with high-slung, strap handle presents an extremely developed strap that recalls some examples from the settlement of Colle dei Mori in Umbria, a site dating between the RB and the early stages of the FB (Ponzi Bonomi 2002, fig. 1; Damiani 2010, tav. 78:8). A possible indication that this group of layers is later as compared to the earlier ones is also the presence of bowls with inverted rims, a form more commonly encountered from the end of Bronze Age.[18]

Concerning the Aegean-type pottery, there are two *amphoriskoi* (Pagliara *et al.* 2007, fig. 16:IV.51-52), one with linear decorations, the other with wavy lines on the shoulder. This form becomes quite common beginning from LH IIIC middle, but the condition of the pieces unfortunately prevents a precise chronological attribution to LH IIIC middle or late. Other sherds belong to carinated cups or bowls FS 240 (Pagliara *et al.* 2007, fig. 16:IV.48-49). A clearly recognisable sherd shows a zig-zag decoration along the body and a series of dots along the rim. Shape and decoration find precise comparisons with a couple of examples from Porto Perone-Satyrion (**PP21-22**: Fisher 1988, figs. 35:231, 37:241) and

[18] In reality, bowls with inverted rims are already widely present in the Adriatic area from a late phase of RB (Cazzella *et al.* 2005); but see the large amount of this kind of bowls at the early FB site of Monte Titano (Bottazzi, Bigi 2008).

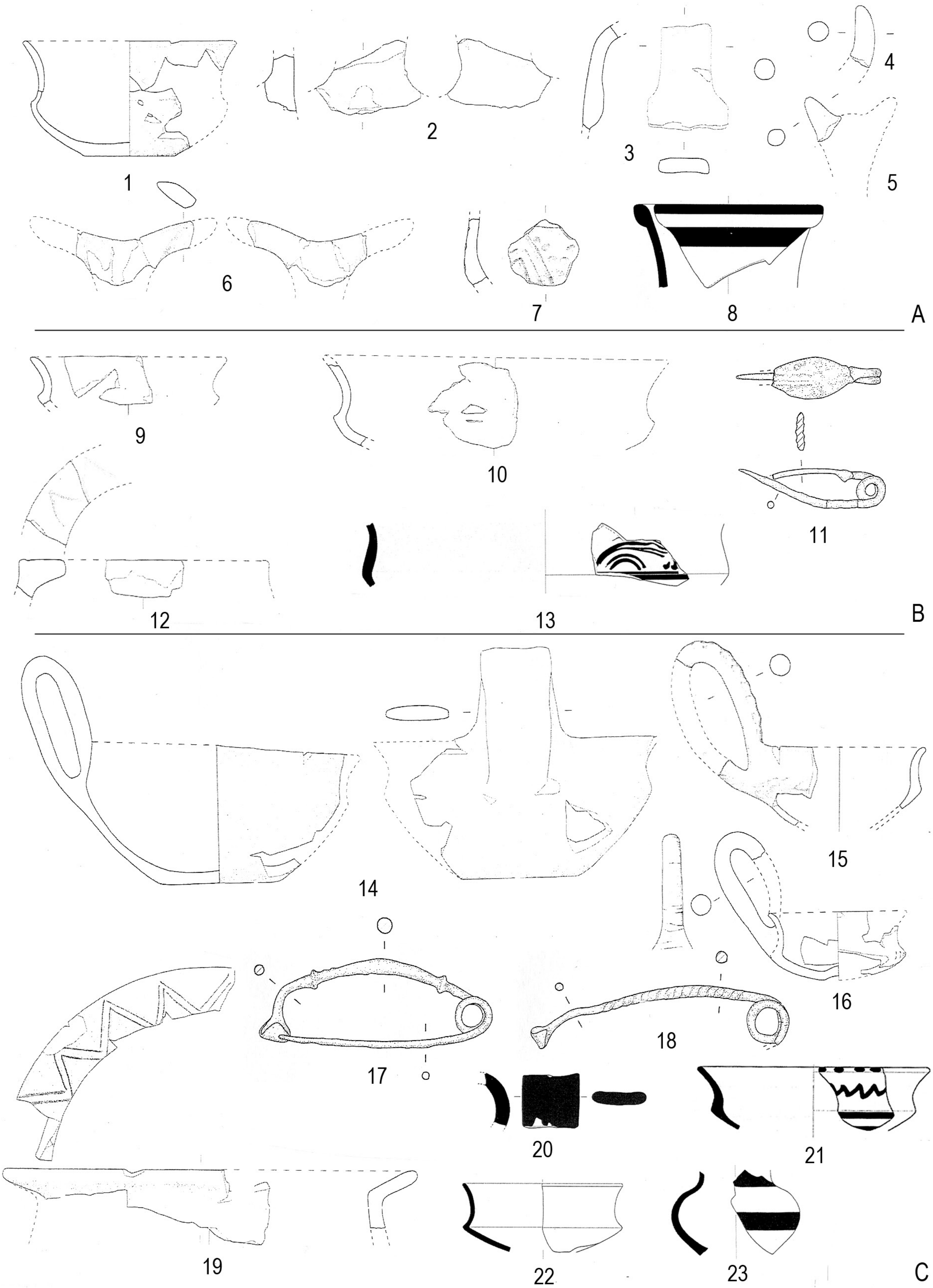

Fig. 3.8. Rocavecchia SAS X/2005: A. phase II; B. phase III; C. phase IV (after Pagliara *et al.* 2007, figs. 9-17). (pottery 1:4, bronzes 1:2).

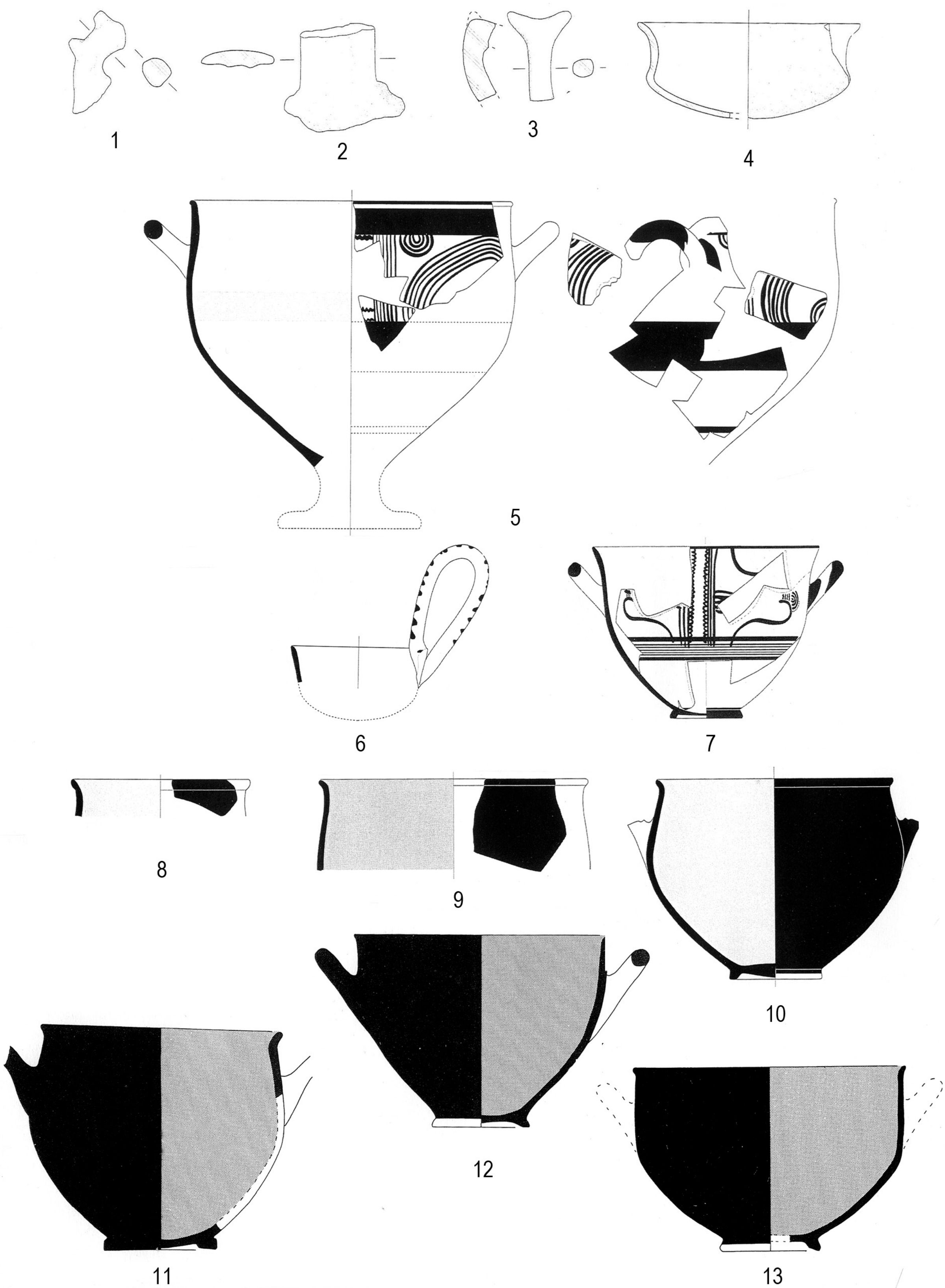

Fig. 3.9. Rocavecchia SAS IX/2005-2006: 1-10 phase I (After Pagliara *et al.* 2008, figs. 13C, 15:I.3-6; Guglielmino 2009, figs. 2:1, 2); Aegean comparisons for Rocavecchia's phase I monochrome deep bowls (11-13) (after Mountjoy 1997a, figs. 9:60-61, 14:86). (1:4).

Broglio di Trebisacce (Bettelli 2002, fig. 66:54), for which, however, it is difficult to establish an exact chronology on the basis of the excavation data. As already mentioned, it can be said that carinated cups with decorated walls are typical of LH IIIC advanced; their possible continuation into LH IIIC late is under discussion (Mountjoy 1986, 190, fig. 250; Stockhammer 2009, 347, 349) (Fig. 3.8:14-23).

To sum up, some ceramic types are present in **phase IV** of **trench X** at Rocavecchia similar to ceramics of the trench's previous phase. At the same time there is an apparent increase in the number of bowls with inverted rim and the presence of a specific type of violin-bow fibula that, even though possibly still dated to the RB, undoubtedly presents innovative characteristics as compared to the shapes of the earlier period. On this subject it is interesting to note that at Afragola, a site where pottery types appear very similar to those of Rocavecchia, violin-bow *fibulae* both with and without swellings never exhibit a convex thickened arch like that at Rocavecchia (Laforgia *et al.* 2007, fig. 1:6). It is still premature to say what this can be significant in terms of chronology, especially regarding the transition from RB to FB; a greater number of comparisons among a larger quantity of data and contexts is necessary.

Additional data related to RB-FB sequence come from the levels of **trench IX**, these too being divided by the excavators into phases. **Phase I** shows local pottery types, the most recent of which clearly date to a late moment of RB (Damiani 2010, figs. 62-63), such as the raised strap handle of cups or bowls decorated with vertical grooves (Pagliara *et al.* 2008, fig. 13C:25); the vertical rod handle with horns on top (Pagliara *et al.* 2008, fig. 13C:26); and the necked cup with everted rim (Pagliara *et al.* 2008, fig. 13C:28). A type of horizontal handle with plastic appendices that could come from an immediately earlier occupation (Pagliara *et al.* 2008, fig. 13C:27) finds comparisons with an example from an initial RB context of Cortine di Fabriano (Damiani 2010, 24-26, fig. 13:1) (Fig. 3.9:1-4). A large amount of Aegean-type pottery, both painted and plain, has been found in the same context. The sherds are datable both to LH IIIB2, with one import (Pagliara *et al.* 2008, fig. 15:I.5-6; Guglielmino 2009, fig. 2:1-2, 5; Coluccia 2010, 356:22.11, fig. 11) (**RO49**, Fig. 3.9:5) and to LH IIIC early (Pagliara *et al.* 2008, fig. 15:I.3-4; Guglielmino 2009, fig. 3:1-2) (Fig. 3.9:8-10).

It would therefore seem that this phase dates to a late period of the RB, parallel to the circulation of Mycenaean LH IIIC early pottery and with the likely presence of residual elements of an earlier occupation, the evidence for which could be better preserved in other areas of the settlement. However, it is also possible, considering the good state of preservation of the pottery, that the Aegean-type wares were well cared for and they actually continued to be used when stylistically more advanced types were beginning to circulate.

In **phase II** types of local pottery characteristic of a late moment of RB continue, such as the vertical rod-horned handles decorated with grooves (Pagliara *et al.* 2008, fig. 13B:20), and the cups and bowls with sharp and grooved carination (Pagliara *et al.* 2008, fig. 13B:21-22) (Fig. 3.10:1-3). Also in this case there are large amounts of associated Aegean-type pottery. The typological range seems to support a chronology at the beginning of LH IIIC (Fig. 3.10:4, 8); anyway it is important to stress also the presence of three fragments of transport stirrup jars, LM IIIB in date, of Cretan provenance (**RO430**, **RO461**, **RO531**) (*infra* Fig. 4.49). Supporting a LH IIIC early date is the amphora with handle from neck to shoulder (Pagliara *et al.* 2008, fig. 14:II.2; Iacono 2010, 354-355, n. 22.8, fig. 8) that finds comparisons with examples, both imported and locally produced (**CN310**, **T43**, **BT711**, *infra* Figs. 4.43, 4.62, 4.74), from Broglio di Trebisacce, Coppa Nevigata and Termitito (Bettelli 2002, fig. 70:90; Vagnetti 2012, 423-426, fig. 8:33). There is also a small stirrup jar, the decoration of which is considered as FM 18 Mycenaean flower, but which, in reality, could represent flames ending in spirals filled with vertical lines, similar to that of a pot imported from Greece found at Broglio di Trebisacce (cfr. *supra*) (Fig. 3.10:9). The vessel found at Broglio has been dated from the beginning of LH IIIC on the basis of its decoration on two registers (Pagliara *et al.* 2008, fig. 14:II.1; Vagnetti, Panichelli 1994, 394, 399, fig. 72:5). Also present are three deep bowls, the dating of which could fall between the end of LH IIIB and the beginning of IIIC

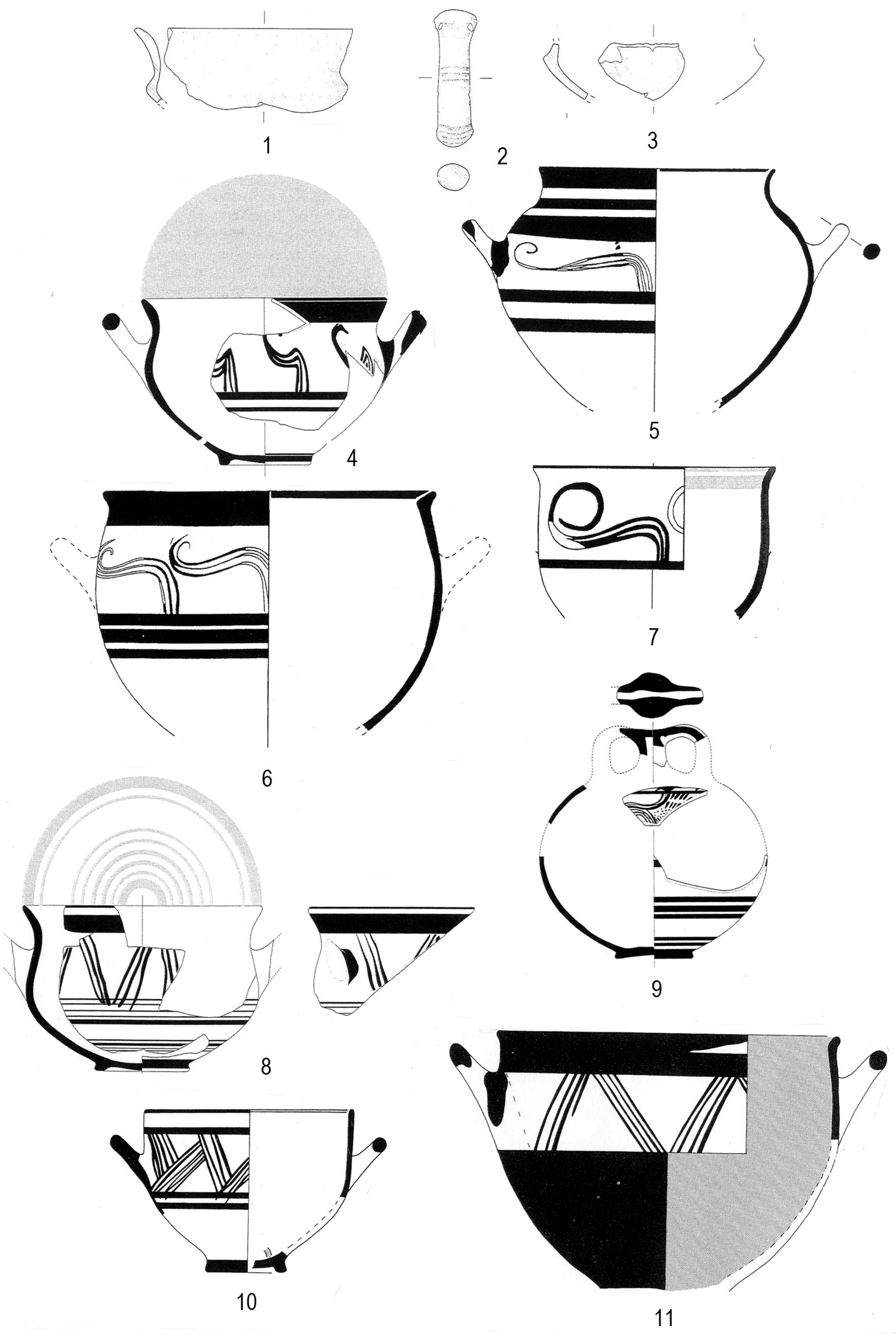

Fig. 3.10. Rocavecchia SAS IX/2005-2006: phase II (1-4, 8-9) (after Pagliara *et al.* 2008, figs. 13B, 14:II.1; Guglielmino 2009, fig. 3:4, 6); Aegean comparisons for Rocavecchia's phase II deep bowls (5-7, 10-11) (after Mountjoy 1997a, figs. 9:59, 12:76; Rutter 2003, fig. 6:1-3). (1:4).

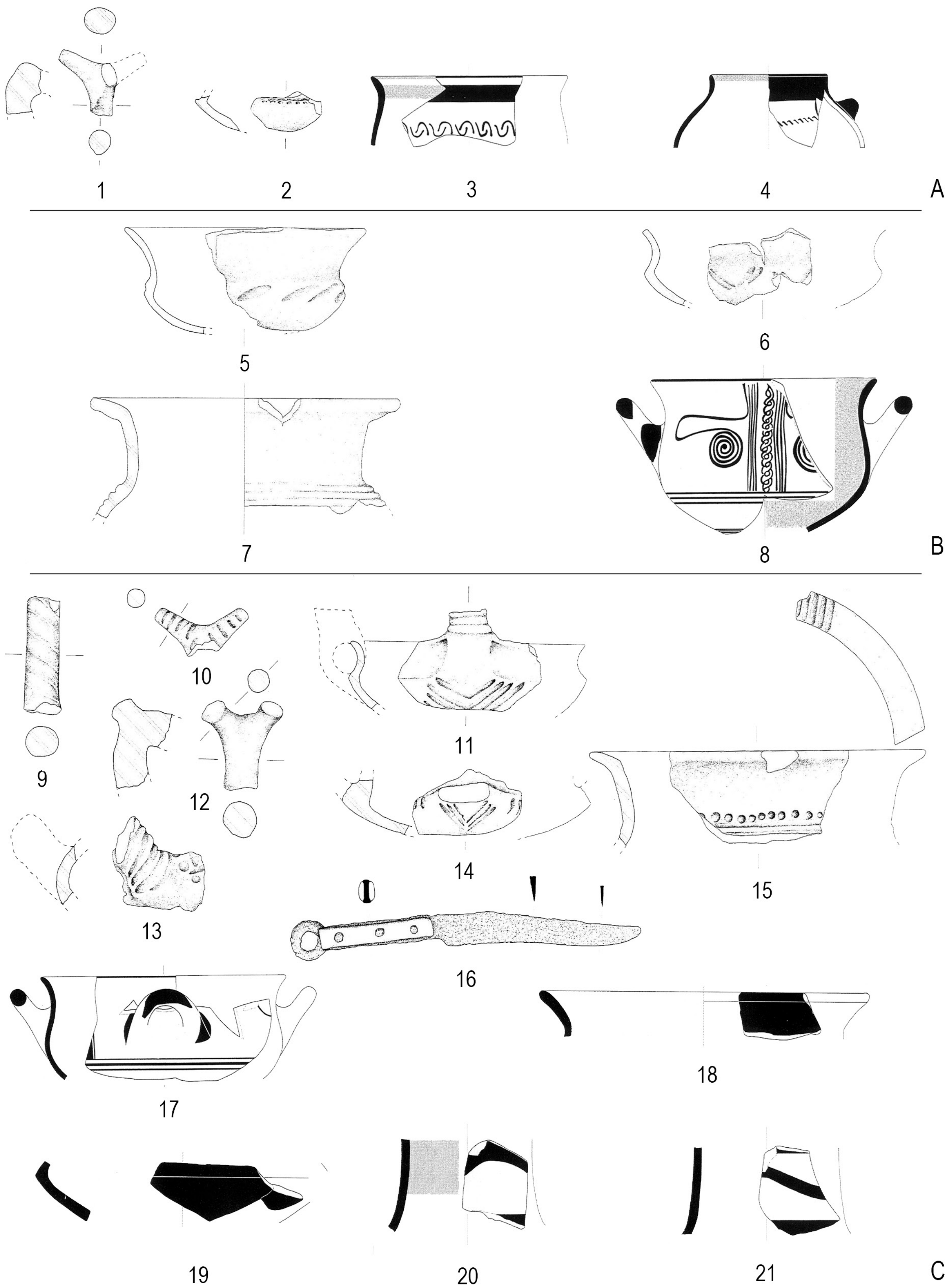

Fig. 3.11. Rocavecchia SAS IX/2005-2006: A. phase III; B. phase IV; C. phase V (after Pagliara *et al.* 2008, figs. 11, 12, 13A-B, 14:III.1-2, IV.1, V.1, 15:V.2; Guglielmino 2005a, pl. CLXVI:c; 2009, fig. 4:3, 5). (1:4).

(Guglielmino 2009, fig. 3:3-4, 6). In particular, two examples exhibit particular and unusual decorations that find comparisons with examples dated by P. Mountjoy to her controversial phase LH IIIB2-IIIC early transitional, that J. Rutter correlates with the beginning of LH IIIC early (Mountjoy 1997a, figs. 1:2, 9:59; 12:77 (Pylos); Rutter 2003, figs. 6, 11:4, 12:5).

Certain types of local ceramic ware common to a late phase of RB Adriatic are present in **phases III** and **IV** of **trench IX**: vertical rod handles topped with horns (Pagliara *et al.* 2008, fig. 13A:16); carinated cups and bowls decorated with grooves, some of which form angular patterns (Pagliara *et al.* 2008, figs. 13A:18, 12:12); necked cups with groove-decorated shoulders (Pagliara *et al.* 2008, fig. 12:13) (Fig. 3.11:1-2, 5-7). In addition to several types of deep bowl with panelled patterns, datable between LH IIIB2 and IIIC early (Pagliara *et al.* 2008, fig. 14:IV:1; Coluccia 2010, 357, n. 22.12, fig. 12) (Fig. 3.11:8), an example of the associated Aegean-type pottery is a medium to small-sized collared pot with bosses along the shoulder and which may be a version of FS 63-64 (Fig. 3.11:4). Both the form and the monochrome decoration of this vessel's neck are similar to examples from LH IIIC middle and late (Pagliara *et al.* 2008, fig. 14:III.2; Mountjoy 1999, figs. 99:231, 216:406-407, 226:517-522; 463:14).

Regarding **phase V** of the same trench, various local pottery types and decorations have been found: grooved vertical rod handles with and without horn decorations which may be cylindrical or conical in shape; cups with marked carination decorated with grooves which form angular patterns; closed vessels decorated with grooves and dots (Pagliara *et al.* 2008, fig. 11). All of these examples find comparisons in contexts which date to the end of RB, such as Afragola and the Campania plain; Moscosi phase IV; Tolentino; the Terramare region (Laforgia *et al.* 2007; Albore Livadie 2007, fig. 1:2,4,6-8; Sabbatini, Silvestrini 2005, fig. 3; Percossi *et al.* 2005, fig. 3:8; Cardarelli, Pellacani 2004; Bianchi 2004) and possibly to the beginning of FB (Monte Titano, Bottazzi, Bigi 2008, 55, fig. 12, tav. 8:11-13,15-18) (Fig. 3.11:9-15).

Related to these phases is a knife similar to the Baierdorf type, datable to the RB and stylistically similar to others found in the Transalpine region (Pagliara *et al.* 2008, fig. 15B:V.2; Maggiulli 2010, 363, n. 22.22; fig. 22) (Fig. 3.11:16). As observed by its excavators, the blade's similarity with knives of the Scoglio del Tonno type indicates the same period.[19] A few Aegean-type sherds are also present (Pagliara *et al.* 2008, fig. 14:V.1). In terms of chronology, two finds of particular interest are a pair of closed pots with wavy bands around their necks (Guglielmino 2009, 195-196, fig. 4:3-5) (Fig. 3.11:20-21) pertaining to a typology well-attested at Rocavecchia (Guglielmino 2005a, 643, tab. CLXVI:f; Jung 2006, 164, Abb. 22:19-21, Taf. 12:8-10) and present at Broglio di Trebisacce along with another, probably analogous example (see above for a definition of the type). If we can assume at Rocavecchia that the indigenous pottery, the Aegean-type pottery and the recovered bronzes are coeval, a dating of the two above-mentioned **trench IX** sherds to LH IIIC advanced does not seem unreasonable. Nor would such a hypothesis be inconsistent with the presence of the Baierdorf-type knife or the style of associated local *impasto* pottery. Therefore, **phase V** could be identified as the final horizon of RB within the timeframe which has so far been defined for the settlement.

Based on the stratigraphic examination of **trenches IX** and **X** at Rocavecchia and on the quantity of Aegean pottery recovered therein, it seems evident, as already underlined by the excavators themselves as well as by other authors (Recchia, Ruggini 2009), that at least in these areas of the settlement the initial phase of RB (RB1) is either under-represented or completely absent. In the case of **trench IX**,

[19] A knife very similar to the Rocavecchia specimen, found within tomb 15 at Ialysos (Rhodes), was recently studied by Mario Benzi (2009). Two elements which link the knife to a style typical of the RB in Italy and Europe are its particular type of hilt and the double bird-shaped protome decoration which is present along the entire back of its blade. A stylistically Aegean decorative element was most likely added in a phase later than the knife's creation, in a way similar to that of the better-known knife of Phaistos (Benzi 2009, figs. 2-4). From a chronological perspective it is important to note that the tomb, the first opening of which dates to LH IIIA, was reused during LH IIIC, prior to the early-developed phase (Benzi 2009, 59), or, in other words, a timeframe coherent with the late period of the Italian RB.

such a gap could be linked to the intense building activities in the RB2 and to the creation in FB of a structure, possibly serving cult functions, which may have removed earlier levels in the area. In **trench X** it is clear that the layers of a late phase of RB developed immediately above those dated to the end of MB. In fact, according to the excavators, the structure erected in phase II was built directly atop the ruins of an earlier structure (Pagliara *et al.* 2007, 323). In this case an explanation similar to that proposed for **trench IX** does not seem probable. We must therefore wonder if the extensive gaps in the data for the initial phase of RB (RB1) at Rocavecchia should not rather be read within the broader, more far-reaching phenomena that affected the settlement. In particular one could refer to the events following the widespread destruction of the end of MB and the subsequent construction of the Subapennine (RB) walls; it could not have happened at the beginning of RB. It seems equally clear, however, that there were activities at the site in an initial phase of RB. This hypothesis would be supported by the amount of Aegean-type pottery at the site belonging to LH IIIB. In any event it should be noted that, at the present state of knowledge of the site, these remains could be merely residual (Guglielmino 2005, 307:II.185; Guglielmino *et al.* 2010, 270:26, 272:35, fig. 8:26, 35).

3.1.3. Final Bronze Age (FB)

Some Aegean-type pottery is attested in the FB levels of the Apulian settlements of **Rocavecchia** (Guglielmino 1996; Pagliara *et al.* 2007; 2008) and **Santa Maria di Leuca** (Benzi, Graziadio 1996a).

At both these sites the Aegean materials are associated with a locally made *impasto* pottery in Protovillanovan style, a fine ware with a Protogeometric decoration and with fine fabric *dolia*, all of which are datable to the FB.

Going into further detail, **phase V** of **trench X** at **Rocavecchia** presents contexts linked to that last phase of Bronze Age occupation which saw the destruction of the site's latest walls (Pagliara *et al.* 2007, 313-315, 343). Several authors accept a dating for this period to an advanced phase of the FB (most likely a later phase of FB2) (Guglielmino 2003, 99; Alessandri *et al.* 2004, 401; Guglielmino 2005a, 643; Jung 2006, 153-156). The *impasto* ware is characterised by the presence of necked cups, with moderately wide, angular shoulders, decorated with grooves or ribs.[20] There is also a wide distribution of Protogeometric fine ceramics and *dolia* with grooved bands (Fig. 3.12:1-15). The Aegean-type pottery related to this period is datable within LH IIIC late and, as proposed by Jung, the Submycenaean period, and is especially close stylistically to that developed in the north-western Peloponnese (Jung 2006, 165, tab. 12; Eder 2009, 137, fig. 2:2-3) (Fig. 3.12:1-7). Guglielmino dates the *amphoriskos* present in this group of strata at Rocavecchia to LH IIIC late (Guglielmino 2005, 310, fig. II.199) while Jung prefers comparisons with Submycenaean examples (Jung 2006, Abb. 22.9, 163, tab. 12:4) (Fig. 3.12:6). An interesting parallel for this vessel comes once again from Crete, where a comparable example was discovered in a closed context dated to LM IIIC (Rethemiotakis 1997, fig. 11c). Similar examples dated to the same phase are also found at Palaikastro (Sackett *et al.* 1965, fig. 15:P23) and Karphi (Seiradaki 1960, fig. 3:10).[21] If a Cretan influence on this piece could be confirmed, it would be an important piece of evidence for the continuation of relations between the Apulian port of Rocavecchia and Crete in very advanced phases which were previously thought to be characterised by limited relations with the northwestern Peloponnese. The second Aegean vessel from this phase has a closed shape with a distinct monochrome neck, probably FS 58, which likely dates to LH IIIC late (Guglielmino 2005, 310, fig. II.200; Jung 2006, Abb. 22.10, 162). The

[20] *e.g.*, Guglielmino 2005, 308, fig. II. 188-191, 193.

[21] Vessels of a similar form are also very common in the tombs of Rhodes, where examples found in closed contexts are dated to LH IIIC early (Benzi 1992, tab. 27:T17/a, 71:T38:/f).

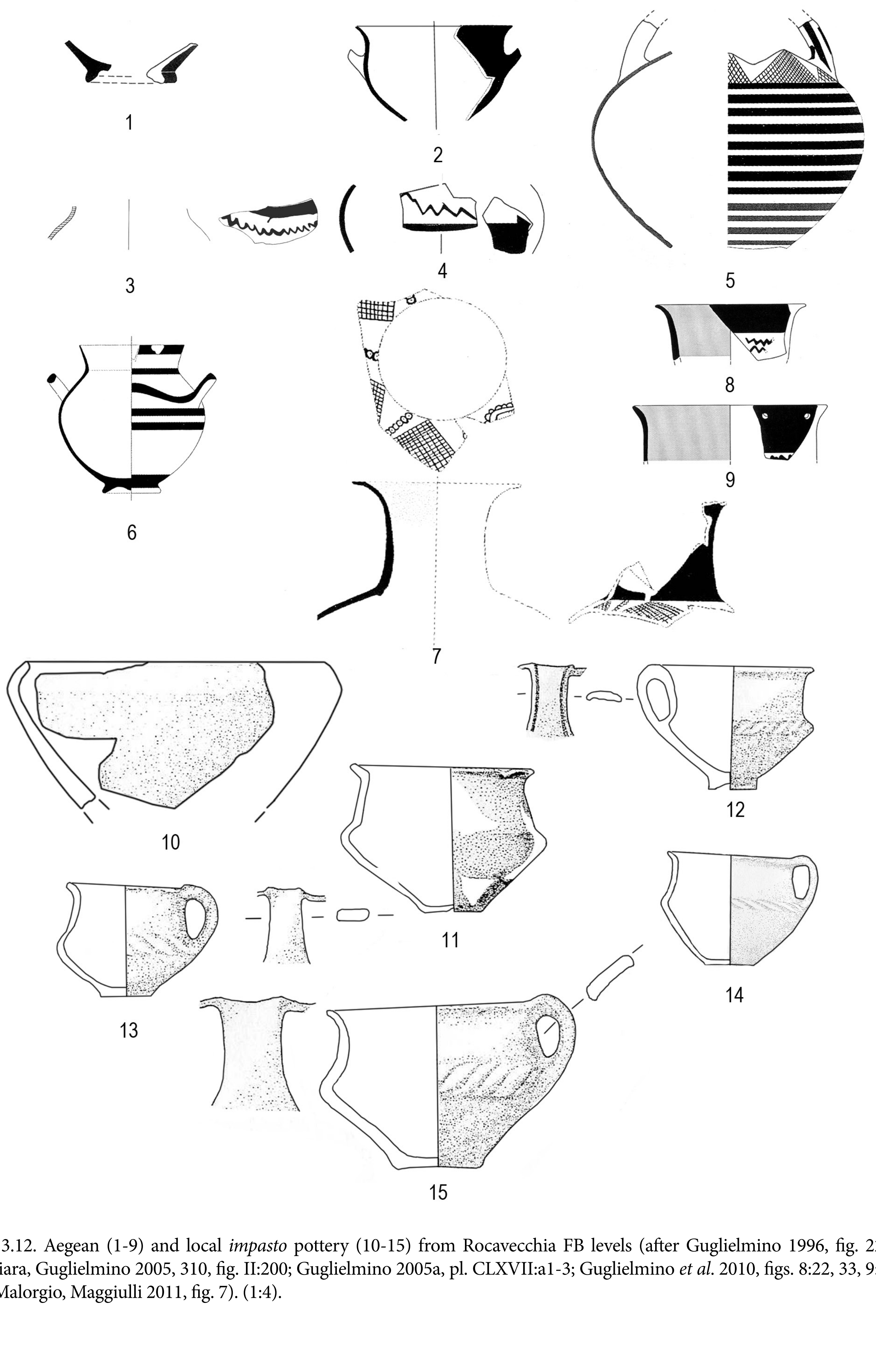

Fig. 3.12. Aegean (1-9) and local *impasto* pottery (10-15) from Rocavecchia FB levels (after Guglielmino 1996, fig. 22:1; Pagliara, Guglielmino 2005, 310, fig. II:200; Guglielmino 2005a, pl. CLXVII:a1-3; Guglielmino *et al.* 2010, figs. 8:22, 33, 9:39, 42; Malorgio, Maggiulli 2011, fig. 7). (1:4).

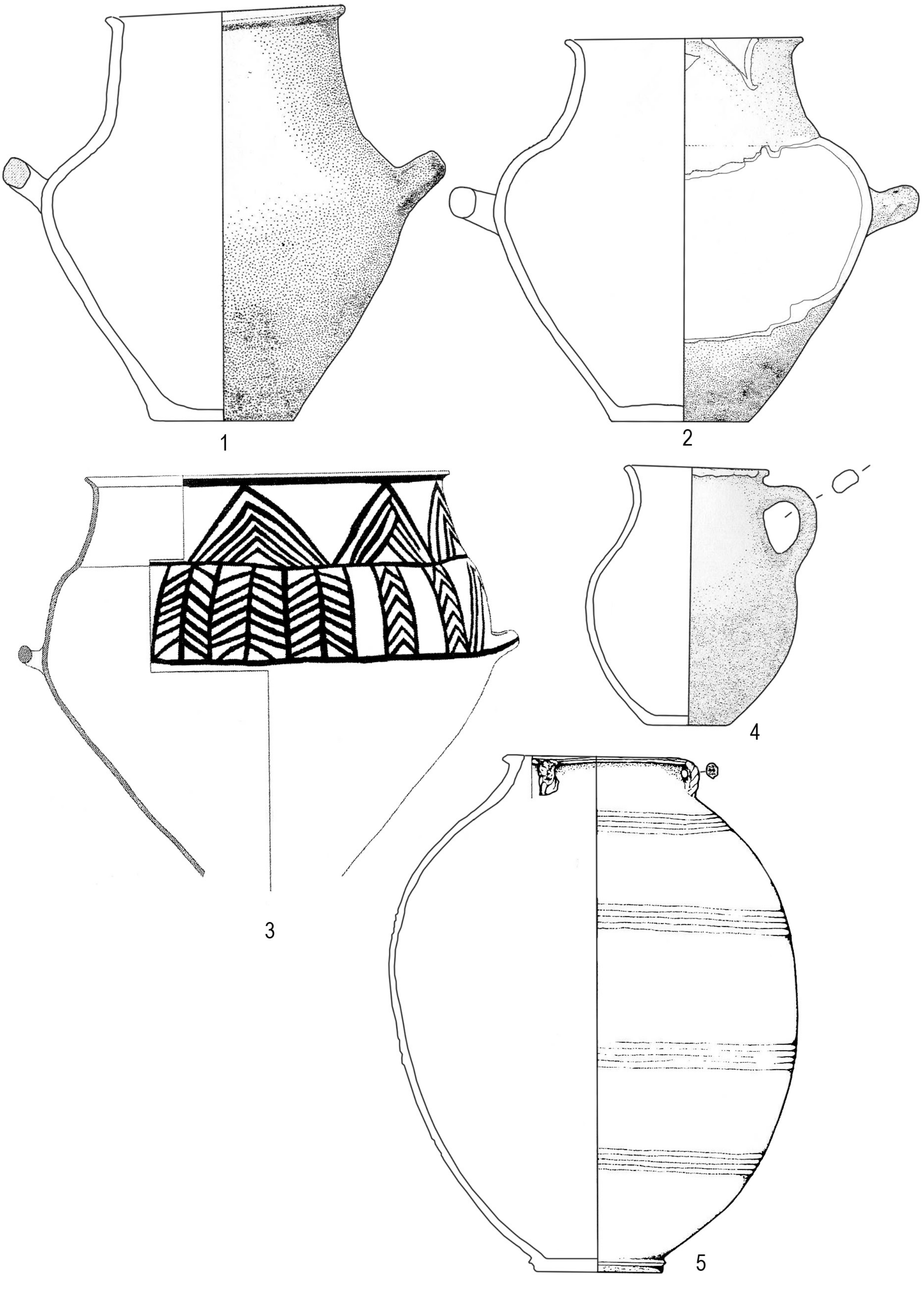

Fig. 3.13. Local *impasto* (1-2, 4), Protogeometric pottery (3), and *dolia* (5), from Rocavecchia FB levels (after Malorgio, Maggiulli 2011, figs. 8-9; Bailo Modesti *et al.* 1999, fig. 4; Guglielmino 1999, fig. 3). (1-2, 4 1:6, 3 1:10, 5 1:16).

timeframe projected for this vessel is consistent with that of other Aegean-type pottery discovered in contemporaneous contexts at Rocavecchia.

Phases VI and **VII** of **trench IX** provide additional data for this period at Rocavecchia, although local *impasto* pottery has not been published from these levels. According to the excavators, **phase VII** should be coeval with the destruction of the site's FB walls, and therefore datable to FB2 in the same way as **phase V** of **trench X**.

A single Aegean sherd has been discovered in **phase VI** of **trench IX**; this sherd has an open form and was probably part of a deep bowl decorated with a panelled pattern composed of alternating zig-zag and vertical lines (Fig. 3.14:1). Other probable decorative elements consist of a row of semicircles beneath the vessel's rim and a pictorial element (possibly a bird) next to the panel. The vessel's interior is monochrome (Pagliara *et al*. 2008, fig. 14:VI.1). The style recalls the dense, miniature compositions typical of LH IIIC middle (Close Style) (Pagliara *et al*. 2008, 260, 263), even though comparisons, especially for the type of panel, can also be found in both LH IIIC middle (Mountjoy 1999, figs. 151:101, 465:20) and LH IIIC late, up until the Submycenaean period (Mountjoy 1999, figs. 58:239; 166:68; 237:594, 313:296, 316:311) (Fig. 3.14:2-4). In fact, it is in these later phases that this type of panelled motif appears more frequently associated with pictorial elements (Crouwel 2009, fig. 2).

Therefore, a dating to LH IIIC advanced or late remains uncertain for this sherd. According to the excavators, **phase VI** of **trench IX** at Rocavecchia must fall within the beginning of the FB (FB1), which seems logical based on the chronology proposed for the preceding and following phases, and which is also corroborated in both cases by association with Aegean ceramics and bronzes. Despite the impossibility of evaluating the associated local *impasto* pottery, the chronological classification of the only published Aegean sherd from this level seems consistent with the classification proposed by both the excavation report and the present study.

As already mentioned, both local and Aegean-type ceramic aspects found at the settlement of **Santa Maria di Leuca** are similar to those of the FB occupation at Rocavecchia which have just been described. In both of the Apulian settlements we can notice a solid correlation between an advanced phase of FB (FB2) and LH IIIC late, up until Submycenaean (Jung 2006, 165-173, tab. 13; Eder 2009, 136-137, figs. 1:3, 2:1) (Fig. 3.15).

Some interesting observations can be made regarding the levels of **Ausonio II** on the **Lipari** acropolis, datable to the FB. Some of the few significant Aegean sherds recovered might date to LH IIIC advanced (Taylour 1980, tab. CCXLV, 7 and 10). Aegean-type pottery has been found in other contexts linked to the same phase which could date up until LH IIIC late, or possibly also Submycenaean (Taylour 1980, tab. CCXLIV, 4 and CCXLV, 6). Of particular interest among these is the fragment of a vessel of uncertain shape with an irregular zig-zag decoration on its shoulder located between two wide horizontal bands. Such a decorative pattern is very common on both open and closed vessels in both LH IIIC late and Submycenaean contexts (Mountjoy 1999, *e.g.* figs. 163, 25; 173, 13; 239, 612-614; Jung 2006, tab. 12, 2-3; 13, 6; 19, 7; Moschos 2009, fig. 39). A second sherd might be from a krater decorated with pairs or series of horizontal wavy lines, consistent with a style characteristic of LH IIIC late.[22] Such a chronology could be coherent with what has been observed at both Santa Maria di Leuca and Rocavecchia, where the Aegean-type pottery datable to this period characterises FB2 contexts and levels associated with Protogeometric fine ware.

[22] Mountjoy 1999, figs. 57, 438; 58, 440; Jacob-Felsch 1996, tab. 38, 264 (Schicht 11, Horizont 6, table 24); Popham *et al.* 2006, p. 193, fig. 2.23, 3-4. See also Mountjoy 2009, figs. 9, 15.

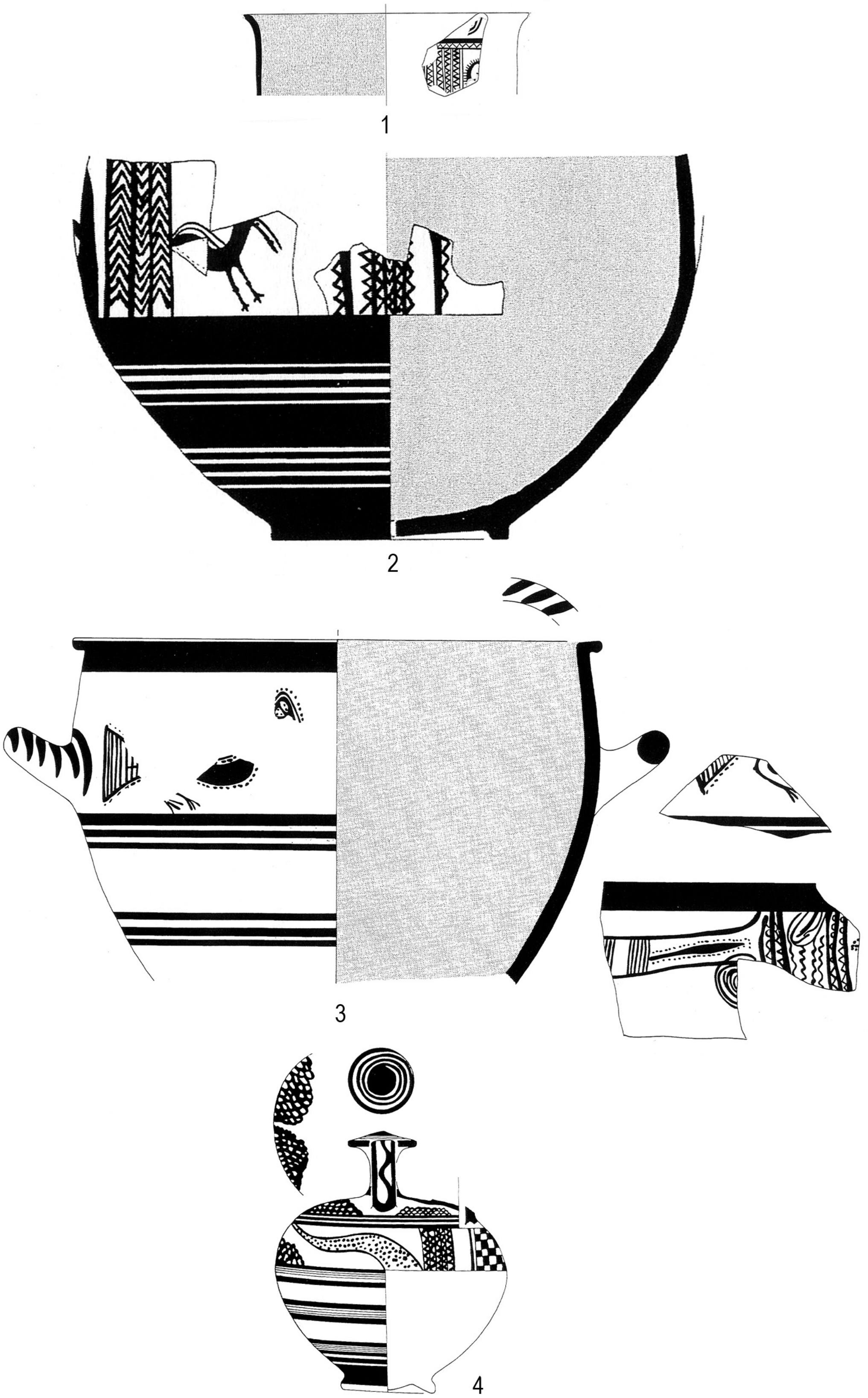

Fig. 3.14. Rocavecchia SAS IX/2005-2006: 1 Mycenaean deep bowl from phase VI (after Pagliara *et al.* 2008, fig. 14:VI.1); 2-4 Aegean comparisons for decoration and style (Argolid, Phokis, Kalymnos, after Mountjoy 1999, figs. 58:439, 313:296, 465:20).

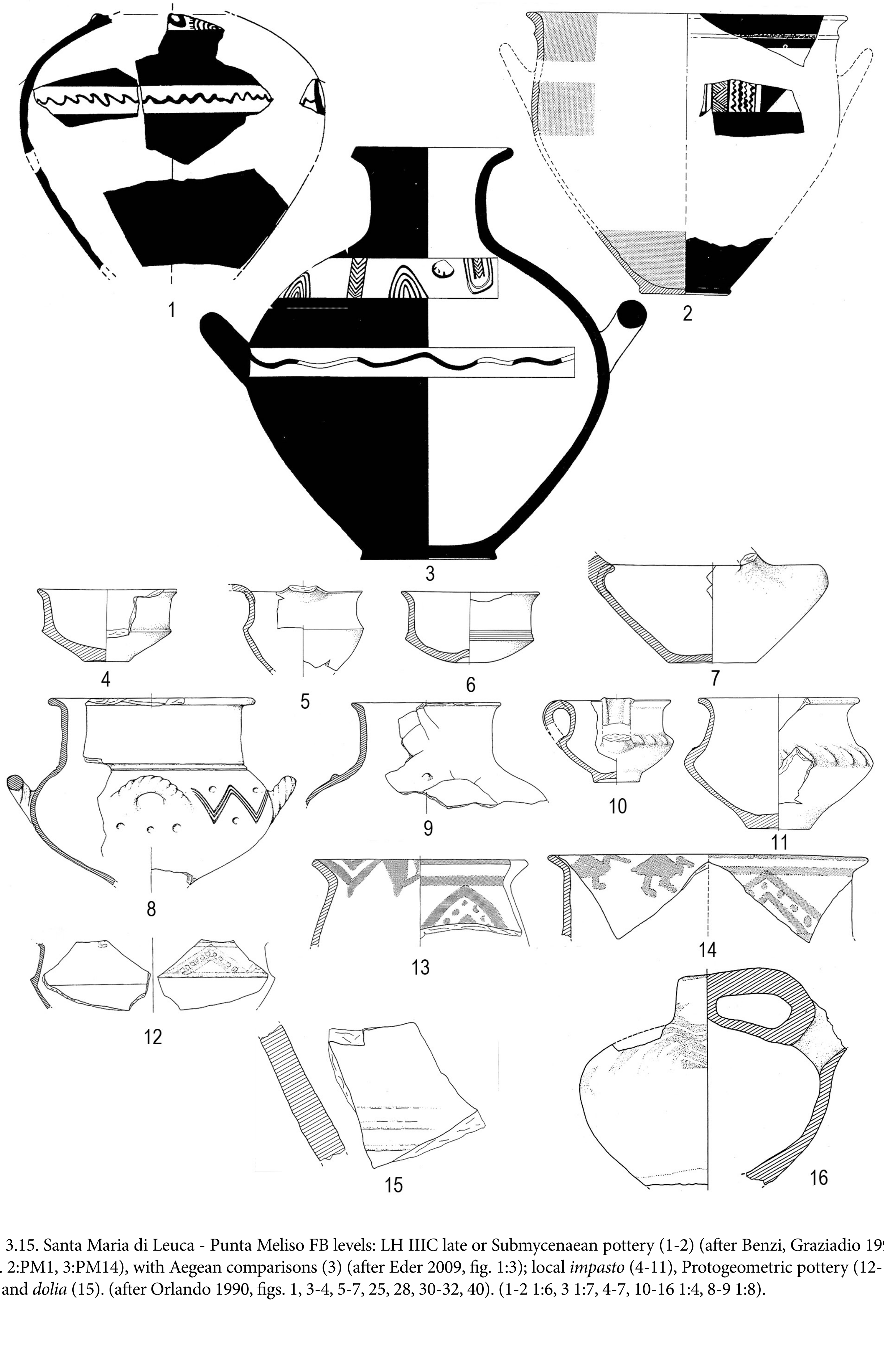

Fig. 3.15. Santa Maria di Leuca - Punta Meliso FB levels: LH IIIC late or Submycenaean pottery (1-2) (after Benzi, Graziadio 1996, figs. 2:PM1, 3:PM14), with Aegean comparisons (3) (after Eder 2009, fig. 1:3); local *impasto* (4-11), Protogeometric pottery (12-14, 16) and *dolia* (15). (after Orlando 1990, figs. 1, 3-4, 5-7, 25, 28, 30-32, 40). (1-2 1:6, 3 1:7, 4-7, 10-16 1:4, 8-9 1:8).

3.2. The contribution of Italian type *impasto* and wheel-made grey wares discovered in the Aegean

Marco Bettelli

The presence in reliable Aegean contexts of certain ceramic types found throughout southern Italy provides further important support that is useful for the construction of a comparative chronological sequence between the Italian peninsula and the Aegean area during the Late Bronze Age. Handmade burnished ware (HBW or *impasto* ware) and Grey wheel-made ware of levigated clay have been found at several Cretan and mainland sites (Bettelli 2009, 2010).[23] In this section I am not examining again the entire corpus of materials and its important historical implications; I will focus on some Aegean sites and finds relevant for a good chronological comparison with Italy.

Kommos

As is well known, a group of HBW has been found in LM IIIB layers at Kommos in southern Crete (Rutter 2006, 674-678). They are typical Nuragic vases of open and closed shapes, dating to the RB in Sardinia (Bettelli 2010, 120). These pots appear to be imported, as is also the case with the Nuragic vessel recently discovered at Pyla-Kokkinokremos in Cyprus (Karageorghis 2011, figs. 1-5; Bettelli in press). The presence of Nuragic pottery imported from Sardinia to Crete and Cyprus, probably until toward the end of the Mycenaean palatial society, must be related to a trade route which connected the largest islands in the Mediterranean, including Sicily. As further evidence of this trade route we can also cite a HBW fragment found in Beirut which possibly comes from a Sicilian (Thapsos or Milazzese style) jug (Jung 2009, fig. 3; Boileau *et al*. 2010, 1684-1685; Bettelli in press).[24] The Levantine or Cypriot bichrome pot found at Mursia (Pantelleria) is evidence that this southern route must have been active from an early stage of the Italian MB (Marazzi, Tusa 2005, pl. CLI:f, g). These examples, while important, are not, however, very suitable for a precise comparative chronology between Italy and the Aegean, considering the fact that they are Nuragic and, possibly, Thapsos-Milazzese pots, the circulation of which is limited to the islands of Sardinia and Sicily and to the Aeolian archipelagos. We must also consider that the chronological development of Nuragic pottery is not yet perfectly clear, as the shape and the context of provenance of the pot from Pyla suggest (Bettelli in press).

Chania

This settlement in north-western Crete shows solid evidence of HBW and Grey wheel-made pottery with Italian connections (Hallager, Hallager 2000, 165-167; 2003, 253-256). The first significant presence of HBW at the site is attested in the LM IIIB1 strata (Hallager, Hallager 2011, 371-372,

[23] For a recent reassessment of HBW discovered in the Aegean see also Strack 2007.

[24] A number of HBW pots were recently identified in several Levantine sites. The majority of them are of non-diagnostic shapes (Jung 2009, fig. 9), but there are some carinated cups from Tell Arqa (Lebanon) which could be comparable to Italian *impasto* cups of RB2 types (Charaf 2011, fig. 2:1-2). The presence of HBW, possibly of Italian style, in this area of the Mediterranean opens new perspectives on the spread of this kind of pottery beyond the Aegean. It is worth noting that the pot from Beirut might be an import from Sicily, while the cups from Arqa seem Ionian-Adriatic in style and are both locally made and later in date. These differences, which reflect those highlighted in the Aegean HBW repertoire (Bettelli 2010), are probably linked to different routes and patterns of circulation of goods and people which existed both before and after the collapse of the Mycenaean palaces. In fact, an increasing importance of the 'Adriatic' route is observable in the course of the 12th century BC (Bettelli 2010, in press), as is also testified by the presence of raw materials and goods of Cypriot or Levantine origins at Frattesina.

pl. 128). Among the most recognisable shapes present are a necked jar and a few fragments of carinated cups (Hallager, Hallager 2011, pls. 128:80-P1046+, 150C:1-4). A peculiar HBW sherd has also been found in this group of strata, although in a mixed context containing geometric pottery. The sherd is part of the rim of a conical bowl, decorated with double horizontal zig-zag lines roughly incised on the vessel's external surface. Part of a possible high-slung strap handle, or tongue, along the rim is also preserved (Hallager, Hallager 2011, p. 371. n. 1275, pl. 128:77-P2049).

Most of the HBW fragments found at Chania were recovered in levels or structures dating to LM IIIB2. The majority of these come from closed vessels used for the preparation or cooking of food, and possibly also for storing small quantites of it. Common forms found include jars and situlae, while carinated cups and bowls, and bowls with inverted rims, used for the consumption of food and drink, were also found.

Regarding the presence of Grey ware, only open tableware vessels are present: cups and bowls with rounded or carinated bodies and kylikes.

The results of chemical analyses carried out on some of the HBW and Grey ware vessels found within the LM IIIB and IIIC levels of the site demonstrate that these objects were locally produced from the beginning of their diffusion in the settlement (Hallager, Hallager 2000, 165, n. 301, 166; 2003, 253, n. 541, n. 559, 2011, 371; Jones 2003). A vast literature already exists concerning the HBW of Chania.[25]

The publication of new discoveries does not add much to what has already been observed. The presence of carinated cups and bowls has evoked comparisons with the Italian peninsula during the RB. Specifically, both the profile of the open carinated forms with high-slung strap handles (Hallager, Hallager 2003, tab. 85:70-P0352/0802/0956; 71-P0182) (Fig. 3.16:14) and the peculiar shape of the bird-shaped handle's protome (Hallager, Hallager 2000, tab. 51: 80-P0062) suggest a style common in the Adriatic and possibly Ionian areas of the Italian peninsula (Damiani 1991).[26]

The necked jar found in the LM IIIB1 levels is another example which finds stylistic parallels in the peninsular Italian repertoire beginning from MB3 (Damiani 2010, 256-259, figs. 83-84; D'Agata *et al.* 2012, fig. 4B:1). In terms of chronology, it should be noted that elements which, in Italy, usually belong to a late Subapennine Adriatic phase (RB2) (Baldelli *et al.* 2005, fig. 11:5, 16, 18-20; Damiani 2010, figs. 62-63) including the high-slung strap handles on carinated cups, have also been discovered in contexts from the LM IIIB in phases as early as LM IIIB1. It is interesting to note that a smaller version of this last type of handle was already widespread in peninsular Italy during RB1 (Damiani 2010, fig. 61:51C, 7, perhaps 51A, 78G). The fact remains that Italian Subapennine pottery types dating to RB2 are attested at Chania in LM IIIB2 contexts. We will discuss this topic below.

The above-mentioned sherd with horizontal zig-zag decoration constitutes the only anomalous element within this otherwise homogenous set of finds. This vessel presents a decoration which is widespread in earlier phases of the Bronze Age in Italy. In the Aeolian Islands decorations with rows of horizontal zig-zags are common in pottery of the Capo Graziano *facies* (MB1-2) (Bernabò Brea, Cavalier 1980, figs. CXVII-CXXXV). In Apulia this style is well-represented in the local MB2-3 *facies*, with some examples similar to that found at Chania, especially at Rocavecchia (Scarano 2006; D'Agata *et al.* 2012, 301, fig. 4B:3).

If the comparison with Apulian MB2-3 decorated ware is correct, the vessel from Chania is clearly out of context in the level where it was found and most likely belongs to an earlier level of the settlement. If this were the case, the vessel in question would be a valuable piece of evidence of the early stages of the relationship between LM Crete and South-eastern Italy. This same relationship

[25] Bettelli 2002, 117-137, with previous bibliography; Jung 2006, 181-185, 208-210; Bettelli 2009; D'Agata *et al.* 2012.

[26] The slight concavity of the wall of these cups makes them comparable to the "con gola poco accentuata" type defined by I. Damiani (2004, fig. 3B). Sabbatini, Silvestrini 2005, fig. 2:1, 4, 8. Damiani 2010, 288, A17, tipo 3, tab. 99:4-8 (handle with bird-shaped protome); *ibidem*, discussion on p. 419 (cups type 78B and 100B).

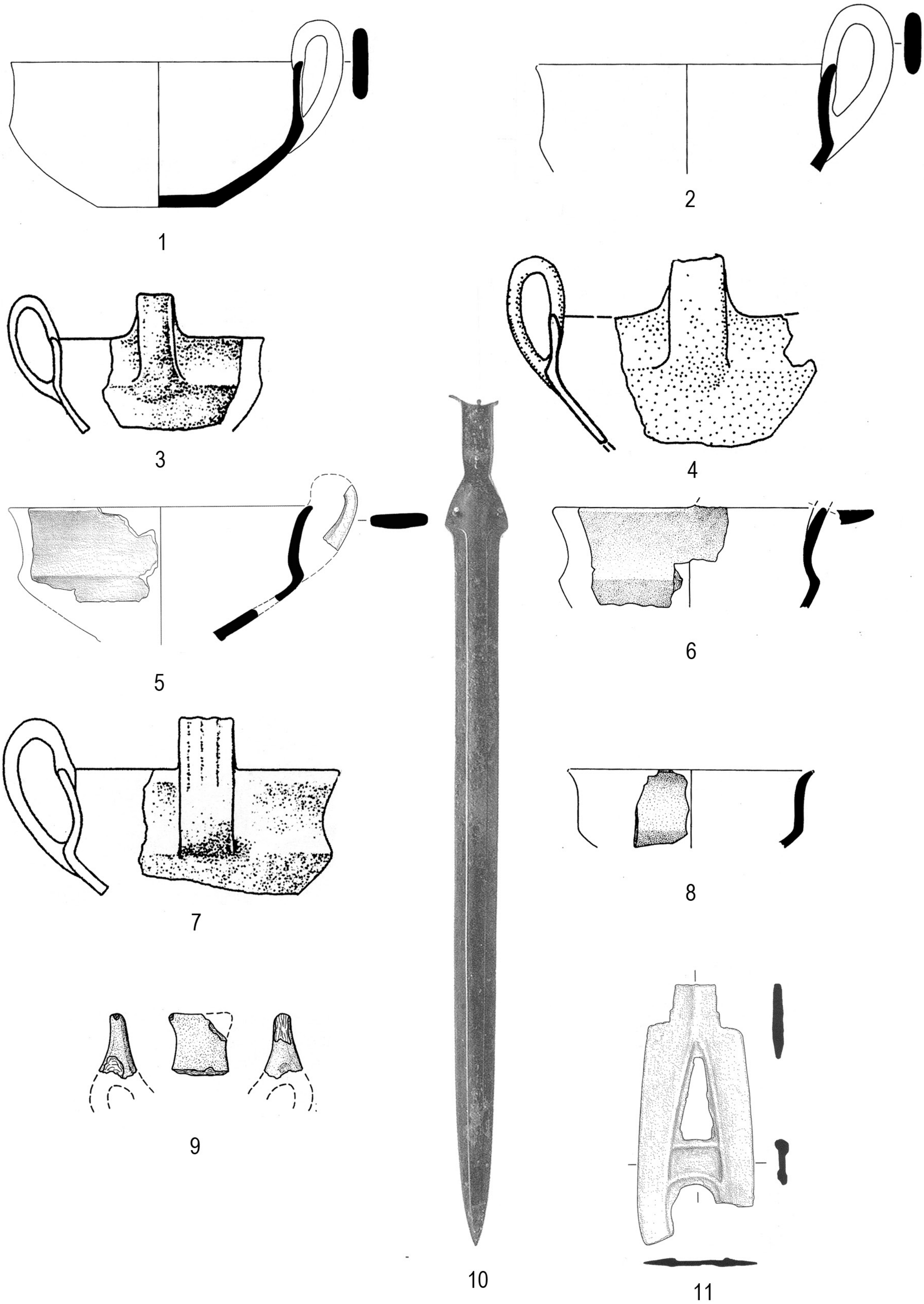

Fig. 3.16. HBW carinated cups from Chania (1-2) (after Hallager, Hallager 2003, pl. 85; 3-4); *impasto* carinated cups from Cavazzoli, Fontevecchia di Camerano, Quingento di San Prospero (3-4, 7) (after Damiani 2004, fig. 3A:4, 3B:1-2); HBW carinated cups and handle from Kastrokephala (5) and Tiryns (6, 8-9) (after Kanta, Kontopodi 2011, fig. 8.g; Kilian 2007, Taf. 24:309-311); bronze sword (10) and razor (11) of Italian types from Kastrokephala (after Kanta, Kontopodi 2011, figs. 6.a, 7.a). (1-10 1:4, 11 1:2).

can also be observed, for example, at Rocavecchia during MB3 (sample n. **RO74**) (Vagnetti 1985; Guglielmino 2009a).

It is interesting to note that a small group of HBW pottery (a carinated cup, a jar with an ovoid body, and a jar with a distinct, everted rim) — apparently a set of ceramics intended for the preparation and consumption of food — was discovered on the floor of a room in building 1 dating to LM IIIB2 which is otherwise associated with Grey ware and abundant LM pottery (Hallager, Hallager 2003, 65-71). A number of HBW vessels were also found in a previous phase (LM IIIB1) in floor deposits of the same settlement (Hallager, Hallager 2011, 371). It seems clear that such vessels were used by the inhabitants of the domestic unit along with wheel-made and painted tableware, and that these vessels were not solely used for cooking and storage purposes (Bettelli 2009).

A small group of HBW which falls stylistically within the Italian Subapennine ceramic repertoire was found during the excavations in the area of the Royal Road at Knossos.[27] The objects found include several carinated cups (one of which bears a high-swung strap handle similar to those found at Chania), an important horn fragment from the top of a Subapennine horned handle (perhaps from a cup), and some vertical rod-shaped handles (Bettelli 2002, 122; D'Agata *et al.* 2012, 309, fig. 7B). The majority of these pottery types are datable to the RB2 in Italy.

Very recently a HBW carinated cup was published from the fortified site of Kastrokephala, close to Heraklion (Kanta, Kontopodi 2011, fig. 8.g) (Fig. 3.16:5). This site is dated to an early stage of LM IIIC, and it is interesting to note that the cup's profile, with a sharp carination and concave wall, is different from the Chaniot vessels mentioned above and it is more similar to a HBW cup from Tiryns which will be discussed below, coming from the LH IIIC early layers of the lower citadel (Fig. 3.16:6).

At Kastrokephala a razor of Italian type, similar to the Scoglio del Tonno type (Bianco Peroni 1979, 9-11, tav. 4-5:49-52) and a Cetona type sword (Bianco Peroni 1970, 62-64, taf. 19-20) have also been found (Kanta, Kontopodi 2011, figs. 6a-7a) (Fig. 3.16:10-11). These combined evidence confirm the systematic association between HBW, bronzes of Italian style or origin and, often, Grey ware in many Aegean sites (Bettelli 2002, fig. 53).

Tiryns

Klaus Kilian's study of the material from Tiryns allows for an analysis of the most important corpus of Late Bronze Age HBW present in Greece (Kilian 2007). Kilian's excellent and comprehensive catalogues and graphic documentation facilitate the interpretation of the typologies and cultural references of the pottery, as well as the chronological classification of the diagnostic shapes. The data published enable us to consider these objects as a statistically significant group.

As at Chania, the first nucleus of HBW pottery at Tiryns is present in contexts of the Unterburg datable to a late and final phase of LH IIIB, the same period in which the presence of wheel-made, Grey ware also begins to spread throughout the settlement (Belardelli 1999, fig. 4). From the available evidence it is clear, however, that the majority of HBW pottery comes from LH IIIC levels of the lower city and that its presence reaches a peak in LH IIIC early (Bettelli 2009, fig. 5). The situation at Tiryns

[27] Bettelli 2002, 122, especially footnotes 28, 29, 31. The author studied the HBW from Knossos at the Stratigraphical Museum in the summer of 1993 during the preparation of his PhD thesis. The pottery fragments found were discussed in the subsequent volume (Bettelli 2002), although it was not possible to include their illustrations pending the final publication by the excavators. Some sherds of HBW pottery from Knossos have been published by D'Agata *et al.* 2012, when the present book was in press. In the same paper the authors have published a small group of HBW sherds from LM IIIC early contexts of Thronos Kephala (D'Agata *et al.* 2012, 312-319, fig. 11A). Among them a fragment of cylindrical horn from a handle (D'Agata *et al.* 2012, figs. 9:THK 36/48, 11A:5) could be compared with the handle of a HBW cup from Dimini (see *infra*). As mentioned in the previous section of this chapter, this type of handle is widespread in the Adriatic and Ionian regions of the Italian peninsula during RB2 (Bettelli 2009, fig. 11:1-5).

has parallels in both Chania and Dimini (see below). In the first case, the first appearance of *impasto* and Grey wares at the mainland site is mostly coeval with that at Chania. In the second, the spread of HBW pottery at Tiryns, beginning from an initial phase of LH IIIC, is similar to the situation at Dimini, although some differences in the amount of pottery recovered do exist. Regarding the quantitative distribution of the pottery shapes, there is always a greater prevalence of closed vessels as compared to open ones. The percentage of closed versus open vessels remains mostly constant during LH IIIB and IIIC (Bettelli 2009, fig. 6). A variety of forms exist among the closed vessels found, while tableware are generally represented in smaller amounts (Bettelli 2009, fig. 7). From this perspective the situation is different from that at both Chania and Dimini, where a better balance in the distribution of functional forms seems to exist. The prevailing presence of closed shapes in the lower citadel of Tiryns is not easily explained, especially pending archaeometric analyses which could suggest their possible provenances. If at least a portion of these were imported, perhaps from distant regions, one could imagine that they were used as containers for other types of traded goods. If, instead, these vessels were locally produced, one must imagine that HBW production at Tiryns tended to specialise in uses other than just food preparation and consumption. In this chapter a specific examination of the HBW goods in question has been omitted; although comparisons may be drawn with the corresponding Italian production, these vessels are too generic in shape and too widely distributed to allow a meaningful analysis. However, among the typologies of ceramics used for food storage and preparation, there are some examples which can be compared with pottery distributed in the Italian peninsula during the RB. These include several *situlae* (no. 18-23)[28] (Kilian 2007, 82-83, Taf. 2:18-20, 3:21-23) and vessels with strongly inverted rims, as well as others which can be classified as the so-called *a calderoncino* (small cauldron type) (no. 272-295) (Kilian 2007, 104-106, Taf. 22:272-281, 23:282-295). Both of these forms appear in Italian RB contexts,[29] although they are more widespread in the succeeding FB period. Among the open vessels used as tableware, there is a number of carinated cups and bowls (Kilian 2007, 107-108, Taf. 24:301-311), at least one of which is distinguished by a handle, probably ring-shaped, with an axe-shaped appendix (Kilian 2007, 108, Taf. 24:311) (Fig. 3.16:9). Open carinated forms at Tiryns make their appearance no earlier than LH IIIC early and continue to be present until LH IIIC late. It is interesting to note that a fragment with a less evolved morphology, presenting a slight carination and a rectilinear wall (Fig. 3.16:8),[30] was discovered in an early context along with the above-mentioned axe handle. The latter belongs stylistically to a form which is nearly exclusive to the initial phase of the Italian RB (RB1) and which is particularly well documented in the Marche and Romagna regions (Damiani 1991, fig. 10:A2 and B1; Cocchi Genick 2004a, 40, fig. 7:1-13; Baldelli *et al.* 2005, fig. 10B:14, 20; Damiani 2010, 397-400, fig. 65:D1A-B). The carinated cups and bowls found in later levels of LH IIIC are all characterised by sharp carination and concave necks and bodies. These traits seem increasingly widespread in a later period of the RB (RB2) up until the beginning of the FB. Jung has observed that some examples of this shape present in LH IIIC late layers seem to support a chronological overlap between this phase and the beginning of the Italian FB (Kilian 2007, Taf. 24:303, 305; Jung 2006, 185-187, Taf. 8:1-5). If this hypothesis is correct, it would seem that carinated pottery forms in this region underwent a stylistic development parallel to that which was also underway in the Italian peninsula.

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[28] A similar *situla* of the same type is known at Chania in the LM IIIC levels (Hallager, Hallager 2000, tab. 51:80-P0232/0234).

[29] Bettelli 2002, 126 with bibliography. See also some examples from Rocavecchia (Pagliara *et al.* 2007, figs. 11:III.36; 13:IV.32-33).

[30] Kilian 2007, 108, tab. 24:310; Bettelli 2009, fig. 8:1. Cfr. for examples profiles of carinated bowls from the RB1 settlement of Vaccina (52), as well as those of cups and carinated bowls datable to the same period in the Middle Adriatic area (Damiani 1991, fig. 13:14-16; Baldelli *et al.* 2005, fig. 10B:4-6).

It is important to highlight the presence of typological and stylistic characteristics in the Aegean region in LH IIIC early contexts which in Italy belongs to RB1. This dating also seems to find confirmation via several comparisons encountered among types of Grey ware found in the Plain of Sybaris and at Dimini, as we will see below.

Another object which has come to light from a LH IIIC early level is a carinated cup with a marked carination and a curved wall with an attachment for a probable vertical raised strap handle (Fig. 3.16:6) (Kilian 2007, 107, Taf. 24:309). This vessel is of the same shape as a type which is common in both *impasto* and Grey ware in the Adriatic and Ionian coastal areas of the Italian peninsula during the RB2;[31] it is also similar to the above mentioned HBW cup from Kastrokephala (Kanta, Kontopodi 2011, fig. 8:g)[32] dated to the LM IIIC early. As we have mentioned above, the types of carinated cups with high-swung strap handles are usually dated to RB2 in Italy. Their presence in LM IIIB2 levels at Chania and in the LH IIIC early at Tiryns could suggest a partial synchronism between these two phases. In this regard, however, we must consider the presence of a similar cup in the LM IIIC early settlement of Kastrokephala and also the close similarity with that from Tiryns. Both are different from the Chaniot examples and belong to Italian types which are more 'developed' and possibly a little later in date.

At Tiryns, Kilian also identified a large group of wheel-made Grey ware sherds. It is thanks to the analyses of this scholar that both a definition and a classification of the characteristics of this ware in the Late Bronze Age Aegean was made possible for the first time (Kilian 1988). We owe the nearly complete publication and archeological classification of this material to C. Belardelli (1999, fig. 3), who correctly put these finds in relation to similar and coeval productions of the Italian peninsula. In this chapter we will not add much to the observations and comments previously made (Bettelli 1999, 2002, 117-137), although a summary of a few outstanding aspects will prove useful.

As mentioned above, the first appearance at Tiryns of this pottery class dates to the end of LH IIIB. Belardelli notes that the forms in question belong exclusively to the Aegean repertoire in this initial phase. In the following period, instead, open carinated forms similar to Italian examples of the same type begin to appear in conjunction with analogous productions of HBW. In contrast to Dimini, where pottery in general is in a much better state of preservation, high-slung strap handles are not seen at Tiryns except in the case of the already mentioned carinated *impasto* cup (Fig. 3.16:6). More generally, the formal repertoire of the Grey ware from Tiryns, although presenting some important sylistic links to Grey ware production of the Italian peninsula, seems to maintain a strong Aegean imprint in all phases, especially if comparisons are made with the pottery unearthed at Dimini. This observation does not rule out the fact that typically Aegean forms are widely represented in the repertoire of Grey ware discovered and produced on the Italian peninsula as well (Belardelli 1994; Bettelli 2002, 198-233). This fact confirms the high level of interaction and exchange of pottery shapes, technologies, and craftsmen between the Italian and Aegean regions in this period.

Dimini

To the east of Dimini's Neolithic settlement are the remains of a Mycenaean urban settlement which have been under investigation since 1977. According to Vasiliki Adrymi-Sismani, who has carried out the excavation and the interpretation of the results (Adrymi-Sismani 2004-2005, 2006, 2006a), the Late Bronze Age settlement was founded in the 15th century BC and reached its apex during the 14th and 13th centuries BC. In this period the settlement became an important palatial-type political

[31] More precisely it can be included in the *con ampia gola* type as defined by I. Damiani (2004, fig. 3A); Sabbatini, Silvestrini 2005, fig. 2:2, 3; Pagliara *et al.* 2008, fig. 12:IV.9. For a general study of the shape see Baldelli *et al.* 2005, fig. 11:16, 18-20.

[32] This pot from Tiryns also finds convincing comparisons with some Grey ware cups from Dimini, as we will see shortly.

and administrative center. Like many other Mycenaean sites, Dimini was destroyed at the end of LH IIIB2, although the life of its community continued until the beginning of LH IIIC, with significant changes to its socio-economic organization and likely also its political organization. Herein lies a noteworthy difference between Dimini and the most important centres of the Peloponnese, such as Mycenae and Tiryns, which continued to be occupied throughout the entire duration of LH IIIC. In a section of the Mycenaean settlement at Dimini a palatial complex was discovered, composed of two megara (A and B) and other connected spaces, such as workshops and storerooms, all of which were organized around a central courtyard. This complex was destroyed at the end of LH IIIB and was never reconstructed as a whole. However, some renovations were carried out after the complex's destruction including the repaving of some floors, the building of new walls, and the opening of new doors, all within megaron A. These interventions do not, however, seem to have been directed towards the recovery of the original plan and function of the building. Similarly, part of megaron B as well as a few houses of the settlement continued to be used during LH IIIC early. According to Adrymi-Sismani, HBW and Grey ware at Dimini appear in the layers formed after the destruction of the palace together with Mycenaean ceramics dating to the beginning of LH IIIC. This date seems to contrast with those of the other settlements, such as Tiryns and Chania, where both pottery classes are already present at the end of LH/LM IIIB. The importance of such a discovery lies in the evident typological similarity of both the Grey and *impasto* wares with analogous Italian productions. In some instances, objects have been found which can be identified both typologically and chronologically and which have been linked to specific archeological *facies*.

HBW found at Dimini consists of the usual closed-type vessels used for food preparation/consumption and/or for storage (e.g. simple or raised band jars, a form which finds typological affinities in Italian and European contexts as well); but there are also some examples of carinated cups and bowls which are not insignificant. One in particular (Fig. 3.17:1) presents a vertical rod-shaped handle with a pair of small horns on top (Adrymi-Sismani 2006, BE36013), a type characteristic of a late phase of the Adriatic and Ionian RB. The peculiar cylindrical shapes of the vessel's horns recall certain examples found in Apulia, Calabria and Campania such as those already mentioned from Rocavecchia (see above) (Fig. 3.17:2-4).[33] A second specimen consists of a carinated bowl with a wide horizontal rim on which a symmetrically arranged pair of semicircular lugs are set vertically (Adrymi-Sismani 2006a, fig. 22:BE35998). The same feature is found both on a similarly shaped bowl from the terramara of Santa Rosa di Poviglio (Parma) dated to RB2 (*Le Terramare*, fig. 185:3; Bianchi 2004a) (Fig. 3.17:5-6), as well as on several bowls from the RB2 settlement of Afragola (Naples).[34]

Also worth mentioning are two other examples which are almost entirely restored and which present different, problematic features. The first is an amphora with four small vertical strap handles on its neck which finds precise parallels with jar shapes present in the so-called 'layer a, middle levels' of Porto Perone. This amphora type is not, however, very common in the *impasto* ware of the Italian peninsula during the RB (Adrymi-Sismani 2006a, fig. 25.11; Lo Porto 1963, fig. 16:3).[35] The second, more ambiguous example, is a bowl with an inverted rim decorated with shallow diagonal grooves set in such a way to form an angular pattern, and with a row of small dots on the lip (Adrymi-Sismani 2006, BE 2969; Jung 2006, 36). Bowls with inverted rims are well-documented on the Italian peninsula

[33] Ingravallo 1995, tab. LXXXVI:3; Muntoni 1995, tab. XXX:3; Boccuccia, Recchia 1998, fig. 58; Gorgoglione 2002a, figs. 28:4, 36:7; Cocchi Genick 2004, 47, fig. 10:11; Damiani 2004, fig. 2; Aisa, Tucci 2004, fig. 2:1, 4; Jung 2006, 202-203; Pagliara *et al.* 2007, fig. 9:II.8, 10:III.9; Pagliara *et al.* 2008, figs. 11:3-4, 13A:16).

[34] Unpublished ceramics under study by the present author.

[35] R. Jung links this fragment to examples from the FB cemetery at Timmari and from a Sicilian burial of the *facies* Pantalica north (Jung 2006, 35-36, no. 210-211). However, it seems that the comparison suggested above is more coherent and compelling for the HBW finds from Dimini given their chronology and archaeological *facies*.

in advanced RB contexts (Cocchi Genick 2004, fig. 6:9-19; Baldelli *et al.* 2005, fig. 11:3-4; Damiani 2010, tab. 10-12A), while decorations of the type described appear more frequently during the FB. R. Jung correctly compares the piece from Dimini with examples from Marche dating to the end of the FB (Peroni 2005, fig. 6A:7; Mambelli *et al.* 2005, fig. 1:25-26). It would, however, be risky to propose a correlation between the two contexts based on Jung's comparison alone: the chronology put forward for the levels containing HBW at Dimini and that proposed for the above-mentioned Italian vessels are quite far apart. For the moment it would be preferable to take into consideration the unarguable similarity of this HBW vessel from Dimini and the Italian examples of 'protovillanovan' taste. We must bear in mind, however, that the taste for grooved or relief decorations makes its first appearance on the Italian peninsula in a late phase of RB (RB2), particularly in the Adriatic and Ionian regions (Bettelli 2008, 26-29).[36] A collared cup from the terramara of Vicofertile (Parma), datable to the RB2, has a similar decoration (Damiani 2010, tab. 66:3) (Fig. 3.18:5).

Other, more general comparisons with the Italian peninsula can be seen in one or two vessels decorated with impressed raised bands, and with a small cup that has a rounded body and a vertical rod-shaped handle.[37]

A few Grey ware vases have been found, often mixed with HBW vessels, in the levels of the settlement that were reoccupied after the destruction of the site's two megara (Adrymi-Sismani 2006a, 471, fig. 25.5). These finds consist of tableware of primarily open forms, although closed specimens are not entirely absent. It is interesting to note that, here at Dimini as in Italian contexts, the majority of open vessels are carinated cups and bowls. This characteristic is more evident at Dimini than at Chania or Tiryns. The larger-sized examples have high-slung strap handles whereas the smaller ones, based on the available documentation, seem to have vertical rod-shaped handles. These typological characteristics correspond exactly to those found in the cups and bowls common on the Italian peninsula during RB2 (Fig. 3.17:10-11).

Another point of convergence is the variability in the sizes of the ceramics found. Although in this case it would be risky to speak of table sets, as Maria Antonietta Castagna proposed in the case of Broglio di Trebisacce (Castagna 2002, 2004), it cannot be denied that in this Thessalian context there is a certain correspondence between types of vessels and their sizes (Fig. 3.7). Unfortunately, given the current state of knowledge, it is not yet clear at which level the different vessels are found in relation with each other. A noteworthy stylistic divergence from Italian types is the frequent occurrence at Dimini of ring-based vessels which are more consistent with local ceramic traditions. Grey ware carinated cups and bowls produced in Italy are almost all characterised by flat bases in line with the local Italian *impasto* tradition. One exception is a ring-based example unearthed in the RB1 levels at Torre Mordillo.[38] Dimini is not devoid of flat-based specimens, however, in the form of a few small carinated cups and bowls (Adrymi-Sismani 2004-2005, fig. 21:BE35895, BE35894). Such examples in fact make the hypothesis of an Italian influence on this particular pottery production even more compelling.

Even the sole wheel-made Grey ware closed vessel published from Dimini can be linked to types of necked jars common especially in the Plain of Sybaris and made of the same fabric. In fact, while

[36] A bowl with an inverted rim decorated with a continuous series of horizontal grooves from the 'layer a, middle levels' of Porto Perone could be more pertinent to the RB (Lo Porto 1963, fig. 17:3). Other examples of groove-decorated pottery from the Terramare area can be dated to the same period (Mutti 1993, fig. 20:2).

[37] Adrymi-Sismani 2006, BE 36082, BE 36083, BE 35896; Bettelli 2002, fig. 55:9-10. This same type of vessel has also been found at Lefkandi-Xeropolis in the destruction levels of phase 1B (Popham *et al.* 2006, fig. 2.42:2, tab. 26:4). The handle of the cup BE 35896 has been restored and thus the comparison is based on the reliability of the reconstruction. If the cup has been restored reliably it would be comparable to other types of both *impasto* and Grey ware from Adriatic and Ionian Italy (Damiani 2004, fig. 5; Damiani 2010, tab. 17B, 18A:1-5).

[38] Damiani 2001, fig. 86B:16; Jung 2006, 49, Taf. 7:6.

Adrymi-Sismani (2006a, fig. 25.7) ascribes this vessel to FS 58, some of its characteristics, such as the shape of the rim, neck and belly, deviate from the truly Mycenaean form, and instead find close comparisons with types of *impasto* and Grey ware necked jars of RB peninsular Italy (Bettelli 2002, fig. 49, 2008, fig. 4) (Fig. 3.17:7-9). Vessels of the sort, and especially those crafted in wheel-made Grey ware, are objects of a certain prestige in protohistoric Italy. Castagna, regarding the 'central house' of Broglio di Trebisacce, proposes that, among the site's identifiable table sets, the necked jars in Grey ware may have served as containers for beverages used during collective ceremonies that took place in this important dwelling (Fig. 3.7). Moreover, they may have formed a consistent set along with a few carinated cups of different sizes (Castagna 2002, 2004). It is interesting to note that, at Dimini, the Grey ware necked jar was found together with a carinated cup made of the same fabric. Among the wheel-made Grey ware of Dimini there is at least one example of a truly Aegean typology, as already reported by the excavator (Adrymi-Sismani 2004-2005, 29, fig. 21:BE 35740). This is a FS 294 basin, a type which has also been found in Grey ware in southeastern Italy (Belardelli 1994, fig. 97:4; Gorgoglione 2002b, fig. 2:1).

Despite some differing stylistic features that characterise the two areas, we can affirm a nearly complete overlap of the wheel-made Grey ware found at Dimini with forms common in the south-eastern zone of the Italian peninsula, namely the Plain of Sybaris. This observation contrasts with the situation at Chania, where, apart from some general technological analogies, no systematic and clear typological comparisons are detectable. It is also interesting to point out that wheel-made Grey ware and HBW have also been found at the nearby settlement of Volos-Palia/Kastro, where life continued even after the abandonment of Dimini (Adrymi-Sismani 2006a, 471). Regarding the HBW present at the site, an example recently published by R. Jung offers an interesting starting point for discussion (Jung 2006, 36-37, Taf. 17:7). The example in question is a cup with a rounded body and a distinct, wide, everted rim (Fig. 3.18:1). This type is comparable to one which is both widespread and common in an advanced phase of the RB in both the Terramare[39] and Marche areas (Sabbatini, Silvestrini 2005, fig. 2.5; Damiani 2010, *famiglie tipologiche* 35-36, tab. 65-70A), as well as in southern areas on the Adriatic coast (Pagliara *et al.* 2007, fig. 9:II.2, 2008, fig. 13C:28) and some sites in Campania where the material culture seems strongly linked to northern Adriatic contexts (Laforgia *et al.* 2007, fig. 1:4; Bettelli 2008; Cardarelli 2009; Bettelli *et al.* in press) (Fig. 3.18:2-5, 7-9). The decoration of this cup (horizontal and oblique grooves, and dots) recalls a style which, in terms of both the typology of patterns and the techniques of execution, was frequently used in the same period and in those same regions just cited.[40] At Lefkandi-Xeropolis a similar cup was found as part of a small group of HBW vessels that dates to phase 1a of the settlement (Popham *et al.* 2006, tab. 49:1; Bettelli 2008, fig. 6:6) (Fig. 3.18:6).

3.3. Final remarks

Marco Bettelli, Lucia Alberti

In comparison to past decades we now have a clearer timeline in which to place the development of relations between the Aegean and the Central Mediterranean in the Late Bronze Age. According to the data reviewed in this study, it is possible to propose a synchronism between MB1 and LH I, as well as MB2 and LH II, primarily on the basis of the associations of the Aegean pottery found in the Protoapennine strata of Vivara and Rocavecchia, and of Capo Graziano 2 in the Aeolian Islands. With regards to MB2, pottery found at Vivara (Punta d'Alaca) and Rocavecchia suggests that the end

[39] See, for example, the cups from layer III at Cavazzoli; Case Cocconi and Borgo Panigale (*Le Terramare*, figs. 194:III; 198:11; 202:3).

[40] Mutti 1993, figs. 75:10, 81:8, 99:6; Lo Porto 2004, fig. 3:2; Damiani 2004, fig. 4B:3; Pagliara *et al.* 2007, figs. 9:II.13, 10:3.21; Pagliara *et al.* 2008, figs. 11:7-8, 12:12; Bettelli 2008, fig. 5; Cardarelli 2009.

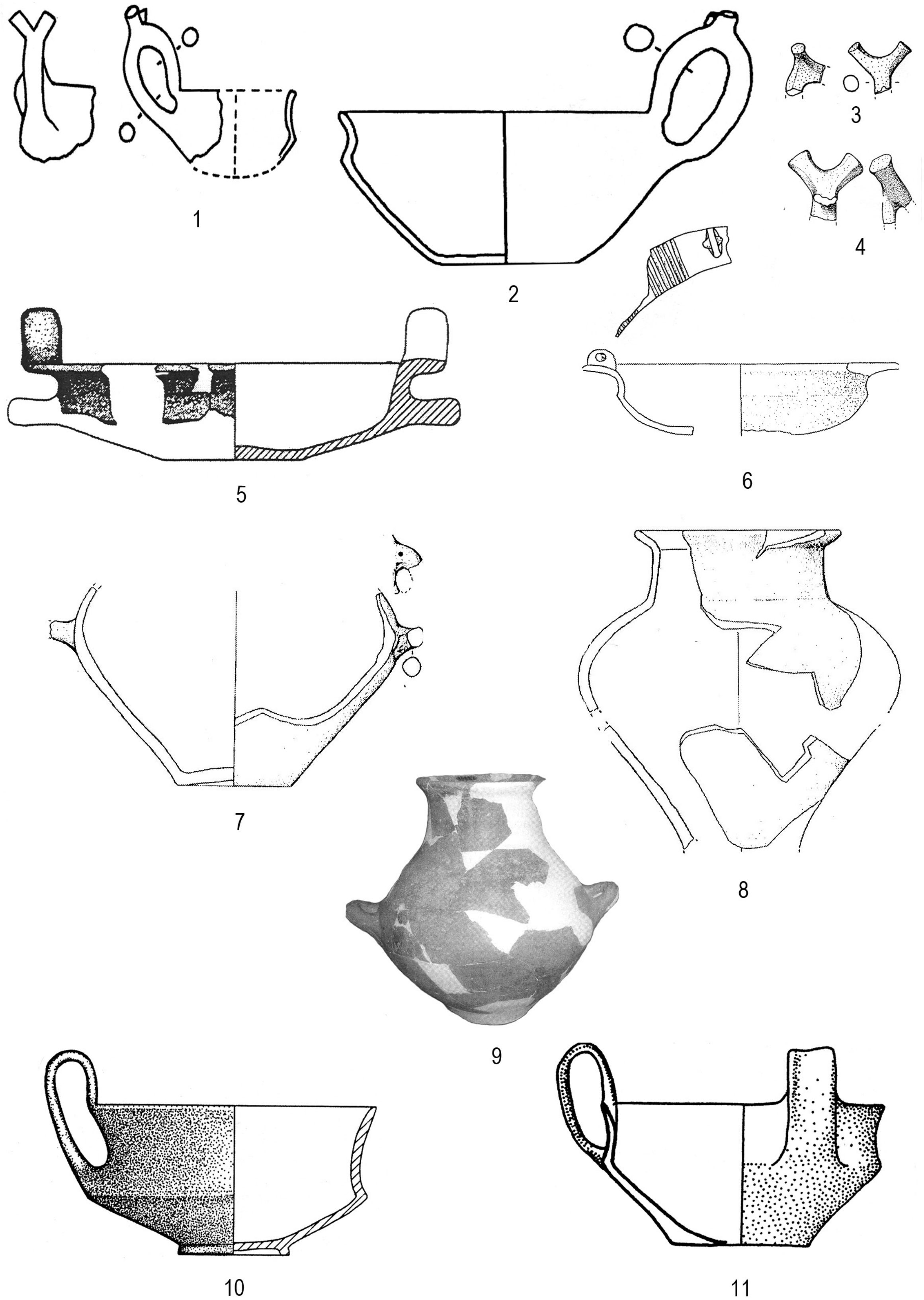

Fig. 3.17. HBW from Dimini (1, 5) (after Adrymi-Sismani 2004-2005, fig. 22:BE35998, 2006); *impasto* ware from Motta di Cirò (2); Madonna del Petto (3); Coppa Nevigata (4); S. Rosa di Poviglio (6) (after Aisa, Tucci 2004, fig. 2:1; Muntoni 1995, tav. XXX:3; Boccuccia, Recchia 1998, fig. 58; *Le Terramare*, fig. 185:3); Grey ware from Broglio di Trebisacce (7-8, 11); Dimini (9-10) (after Castagna 2002, figs. 104:33, 105:35; Damiani 2004, fig. 3A:1; Adrymi-Sismani 2006, figs. 25.5, 25.7). (1 not to scale, 2-4, 10, 11 1:4, 5-9 1:6).

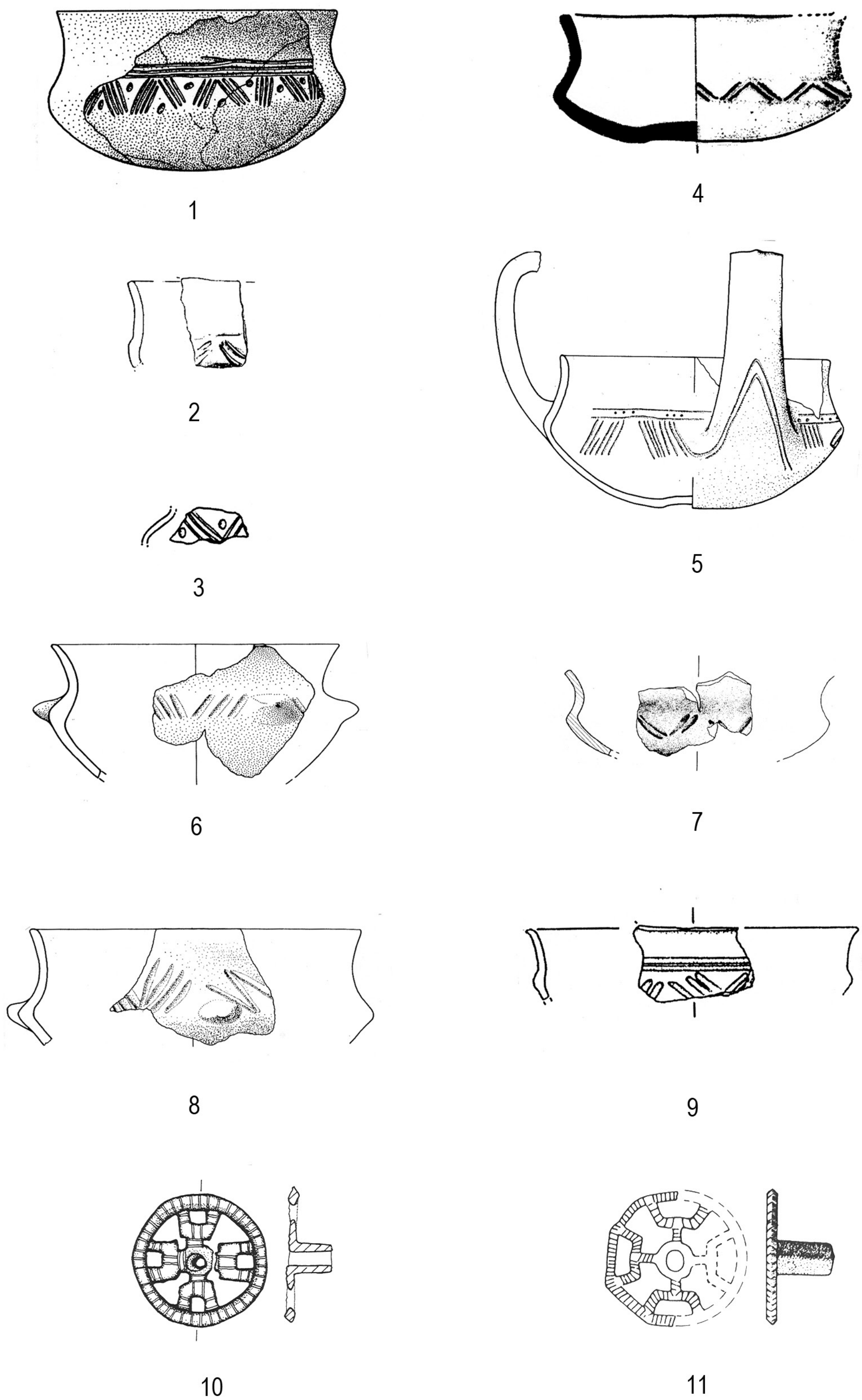

Fig. 3.18. HBW from Volos - Palia/Kastro (1) (after Jung 2006, Taf. 17:7); *impasto* ware from Afragola (2); Gricignano (3); Canosa – Pozzillo (4); Vicofertile (5) (after Bettelli 2008, figs. 5:15, 6:4; Lo Porto 2004, fig. 3:2; Mutti 1993, fig. 75:10); HBW from Lefkandi (6) (after Bettelli 2008, fig. 6:6); *impasto* ware from Rocavecchia (7), Quingento di San Prospero (8), Moscosi di Cingoli (9) (after Pagliara *et al.* 2008, fig. 12:12; Mutti 1993, fig. 99:6; Sabbatini, Silvestrini 2005, fig. 2:6); metal headpins from Dimini (10) and Porto Perone (11) (after Adrymi-Sismani 2004-2005, fig. 10; Müller-Karpe 1980, Taf. 271:E7). (1 not to scale, 4-9 1:4, 10-11 1:2).

of this phase had occurred around the beginning of LH IIIA. Evidence from the Aeolian Islands and Rocavecchia confirms the synchronism between MB3 and LH IIIA.

According to a new interpretation by Damiani (2010), the stratigraphy of Broglio di Trebisacce shows a chronological parallel between RB1 and LH IIIB. Damiani's research also calls into question the theory posited by Jung (2005, 2006) which suggests a possible duration of RB1 into the beginning of LH IIIC. Instead, Damiani dates the stratum containing early LH IIIC materials to RB2; as per Jung's research, this stratum had previously been considered part of the site's RB1 level. On the other hand, as we have already illustrated, some types of HBW pottery which, in Italy, are dated to RB1, can be found at Tiryns in LH IIIC early contexts. Thus, an at least partial parallel between the two phases, as proposed by Jung (2005, 2006) may still be possible, although such a hypothesis would need to be validated with further data.

RB2 runs parallel to LH IIIC from its early to advanced phase, as testified by a great deal of evidence from Broglio di Trebisacce and Torre Mordillo in the Plain of Sybaris, and from Rocavecchia in Apulia. The stratigraphy of Rocavecchia and Santa Maria di Leuca (near Lecce), as well as some evidence from Torre Mordillo, show the synchronism between the advanced and late stages of LH IIIC and the early stages of FB in Italy (FB1-2). It is also possible that the mature phase of FB (FB2) extended into the Submycenaean period.

It is also important to stress the use of HBW in LH and LM contexts in order to show the possible shift between the last stages of the LH and LM phases, as has been suggested by some scholars (Hallager 2007, 196, tab. 1; Jung 2006, 181-185). For instance, at Chania, HBW pottery linked to RB2 Italian types is attested in LM IIIB2 contexts. In the Argolid (Tiryns), the same types of pottery are present in LH IIIC early layers.

CHAPTER 4

CHARACTERISATION AND PROVENANCE

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(with contributions by M. Bettelli, P.M. Day, Y. Goren, D. Pantano, J.A. Riley, M. Sonnino, J.Ll. Williams)

This chapter has six main sections. Part 1 is introductory, beginning with a statement about analytical techniques, data treatment and presentation, sampling strategy and other relevant issues; this is followed by Part 2 which outlines the geological environment and includes remarks on raw materials. Part 3 sets out the project's archaeometric results, arranged as in Chapter 2 according to site and region. The identifications of imports to Italy and regional Italo-Mycenaean productions are established in Parts 4 and 5, leaving Part 6 to give an archaeological overview of the results together with illustrations of the sampled sherds/pots.

4.1. Analyses: methods and procedures

As explained in Chapter 1, the project incorporated from its earliest stages chemical characterisation with the principal task of defining whether the decorated Aegean-type pottery and other classes of Aegean-influenced pottery found in Italy was imported or locally made. The corresponding purpose of petrographic analysis has been directed more towards defining the raw materials employed in the production of the coarser fabrics, such as the *dolia* and *impasto*, and where possible establishing their provenance. Other science-based techniques were drawn into the project for specific and more limited purposes. This section introduces the relevant methods and procedures, leaving the technical detail to the Appendix.

4.1.1. Chemical analysis

Practical circumstances dictated that no less than three techniques of analysis have been adopted during the course of the project. This is an unusual situation, and yet the changes of technique have generally coincided with corresponding changes in the priorities of the individual phases of the project. Table 4.1 gives a summary of the procedures used, and the Appendix outlines the full technical detail.

Atomic absorption spectrometry (AAS)

Atomic absorption spectrometry (AAS) was adopted in the first phase of the project (from 1986 to 1991) because the information required from the chemical data was to be primarily interpreted in terms of origin. The prognosis for the selection of AAS appeared good: the Fitch Laboratory in the British School of Archaeology at Athens, where the analyses were carried out, had a chemical data bank of more than a thousand relevant comparative compositions as well as considerable experience of working with Mycenaean and Minoan fine and coarse wares (Jones 1986a, Chapters 3, 6, 7; Haskell *et al.* 2011, Chapters 3 and 4), and it was known from previous work that the suite of eleven elements measured by AAS (Si, Al, Ca, Mg, Fe, Ti, Na, K, Mn, Cr, Ni oxides) was sufficient to discriminate many south and central Italian clays from those of central and southern Greece and the Aegean Islands. Furthermore, meaningful numbers of samples from a geographical range of sites in Italy were available for analysis, and the issue of cost effectiveness was also important. It was recognised that the AAS data bank would be exploited to advantage for its extensive coverage of the Aegean.

Instrumental Neutron Activation Analysis (INAA)

Instrumental Neutron Activation Analysis (INAA) was adopted in the second stage from 1993 to 1998, following RJ's move from Athens to Scotland in 1992, for two reasons: INAA was already established as the technique of choice for the determination of pottery provenance in the Aegean (see below), and the Scottish Universities Research & Reactor Centre (now the Scottish Universities Environmental Research Centre, SUERC) at East Kilbride offered the opportunity to carry out on-site irradiation and gamma-ray spectroscopy; furthermore, it already had experience in ceramic analysis (see Table 4.1). With the demise of that centre's reactor in 1995 subsequent irradiations were done at Imperial College London's reactor at Ascot with gamma-ray spectroscopy continuing at SUERC.

With the closure during the late 1990s of many of the irradiation facilities in the UK, as elsewhere in Europe, the project had to review its options again. The choice this time lay between X-ray fluorescence (XRF) (which a majority of laboratories in Italy engaged in archaeometric work were

	Technique (and date)	Location	Procedure and Standards	Number of samples analysed
Chemical Analysis	AAS (1986-1991)	Fitch Laboratory, British School at Athens	11 element oxides. Lithium metaborate fusion method of sample dissolution; Lefkandi Brick (see Appendix); Knossos and Mycenae standards (Jones 1986a)	451, of which *c.* 300 were Aegean or Italo-Mycenaean
	INAA (1993-1998)	1. Scottish Universities Research & Reactor Centre 2. Imperial College, University of London reactor at Silwood Park, Ascot	17 elements. See Appendix; Podmore; Edinburgh Standard Clay (Topping and Mackenzie 1988); Lefkandi Brick	376, of which 78 were Aegean or Italo-Mycenaean
	ICP-ES (2000-present)	Department of Earth Sciences, Royal Holloway College, University of London	30 elements. See Appendix; Edinburgh Clay and British Museum Pottery Standard	*c.* 400, of which 168 were Aegean or Italo-Mycenaean
Data Treatment	AAS, INAA, ICP-ES		1.Univariate and bivariate plots 2.Multivariate (SPSS v. 15-19; earlier work with SYSTAT X and Minitab 11): principal components analysis supplemented occasionally by cluster analysis for classification of individual sample compositions; discriminant analysis for comparison of individual composition groups	

Table 4.1. Chemical analysis: techniques and procedures.

using at the time) and **inductively-coupled plasma emission spectroscopy** (ICP-ES). The latter technique, which the project has used since 2000, was selected for several reasons: multi-element capability, good performance characteristics, cost factors and critically the availability in Britain of a national (Natural Environment Research Council-hosted) facility based at Royal Holloway College, University of London, and the long experience that facility has had of analysis of archaeological materials (Thompson, Walsh 2003; Pollard *et al.* 2007, 47-69). Furthermore, the project's increasing emphasis on origin *and* technology enquiry, demanding a broad chemical characterisation, enhances the attraction of the combination of major, minor and trace element measurements (thirty elements in all) that ICP-ES can provide.

Standards

These are given in Table 4.1.

Treatment of chemical data

The data sets from the three techniques of chemical analysis were treated independently of each other, employing conventional procedures. For data sets of twenty or more samples from a given site (such as Broglio di Trebisacce) or area (such as the Taranto area, the Plain of Sybaris or the Po Valley) the first aim was to look for structure within the data, and this was commonly achieved with bi-variate or tri-variate plots (Mg-Cr-Ca oxide). In most of these plots, the scales of the vertical and horizontal have been arranged to encompass only the sample points; in other words, the axes do not meet at the origin.

The subsequent multivariate treatment, usually principal components analysis (PCA, termed Factor Analysis in SPSS) (and less frequently average link cluster analysis) was carried out on the full data set except (a) in those cases where there were missing values of individual elements and (b) the P, Ba, Li and Pb contents in ICP-ES data sets. The element contents were either in natural form or more frequently log transformed (as indicated in the figure caption). More specifically, PCA looked for potential groupings among samples and for outliers, as well as identifying which combination of elements was responsible for that structure. The results of this operation are presented here in the form of plots of, usually, the first two principal components (PC1 and PC2, but sometimes the first and third components, PC1 and PC3). Useful though these plots are, many of them suffer from the disadvantage of only accounting for about half the total variance in composition, thereby giving only a partial picture. In any case, apparent groupings observed in the PC plot were sometimes compared with the main clusters in the dendrogram obtained (on standardised data) from (average link) cluster analysis. PCA consistently identified those elements, such as Mg, Cr, Co, Ni and certain lanthanides, that were separating Aegean imports from local Italian products, and it was also consistently separating the calcareous from the non-calcareous (*impasto*) wares. For these reasons frequent reference is made in this chapter to bi-variate plots (Mg-Cr oxide, Mg-Ca oxide) that are best able to demonstrate these distinctions in a visually simple manner.

In a few instances it proved desirable to compare *group* compositions for a given pottery class found at different sites or regions; discriminant analysis (DA) was used here to establish how well or otherwise these *groups* could be distinguished from each other. DA plots of the first two (or sometimes first and third) discriminant functions were prepared. DA was conducted with the stepwise method using the Wilk's lambda statistic.

In sum, PCA gives a fair representation of the relationship between individual *samples* without any preconceptions/bias as to which site or group they belong, while DA is more structured and discriminates between pre-established *groups*. The scatter of samples within each group in a DA plot reflects the group's relative uniformity; a uniform set of compositions will appear in the DA plot as a 'tight' group.

Before summarising how each data set was treated, a general statement about origin (or provenance) determination can be made here. In the process of comparing the chemical compositions of individual samples with available reference data, an association or match can usually be found, albeit of varying quality. The next step is, of course, to give spatial significance to that association, but this may not be straightforward for several reasons. For a start, the composition characteristics of a reference group may not be unique to a given site or region; furthermore they need not be solely a function of origin but may reflect technological factors or human aspects of raw material choice and manipulation (Haskell *et al*. 2011, 26). Negative statements about origin are always easier to make than positive statements especially when dealing with a site that has yielded only a single or small number of samples for analysis, as is often the case in the present study. Taking these issues together calls for caution in assigning origin, and, in recognition of that, for the purposes of this study the relevant column in the table of samples for each site is headed *Suggested origin*.

AAS

A combination of the visual-comparative and multivariate statistical methods of data treatment was used first of all to differentiate what could have been imported from the Aegean (or elsewhere) from what was produced in Italy, at its crudest a 'local' versus 'non-local' distinction. The next level, which carried no obligation to assign origin, was concerned to identify groupings or associations of samples; such samples would usually be expected to share a common origin. At the final level, if a given composition visually resembled a chronologically and typologically relevant reference group, then that composition would be consistent with an origin within the *region* which that reference group effectively represented. It was at this level that reference was made to the Fitch Laboratory's large databank. With a few exceptions it was possible to make only broad, cautious statements about origin linking a given sample or group of samples to a region; that is not the same as making a definitive assignment of origin. Much less frequent was the situation in which the locally-made pottery at individual sources, such as Rhodes and to a lesser extent West Crete, has distinctive compositions, allowing a more confident positive assignment of origin to be made; in this case it would be expected that a majority of the ten elements (silica being left aside) would lie within the one standard deviation ranges of the relevant reference group. In other instances, it was only possible either to make negative statements about origin or to establish that within a given set of samples there were two composition groups, possibly of different origin. Haskell *et al*. (2011, Chapter 4) give a full account of the Aegean AAS database. Of the elements determined by AAS, the most informative for provenance purposes are Mg and two (usually) correlated trace elements, Cr and Ni. Ca content is more relevant to technological enquiry, for instance in defining fabrics as calcareous or non-calcareous, but it is nevertheless the case that its variation carries spatial significance; for that reason Ca, whether determined by AAS or ICP-ES, contributes, but never on its own, to the assessment of origin.

In an effort to give a simple visual presentation of the AAS data in this chapter, Mg-Cr and Mg-Ca oxide plots have been prepared in which the compositions of suspected Aegean imports are compared with those of pottery selected on macroscopic grounds to be products made respectively at Mycenae, Knossos, Thebes and Chania (Fig. 4.1). Following review of these plots and removal of anomalous samples, such as one with high Mg at Chania, the composition characteristics of these reference groups are given in Database 1.

INAA

The data set generated by INAA was treated as internally consistent. Having identified potential Aegean imports in the classification procedure, recourse was made to available INAA databases to establish what could be inferred about origin. From the 1980s to the present, a number of laboratories have generated substantial INAA databases on prehistoric (and later) pottery in the Aegean and neighbouring regions to the east:

- The Helmholtz Institut für Strahlen u. Kernphysik (HISKP) at Bonn University; see http://mommsen.hiskp.uni-bonn.de/data.html; http://mommsen.hiskp.uni-bonn.de/xpubl.html; Mommsen *et al.* (2002);
- The University of Manchester's Chemistry Department; see Newton (2007) and more recent references in Tomlinson *el al.* (2010);
- The Archaeometry Laboratory at the National Centre for Scientific Research 'Demokritos' in Athens; see Kilikoglou *et al.* (2007).

It was necessary at this stage to establish a level of comparability with those databases; to this end, limited programmes of inter-comparison were carried out on a standard – the Podmore clay– and duplicate pottery samples analysed at the Manchester Laboratory. The results presented in the Appendix indicate that the comparability achieved is no better than satisfactory and varies from element to element; systematic differences are noted in Ce, Sm, Yb and Th whose contents are higher in the SURRC determinations. This finding combined with the fact that two origin-sensitive elements, Cr and Co, used extensively in this study have higher than average errors associated with their measurement, carries an important implication: in considering the suspected Aegean imports, the aim has been to establish a *qualitative* rather than a statistically quantifiable level of similarity with individual reference composition groups. The suspected imports are compared individually on a simple visual basis in bivariate plots with the *mean* compositions of certain pottery groups identified by Mommsen and co-workers as characteristic of particular LBA production centres in the Aegean (Fig. 4.2; Table 4.2). The elements selected for the bi-variate plots are Cr and Co, which are well known as origin-sensitive; corresponding Cr-La plots also proved valuable in some cases. The concentration ranges of some of Mommsen *et al.* reference groups are shown in Fig. 4.2. with the full composition characteristics being given in Database 2.

Owing to the lack of major element determinations by INAA, quantitative analyses by SEM-EDAX were made in a few instances (such as at Monte Grande) to supplement the trace element data (see below).

ICP-ES

The adoption of ICP-ES raised afresh the issue of standardisation of techniques and thus the ability to access, for provenance assignment purposes, databases generated by other techniques and laboratories. There was a need to establish comparability *first* with INAA and *second* with ICP-ES used, first, in Italian laboratories, of which that at the Analytical Chemistry Department at Turin University is prominent (Mirti *et al.* 2004), and, second, at the Fitch Laboratory in Athens (Mountjoy, Ponting 2000). To this end, a collaborative programme of analysis with Bonn, Athens and Turin was set up in 2003 and completed in 2005. As reported in the Appendix, this exercise yielded results that were encouraging – good comparability between both techniques and laboratories (as also found by Hein *et al.* 2002) – yet cautionary, but not unexpected: *ICP-ES and INAA data cannot be used interchangeably in multivariate treatment*. This in turn has led to an assessment, as was also done with the corresponding AAS data, of the level of precision of the provenance assignments to the Aegean that is possible with the ICP-ES data.

Whereas Mommsen *et al.* (2002) have demonstrated that there are some regions within the Aegean that yield high-precision INAA-defined compositions which are consistent with separate fine ware pottery productions within a region – a good example being the Argolid within which the compositions at Mycenae-Berbati can be discriminated from those at Tiryns-Asine – this may not generally be the case; some composition groups, rather than being specific to a production centre, are instead more typical of a region, as in central Crete. To exploit other laboratories' databases optimally requires full comparability in terms both of elemental concentration measurements *as well as* the pottery's type, fabric and date, but sadly the latter requirement cannot always be met. Furthermore, it is well known that *individual* samples may not be representative of their parent populations with the result that the former may be less confidently matched to a reference group than can a *group* of samples. Overall, it seems more realistic to interpret the ICP-ES compositions of the Aegean imports at the *regional* rather than the site level but that the confidence with which a regional association of origin is made is not uniform; some assignments may therefore be more confidently made than others. In practice, this has meant that each composition is compared visually with the mean INAA-defined group compositions and, as with the INAA data, qualitative statements about similarity or dissimilarity with individual composition groups are made.

It remains to point out that selective use has been made of available comparative chemical data obtained in other laboratories for prehistoric and later pottery in different regions of Italy where that pottery overlaps directly with those classes of concern in this study. An example is Coppa Nevigata, for which there are data sets other than those generated by us. Although we are aware of the growing chemical database for prehistoric (and of course later) pottery in Italy, it lies outside the scope of this study to incorporate and fully assess it.

The samples analysed specifically for this study are listed in Table 4.2 and their compositions appear in Database 3.

4.1.2. Petrographic analysis

This involved examination of a thin section, usually 2x2 cm in size, under a polarising microscope. The petrographic study focused on the coarser wares, where the temper is a relevant component of the ceramic paste. In most cases this study helped both to select the samples for chemical analysis and to interpret the compositions in situations where the amount of temper seemed to have influenced the bulk chemical composition (Neff *et al.* 1988; 1989). Moreover the detailed study of the local lithology allowed an independent search of the production area for some sites.

The majority of the finer wares (comprising the Italo-Mycenaean and Aegean) have been studied petrographically in only a few cases because of the greater suitability of the chemical approach in the study of fine-textured pottery. A specific petrographic study, focusing on the differences between the various 'Mixed Italian productions' (Italo-Mycenaean, Grey, Protogeometric) is in progress for some sites (including Coppa Nevigata, Rocavecchia, Scoglio del Tonno, Broglio di Trebisacce) and will be published separately.

A significant petrographic data set of Bronze Age pottery in Italy has already been published (see Levi 2010 for a synthesis with bibliography) and will be summarised in the relevant sections of this chapter.

More than 1000 *impasto* samples are collected in a data-base -Wikipottery- specifically conceived for the technological and archaeometric description of pottery and the definition of Temper Compositional Reference Units (Levi *et al.* 2013).

The petrographic description has followed a standard format which includes the description of the clasts, matrix and voids (Whitbread 1989, 1995; Capelli, Mannoni 1996, 1998).The identification of grog is based on the criteria defined by Whitbread (1986). For some of the pottery classes (coarse ware, pithoi, *dolia*, *impasto*) a more experimental approach was taken with point counting using Digital Image Processing (DIP) with Image-Pro Plus software. Some of the results concerning samples from the Plain of Sybaris and Scoglio del Tonno are discussed elsewhere (Carò, Di Giulio 2003; Polla *et al.* 2006; Carpenito *et al.* 2009).

Some samples from the most significant sites considered in this volume (Coppa Nevigata, Rocavecchia, Scoglio del Tonno, Central Italy, Po Valley) are illustrated with photomicrographs (Plates 1-9).

The photomicrographs, which are all 10x and XPL (except for MIC from Lipari which are XPL and PPL), are arranged according to site: site code, sample number and class/ware.

Scanning electron microscopy (SEM)

SEM was employed to examine (a) the nature and composition of the painted decoration (see Chapter 5), and (b) the microstructure and composition of the fabric. Three instruments were employed at different times in the Department of Earth Sciences, University of Glasgow: (1) a Cambridge Stereoscan S360 with a Link ISIS–300 series software package for analysis and an Oxford Instruments EDS detector, Model 7060, (2) a FEI Quanta 200F environmental SEM and (3) a Zeiss Sigma field-emission analytical SEM, both with energy-dispersive X-ray analysis (EDAX). From the form of the microstructure, viewed in either back-scattered or secondary emission modes, an estimate of firing conditions could be made with reference, for example, to the results reported by Buxeda i Garrigos *et al.* (2003). Chapter 5 describes the procedure for preparing samples for technological investigation with the SEM.

X-ray diffraction (XRD)

This technique, which provides a mineralogical characterisation, was applied to pottery and clays in the Plain of Sybaris by Buxeda i Garrigos *et al.* (2003) and Lazzarini (in Jones *et al.* 1994), in both cases using the powder method. Some experiments were also conducted on raw clays, fired into briquettes at 800 and 950°C in an oxidising atmosphere at a heating rate of 200°C/hr and maintaining the peak temperature for 1 hr.

4.1.3. Sample selection

From the outset, this project focused on those sites where there were sufficient finds of decorated Aegean-type pottery to enable a careful selection to be made based on typology and chronology. The strategy was to sample as many examples as possible or were available, there being little or no sense of minimum number requirement. However at the same time, the project always recognised the importance of including those sites at which only one or two such finds occurred; here the sampling was necessarily more opportunistic. *Impasto*, contemporary with the Aegean-type, was sampled at almost all sites. Other classes, such as Grey and *dolia*, have featured in this study according to either their relative frequency of occurrence or whether the issue of specialised production of Aegean-derived pottery at a given site was considered important to investigate.

There are some instances in which the results of analysis of samples taken in the project's early stages for AAS or, later on, for INAA have proved indecisive in terms of an origin assignment; for example, at Scoglio del Tonno there are six samples whose suggested origin has a question mark. While at least a partial solution to this circumstance would entail re-analysis of the same sample by ICP-ES, this has rarely proved possible because there was usually insufficient powder remaining. Equally, resampling has not been a straightforward option because in many cases the sherds in question are small. This unfortunate situation, acknowledged as a limitation to the coherence of the whole data set, is largely attributable to the way the project has grown organically since it began in the mid-1980s.

4.1.4. Reference material

Italy

The issue of what constitutes valid reference material for the decorated Aegean-type pottery found in Italy has had to confront a basic dichotomy: on the one hand, this and other classes of wheel-made pottery dating to the local Middle and Late Bronze Age found in Italy, and on the other the indigenous pottery at that time, *impasto*, in the hand-made tradition. Much of the former pottery was made of fine-textured, calcareous clays, contrasting with the latter produced usually from a coarser, non-calcareous clay (but see Part 2 below). In the first stage of the project using AAS, the reference material was often indirect, consisting of decorated fine ware pottery from the same site or area belonging to a later (i.e. post-Bronze Age) date and which previous analysis had shown to be of calcareous composition. This approach worked well in southern Italy because of the availability of such data, for instance at Metapontum close to Termitito and in Apulia (see also Jones 1986a 351, 690; Prag *et al.* 1974). As the project progressed, the potential problem ameliorated considerably where clay prospection was deliberately carried out, notably in the Plain of Sybaris. But where such prospection was not possible, and this was the case particularly at most of the smaller sites, reliance fell on petrographic analysis to identify a likely local calcareous fabric. Two additional options were also adopted, first to include the sampling, at settlements, of clay building materials such as daub, clay ovens, clay floor and wall plaster lining. Second, as already mentioned, reference could usefully be made to the growing chemical database derived from other laboratories for pottery from the same or neighbouring sites, preferably but not necessarily of LBA date (this situation worked to advantage in the Po Valley). For the rest, there was no direct reference material apart from the 'local' *impasto* whose value was often limited in the sense that it was often composed more of a *terra rossa* soil than a clay. Its petrographic characterisation was generally much more informative than its corresponding chemical composition.

Aegean

The composition characteristics of some of the most relevant reference groups determined by AAS and INAA are given in Databases 1 and 2 respectively. Figs. 4.1a-c are intended to give a summary graphical overview of the relationship between reference groups (INAA) and between members of the reference groups (AAS and ICP-ES data).

The INAA database for the Aegean region (Hein, Kilikoglou 2012) has expanded impressively in the last fifteen years as a result of the efforts of the three laboratories mentioned above. Mommsen and his

Technique	Reference data	Database	Fig.
AAS (OES)	Group compositions assignable to Mycenae, Knossos, Thebes, Chania and Trianda (Rhodes)	1 (also includes Routsi, Kephallonia, Kommos, Maroni, Kouklia)	4.1
INAA	Group compositions assignable to Mycenae-Berbati, Achaia, Akarnania, Attica, Boeotia, Central Greece, Central and West Crete and Rhodes (published by Mommsen and co-workers)	2	4.2
ICP-ES	Full compositions for Berbati, Tiryns, Asine, Attica and Aegina	3	4.3

Table 4.2. Reference data.

co-workers at Bonn have characterised the major and minor composition groups in Late Bronze Age pottery from a large number of Mycenaean sites principally in the northern Peloponnese, Attica, Aegina and central and western Greece. They have placed considerable emphasis on establishing the origin of Mycenaean pottery found in the East Mediterranean, recent examples being at Tarsus (Mommsen *et al.* 2011) and Tell Kazel (Badre *et al.* 2005; Boileau *et al.* 2010). The southern Peloponnese and Crete (e.g. Tomlinson *et al.* 2010) have received more attention from the Manchester laboratory which together with the Bonn group has also fully assessed the large Perlman-Asaro database (Mommsen *et al.* 2000; Tomlinson 1997).

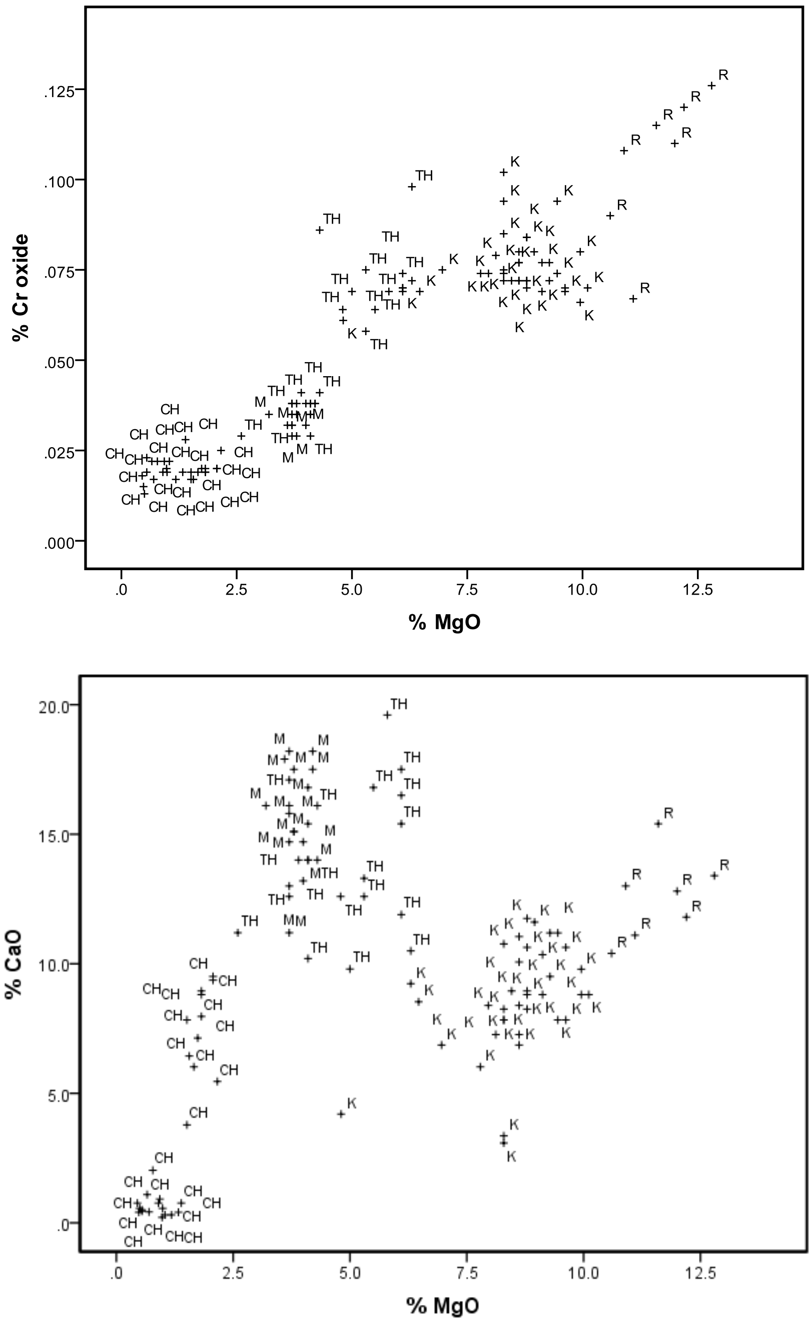


Fig. 4.1. Plots of (a) MgO-Cr oxide and (b) MgO-CaO in pottery found at Mycenae (M), Knossos (K), Thebes (TH), Rhodes (R) and Chania (CH). AAS data.

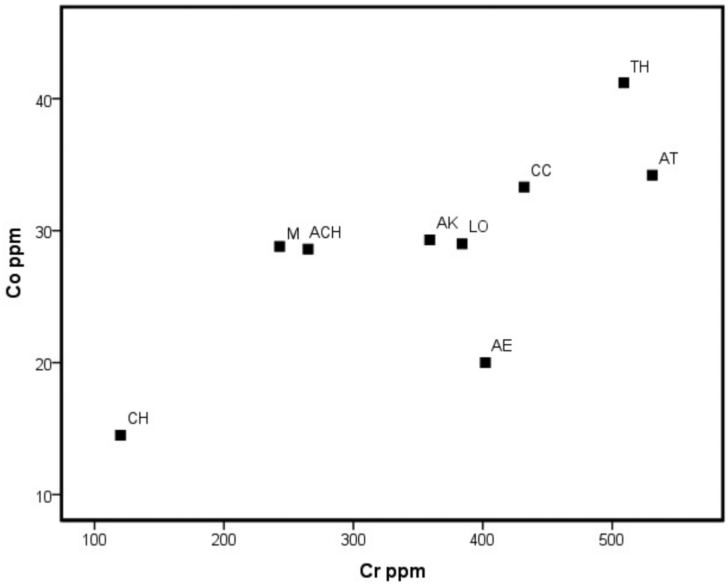
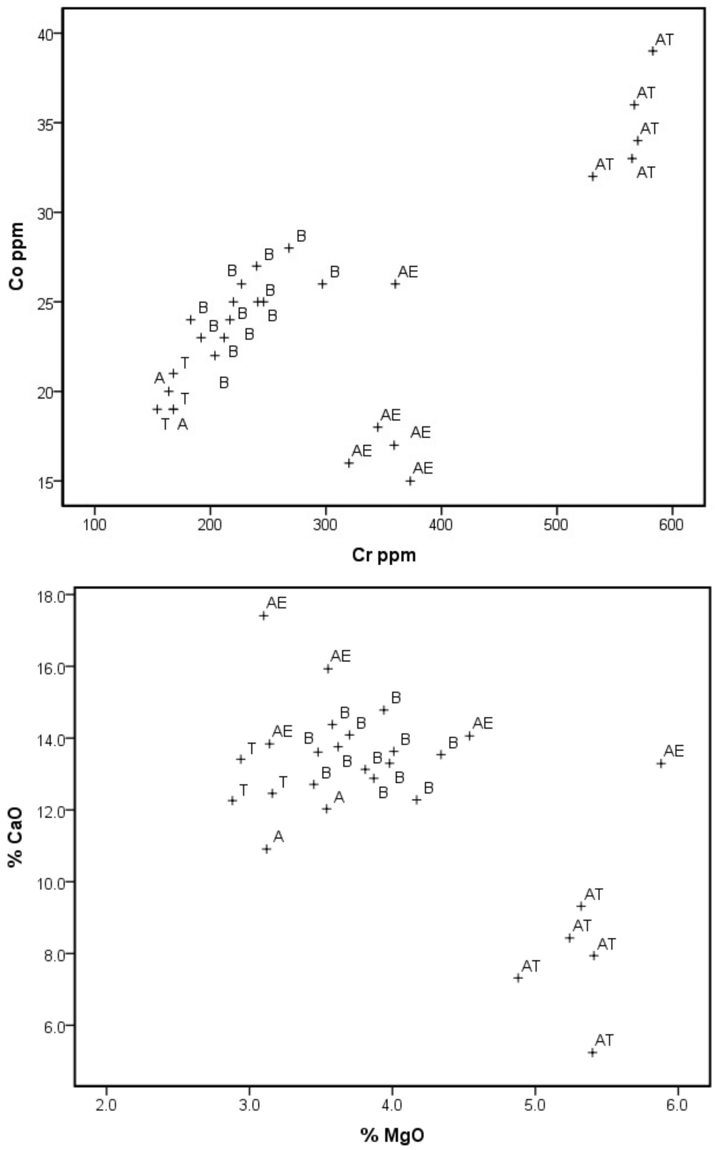


Fig. 4.2. The mean Cr and Co contents (determined by INAA) of groups of LBA pottery that can be assigned to Thebes (TH), Attica (AT), Central Crete (CC), Locris (LO), Akarnania (AK), AE (Aegina), Achaia (ACH), Mycenae-Berbati (M) and Chania (CH). Data published by Mommsen and co-workers. See Database 2 which includes the ranges of each group expressed as % root mean square deviation.



a

b

Fig. 4.3. Plots of (a) Cr-Co ppm and (b) % MgO-CaO in Late Bronze Age decorated pottery found at Berbati (B), Tiryns (T), Asine (A), Aegina (AE) and Attica (AT). ICP data.

Analysis	Decorated sherds	Whole/restored vases	Sherds belonging to other classes
Chemical	Drilling into the cross section with an electrically-driven 2 mm diameter tungsten carbide-tipped drill head, collecting up to 300 mg powder. Cross section of the sherd first cleaned of concretion or weathered surface. Sometimes possible to take more than one drilling and to 'pool' the powder.	Drilling was preferably done into the base in more than one position, again having cleaned the sampling areas. Up to 200 mg of powder collected	Break off a small fragment (*c.* 2 x 2 cm) and grind to powder.
Petrographic	Break a suitably sized (*c.* 2 x 2 cm) fragment off the sherd to prepare a standard thin section	As above	
SEM-EDAX	Small fragment not less than 1 x 1 cm		Small fragment not less than 1 x 1 cm

Table 4.3. Sampling procedure.

A few comments only are made here; first, the INAA pottery compositions in the North Peloponnese are relatively uniform (see Database 2 for some group compositions) and it is only with the aid of discriminant analysis that subtle interregional distinctions can be made (Hein *et al.* 2002, Fig. 1). The chances therefore of distinguishing a product of Achaia from one in the Argolid on the basis of chemical composition may be slim, and the same remarks also apply to the West and Central Peloponnese where Tomlinson (1997) found his chemical groups 3, 4 and 5 represented at sites in Achaea, Palaiokastro in Arcadia, Olympia-Kolosakos and Platanos-Renia in Elis and even in the Argolid. Second, the overlap in the broad composition ranges in Boeotia and Central Crete, readily apparent in the AAS data, extends but to a lesser extent to the INAA data; the same applies to distinctions within Central Crete and between this region and Attica (Fig. 4.2).

4.1.5. Sampling procedure

Where possible a small sample was retained unanalysed for reference. All samples for *chemical analysis* were then dried in an oven for four hours at 550°C prior to analysis.

4.2. Geological environment and raw materials

Sara T. Levi, Daniele Pantano, Maurizio Sonnino

We present in Fig. 4.4 the location of the sites with reference to the Geological Map of Italy (scale 1:500.000) of the *Servizio Geologico Nazionale* (1976-1983) (Figs. 4.4.1-4.4.18: graphics by Daniele Pantano). The principal units surrounding the sites are listed in the gazetteer in Chapter 2 (in a site catchment distance of approximately 10 km). Nevertheless, the scale of these maps gives only a general picture: for specific studies it is necessary to use other more detailed tools as well, of course, as a field approach with a sampling strategy of clays and rocks.

Geological maps essentially report the limits of sedimentary formations, volcanic elements and intrusive and/or metamorphic rocks, that is, they present continuous elements of equal geological significance which are generally uniform from a lithological perspective. The identification of these elements and their vertical and lateral relationships are the basis of all geological studies. The extrapolation of useful archaeological data exclusively from geological data presents a number of problems. A major problem is the exploitation of data that is measured on the km scale (for example, geological formations) and its application to the study of objects on the scale of a few mm (for example, fragments of rock present within a manufactured product). New maps based only on lithology have been experimentally designed for some areas of Italy in order to simplify this approach (Levi, Sonnino 2003, 2006; Levi 2010).

Here it is worth recalling that understanding the physical environment can help determine the relative weight of the following parameters in the choice of raw materials involved in the production process (Sillar, Tite 2000):

- technological (local raw materials; function of the pots; manufacturing techniques)
- cultural (including stylistic aspects)
- social organization of production
- circulation of raw materials, finished products, ideas and craftsmen.

With respect to Bronze Age Italian *impasto* pottery, petrographic analysis of several hundred examples has revealed some trends (Levi 2010, 193-200), for example the preference for some kinds of temper (mainly volcanic) when available, and the frequent circulation of pots with this paste composition. In sedimentary areas grog and the calcareous tempers are the standard, with a trend of diminishing use of calcite during the Bronze Age. Some choices appear to be related more to the function of the pots (such as calcite for cooking pots), others to cultural interactions (such as grog in the Aeolian Islands during MBA3). The diffusion of more calcareous clays for some wares (the so-called *figulina*: Italo-Mycenaean, *dolia*, Grey, Protogeometric and Geometric) is probably also linked to some technological changes including the desire for higher firing temperatures (Picon, Olcese 1995). The increasing standardisation in the ceramic paste during the Bronze Age runs in parallel with the standardisation in the typology of the shapes, indicating a more specialized social organization of the production towards the end of the Bronze Age (van der Leeuw, Pritchard 1984; Rice 1987, 1991).

Units of the Geological Map of Italy (scale 1:500.000):

SEDIMENTARY (white)

HOLOCENE

1. Colluvial, alluvial and fluviolacustrine deposits, modern beach sediments
2. Aeolian deposits (pleistocenic in part)
3. Terraced alluvial deposits

PLEISTOCENE

4. Colluvial, terraced alluvial, fluviolacustrine and fluvioglacial deposits
5. Travertines (locally holocenic)
6. Glacial deposits
7. Sands and conglomerates
8. Clays
9. Terrigenous–skeletal limestones

PLEISTOCENE-PLIOCENE

10. Mainly lacustrine and fluviolacustrine deposits
11. Sands and conglomerates
12. Clays
13. Terrigenous–skeletal limestones

PLIOCENE

14. Sands and conglomerates
15. Clays and marls, occasionally with olithostromes
16. Terrigenous–skeletal limestones like "panchina"

UPPER MIOCENE

17. Conglomerates, sandstones and clays, mainly lacustrine, locally inclusive of lower Pliocene
18. Sandstones (also turbiditic) and clays, in some places with evaporites and subordinately limestones, sometimes including the lower Pliocene and/or Serravallian
19. Gesso-solfifera formation

MIDDLE-LOWER MIOCENE

20. Lacustrine sandstones and conglomerates
21. Sandstones and conglomerates, sometimes turbiditic
22. Shales and marls
23. Skeletal limestones and calcarenites of neritic and shelf facies
24. Marls, often with chert, of pelagic facies
25. Marls, sometimes with chert, with detrital supplies, of slope ("transition") facies mainly turbiditic units
26. Sandstones, marls and sandstones, in some places including upper Oligocene
27. Shales
28. Limestones and marls

PALAEOGENE

29. Conglomerates and sandstones, also littoral, lagoon limestones
30. Sandstones and conglomerates
31. Limestones and calcarenites of neritic and shelf facies
32. Marls and calcareous marls of pelagic facies
33. Marls and calcareous marls, with detrital supplies, of slope ("transition") facies mainly turbiditic units, in some places including lower Miocene
34. Sandstones, sandstones and marls
35. Shales, shales and limestones
36. Limestones and marls

PALAEOGENE-UPPER CRETACEOUS

37. Limestones, sometimes skeletal, of neritic and shelf facies
38. Limestones and marly limestones, often with chert, of pelagic facies
39. Limestones and marly limestones, sometimes with chert, with detrital supplies, of slope ("transition") facies mainly turbiditic units
40. Sandstones and marls
41. Shales and limestones
42. Limestones and marls

UPPER CRETACEOUS

43. Sandstones and limestones
44. Skeletal limestones, locally dolomitic, of neritic and shelf facies

LOWER CRETACEOUS

45. Limestones and skeletal limestones of neritic and shelf facies

CRETACEOUS

46. Skeletal limestones of neritic and shelf facies (sometimes comprehensive of Jurassic)
47. Limestones and marly limestones, sometimes with chert, with detrital supplies, of slope ("transition") facies mainly turbiditic units
48. Sandstones and marls

49. Shales and calcareous shales occasionally ophiolitiferous
50. Limestones and marls

CRETACEOUS-UPPER JURASSIC

51. Limestones and skeletal limestones of neritic and shelf facies (locally inclusive of middle Jurassic)
52. Micritic limestones and clayey micritics, with chert, of pelagic facies
53. Limestones and marly limestones, locally with chert, with detrital supplies, of slope ("transition") facies
54. Shales and calcareous shales (locally with sandstones), sometimes turbiditic

JURASSIC

55. Conglomerates and breccias
56. Limestones and, subordinately, crystalline dolomites of neritic and shelf facies
57. Dolomites of neritic and shelf facies
58. Limestones, marly limestones and marls (cherty) of pelagic facies
59. Limestones and marly limestones, sometimes with chert, with detrital supplies, of slope ("transition") facies
60. Limestones, sometimes arenaceous and marls metamorphosed into carbonatic schists (marbles, phyllites, *etc.*) locally associated with radiolarites and/or ophiolites

UPPER TRIASSIC

61. Limestones and dolomitic limestones of neritic and shelf facies, locally associated with (or with levels of) evaporites
62. Crystalline dolomites of neritic and shelf facies, locally including the lower Liassic and/or the middle-lower Triassic
63. Limestones often cherty, marly limestones and marly clays of pelagic facies
64. Evaporites often with marls

UPPER-MIDDLE TRIASSIC

65. Clastic deposits, mainly conglomerates and sandstones, sometimes including Permian

MIDDLE TRIASSIC

66. Limestones of neritic and shelf facies
67. Dolomites of neritic and shelf facies
68. Limestones and marly limestones, sometimes with chert, of pelagic facies

LOWER TRIASSIC

69. Conglomerates and sandstones, sometimes including the upper Permian
70. Dolomites, limestones and sandstones, sometimes with evaporites

PERMIAN

71. Clastic deposits, locally with marls, sometimes including the Carboniferous
72. Limestones and skeletal limestones, sometimes with gypsum, of neritic to lagoon facies

LOWER PERMIAN-MIDDLE CARBONIFEROUS

73. Argillites (carbonaceous phyllites) with sandstones, pyroclastites and, sometimes, lenses of anthracite

CARBONIFEROUS

74. Sandstones, conglomerates, sometimes with lenses of anthracite
75. Limestones
76. Sandstones and clays with turbiditic characters

DEVONIAN

77. Skeletal limestones of neritic and shelf facies
78. Limestones and shales
79. Units prevailingly shaly, sometimes phyllitic

SILURIAN-ORDOVICIAN

80. Limestones including sometimes the Devonian; units prevailingly
81. Arenaceous
82. Shaly, sometimes carbonaceous

CAMBRIAN

83. Shales
84. Limestones and dolomites
85. Sandstones, claystones with carbonatic lenses

VARIOUS AGES

86. Chaotic complexes of various ages
87. Areas characterised by sedimentary sequences widely comprehensive or showing a complex layering for tectonic reasons

VOLCANIC (thick dots)

QUATERNARY-NEOGENIC CYCLE

1. Rhyolites, rhyodacites and latites (lavas, ignimbrites and pyroclastites)
2. Andesites and latiandesites (lavas and pyroclastites)
3. Phonolites, sodic trachytes and pantellerites (lavas and ignimbrites)
4. Latites, trachytes and potassic phonolites (lavas, ignimbrites and pyroclastites)
5. Alkaline and subalkaline basalts, trachybasalts, basanites, tephrites and sodic trachyandesites, andesitic basalts (lavas, hyaloclastites and pyroclastites)
6. Foidites, tephrites and phonolithic potassic tephrites (lavas, pyroclastites, ignimbrites)

MIOCENIC-PALAEOGENIC CYCLE

7. Rhyodacites, rhyolites, liparites and comendites (lavas, ignimbrites and subvolcanites)
8. Trachytes and latites (subvolcanites, lavas and pyroclastites)
9. Andesites (lavas and pyroclastites)
10. Alkaline and subalkaline basalts (mainly submarines lavas, hyaloclastites and pyroclastites)

CRETACEOUS-JURASSIC CYCLE

11. Basalts and sodic tephrites (hyaloclastites)

MIDDLE TRIASSIC CYCLE

12. Rhyodacites and rhyolites (pyroclastites, ignimbrites)
13. Latiandesites and latibasalts (submarine lavas, hyaloclastites and pyroclastites)

PERMO-CABONIFEROUS CYCLE

14. Rhyodacites and rhyolites (ignimbrites)
15. Dacites and latiandesites (lavas and pyroclastites)

PLUTONIC (sparse dots)

ALPINE CYCLE

1. Granites and granodiorites
2 .Tonalites including smaller masses of diorites
3. Syenites
4. Qartzmonzonites, monzonites, monzodiorites and monzogabbros
5. Quartzdiorites and diorites
6. Amphibolic gabbros

TRIASSIC CYCLE

7. Syenites

8. Monzonites, monzodiorites, monzogabbros including smaller masses of granites
9. Diorites

PALAEOZOIC CYCLE

10. Granites and granodiorites
11. Tonalites including smaller masses of diorites
12. Quartzdiorites and diorites including smaller masses of syenites, monzodiorites and monzogabbros
13. Gabbros

METAMORPHIC (lines)

LOW-GRADE PRE-ALPINE METAMORPHITES

14. Phyllites with albitic paragneisses, porphyroids, marbles and green schists

MIDDLE-GRADE ALPINE METAMORPHITES (LOCALLY WITH SUPERIMPOSED ALPINE METAMORPHISM*)*

15. Micaschists and paragneisses with anphibolites, phyllites, quartzites and marbles
16. Glaucophanic mica schists with eclogites

HIGH-GRADE PRE-ALPINE METAMORPHITES

17. Acid granulites and biotite – sillimanite – garnet gneisses (locally with cordierite), with marbles, amphibolites and pegmatites
18. Basic granulites, with gabbros and diorites of the Dioritic-Kinzinitic Formation

VARIOUS TENDENTIALLY HIGH GRADE PRE-ALPINE METAMORPHITES (LOCALLY WITH SUPERIMPOSED ALPINE METAMORPHISM)

19. Granitoid gneisses
20. Migmatites

OPHIOLITES AND GREEN STONES

21. Gabbros and anorthosites
22. Basalts, spilites and hyaloclastites
23. Serpentinites, serpentinoschists, cloritoschists
24. Metabasites, eclogites, anphibolites, ultrabasites and green stones
25. Peridotites

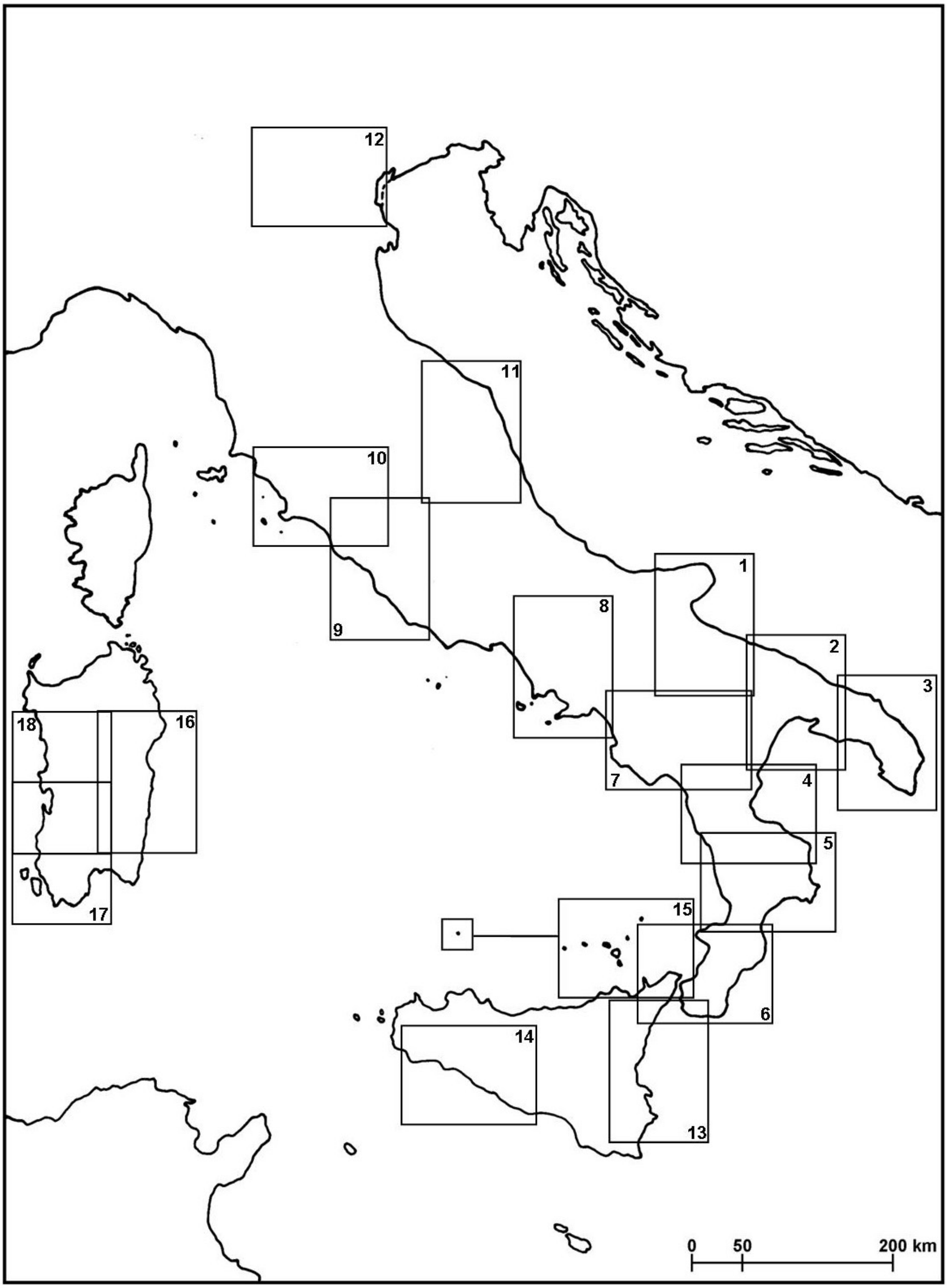


Fig. 4.4. Overview and location of the maps with the Geological Units. Site locations are marked in the single maps by large numbers as given in Chapter 2.

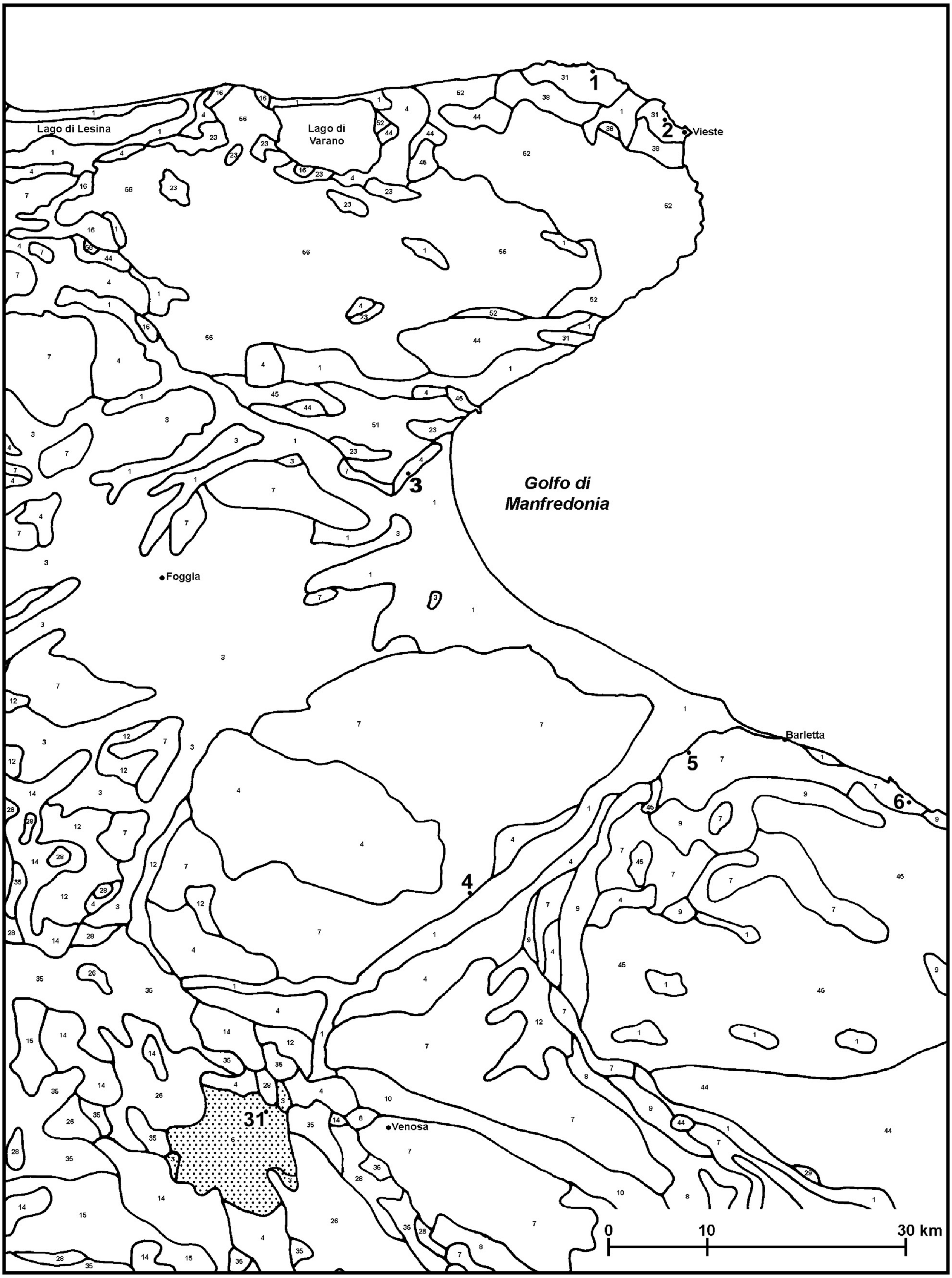


Fig. 4.4.1. Apulia map (Gargano).

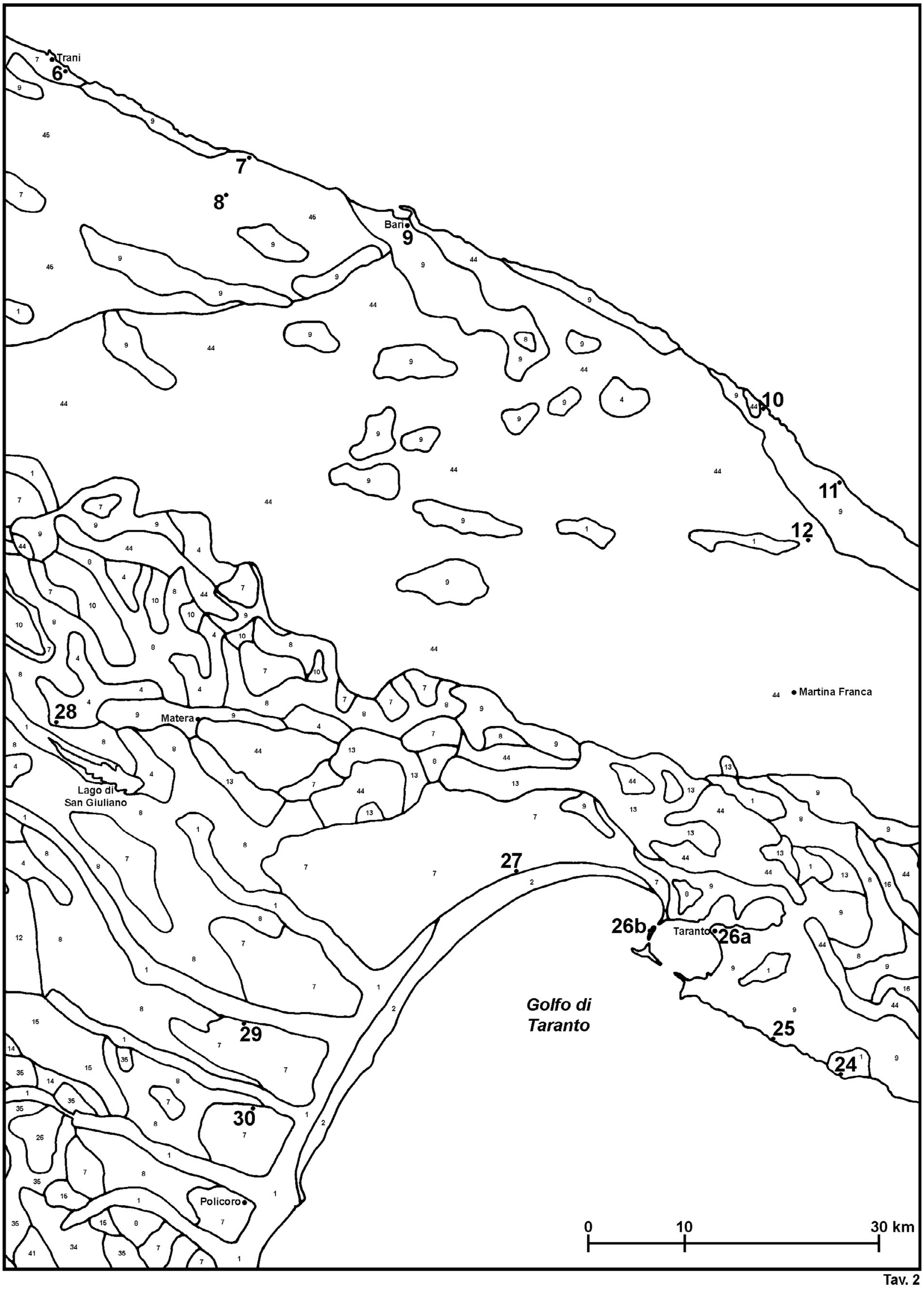


Fig. 4.4.2. Apulia map (Taranto).

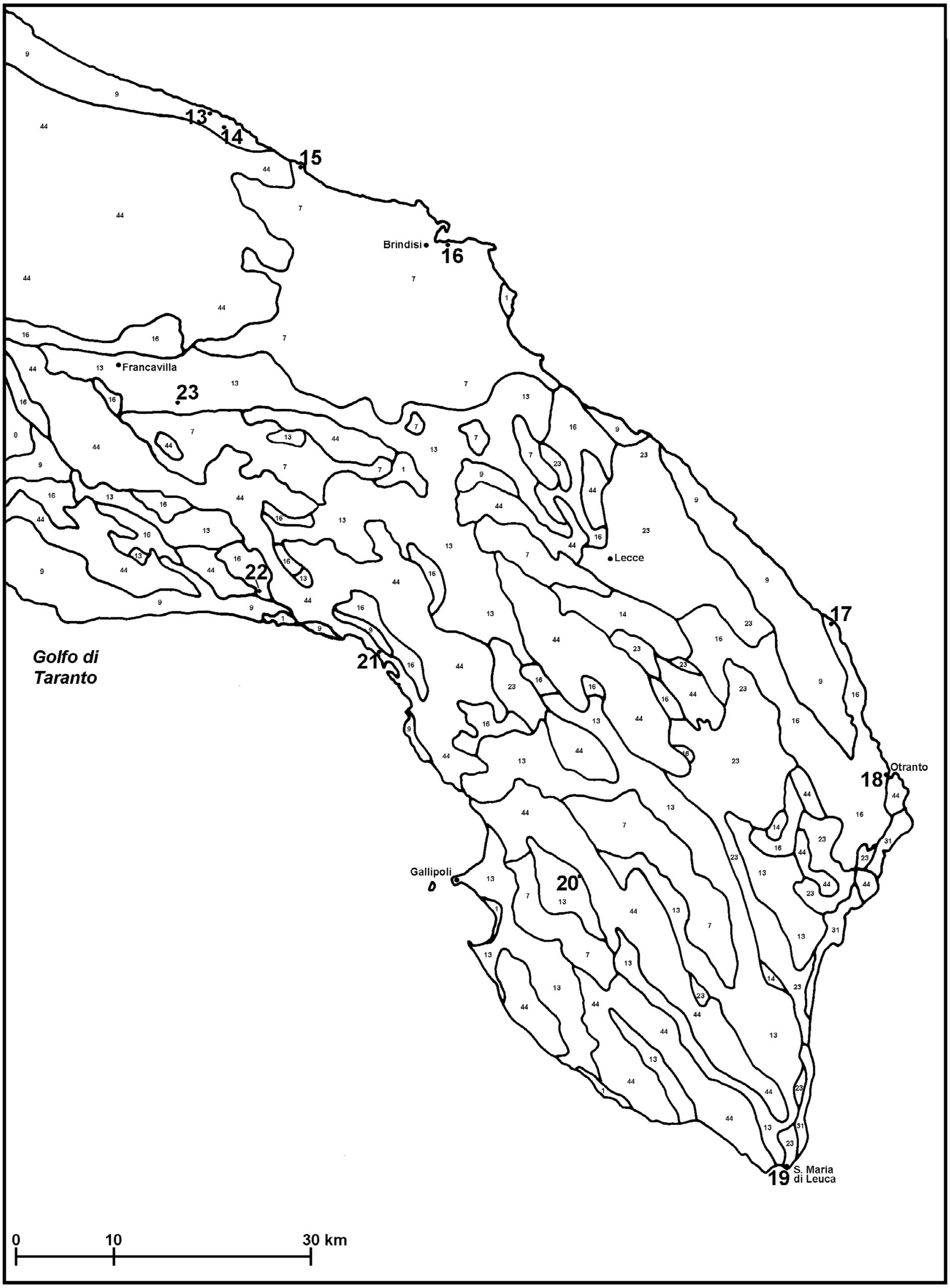


Fig. 4.4.3. Apulia map (Leuca).

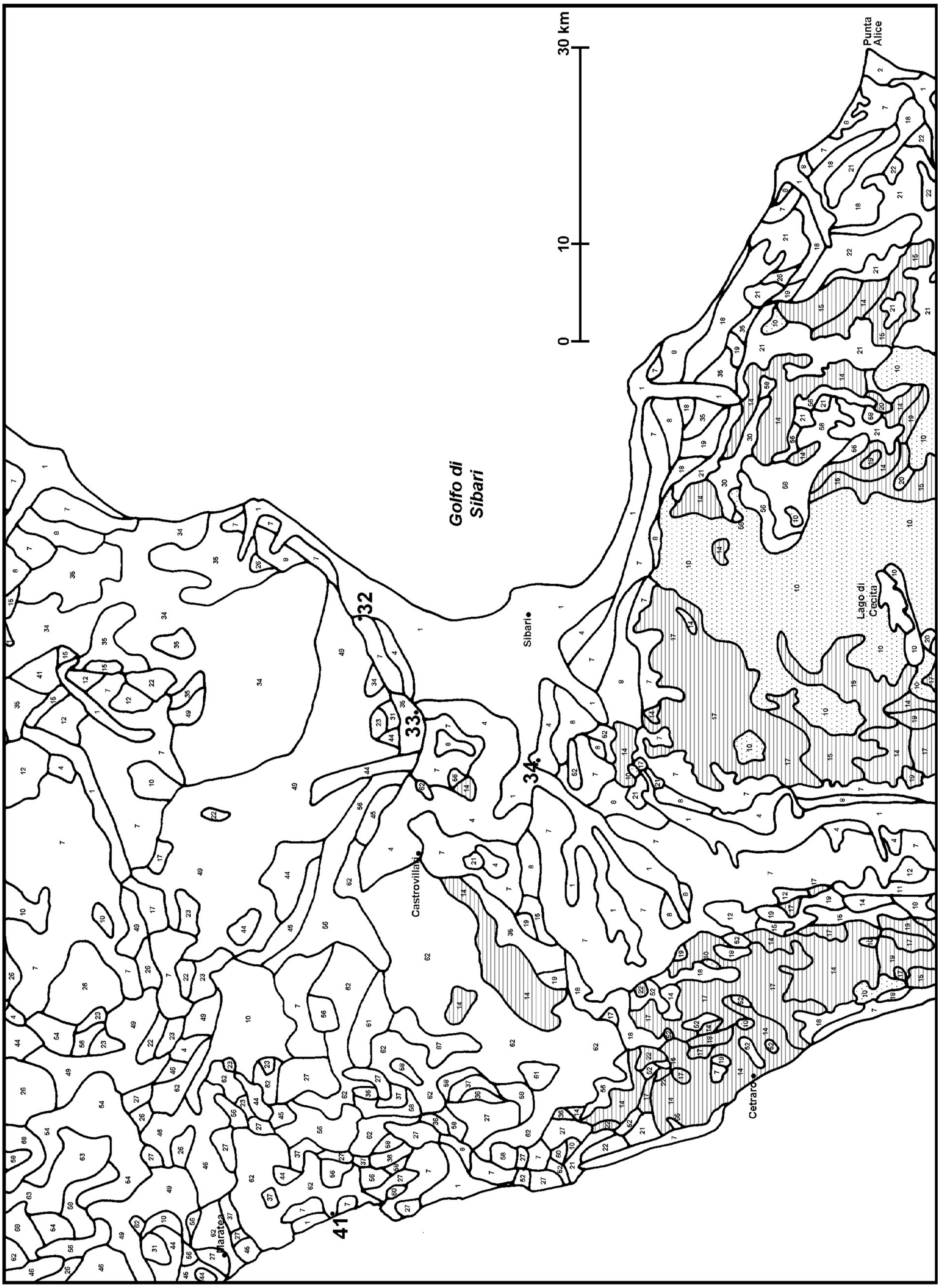


Fig. 4.4.4. Calabria map (Sibari).

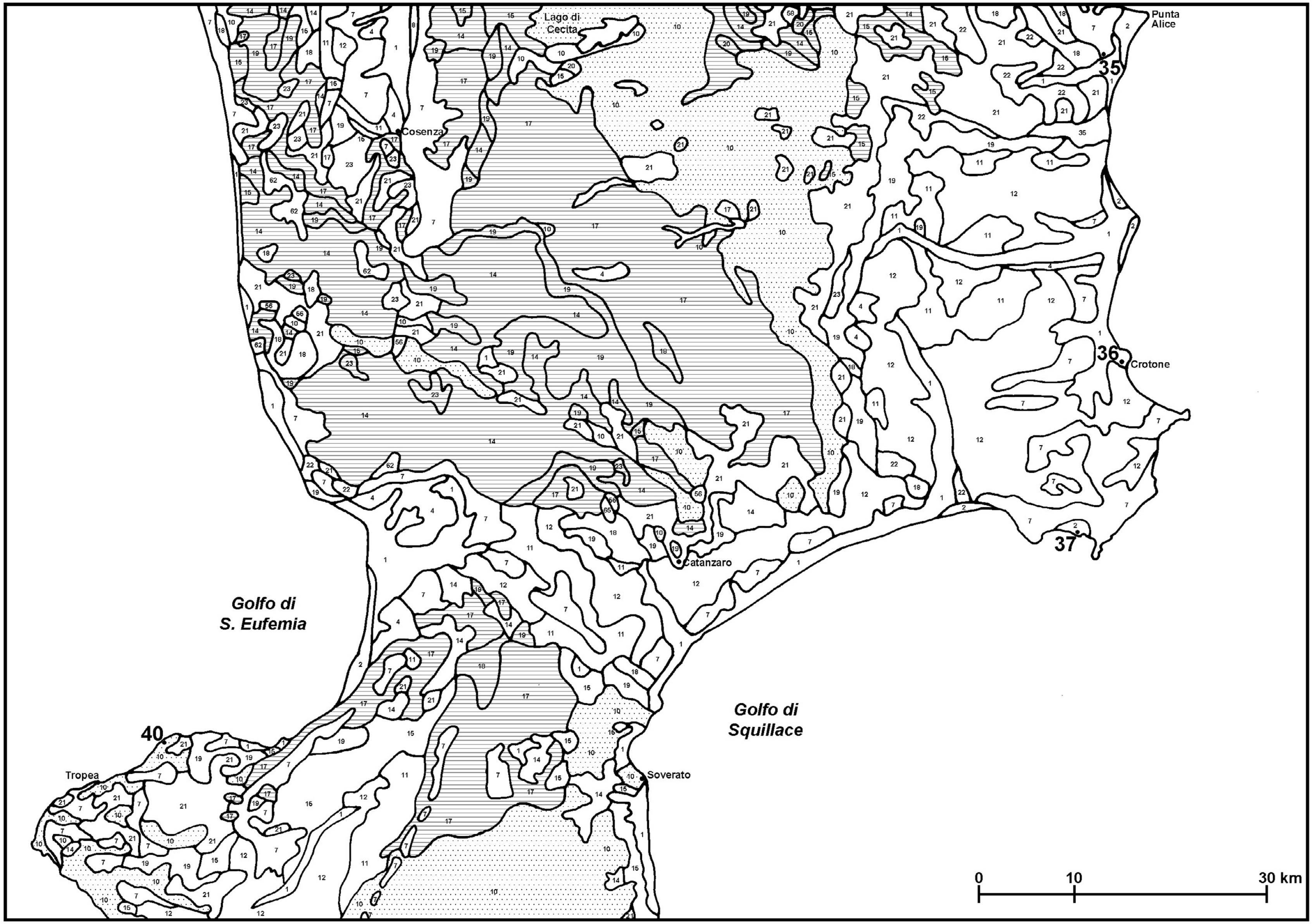


Fig. 4.4.5. Calabria map (Crotone).

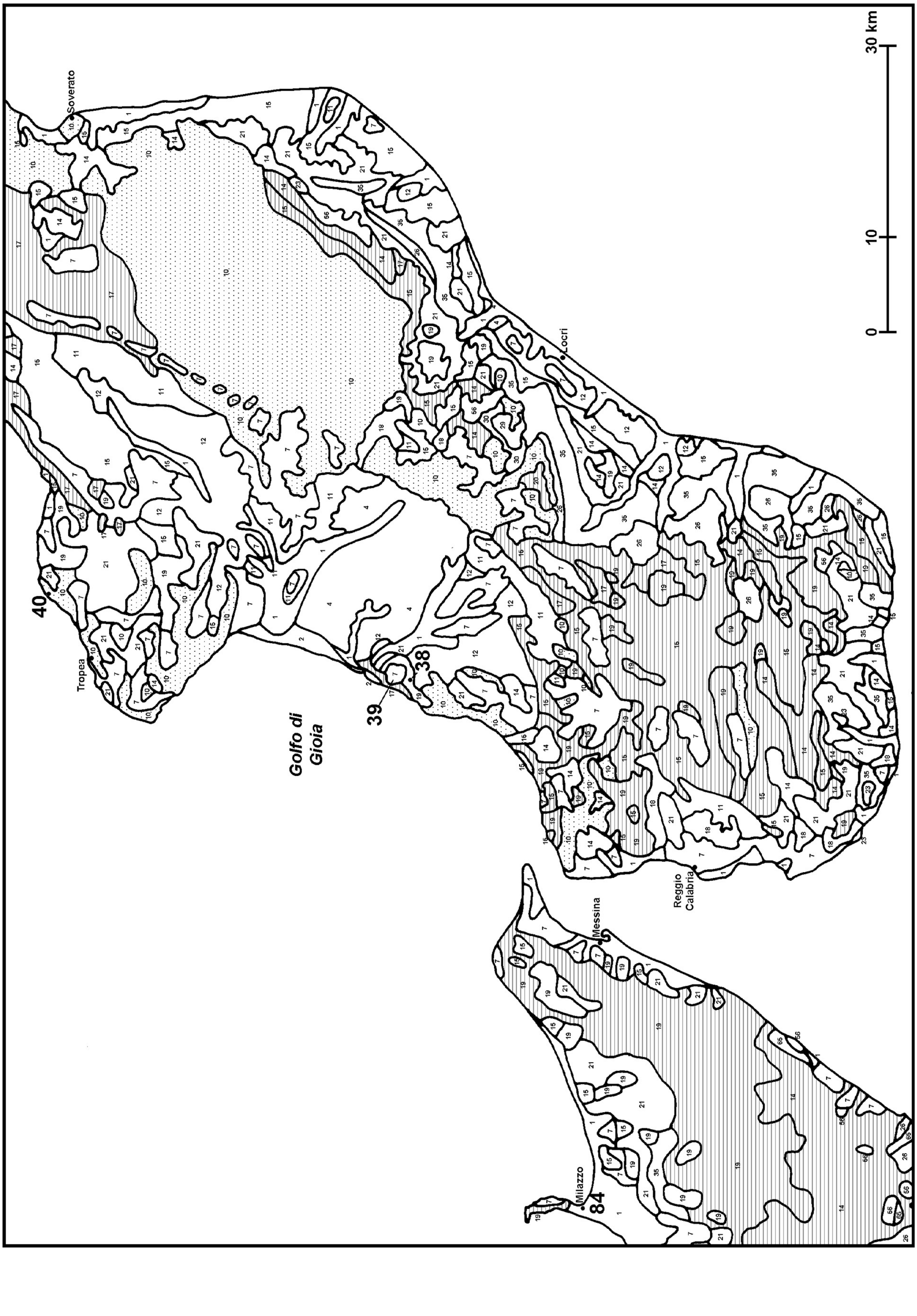


Fig. 4.4.6. Calabria map (Reggio Calabria).

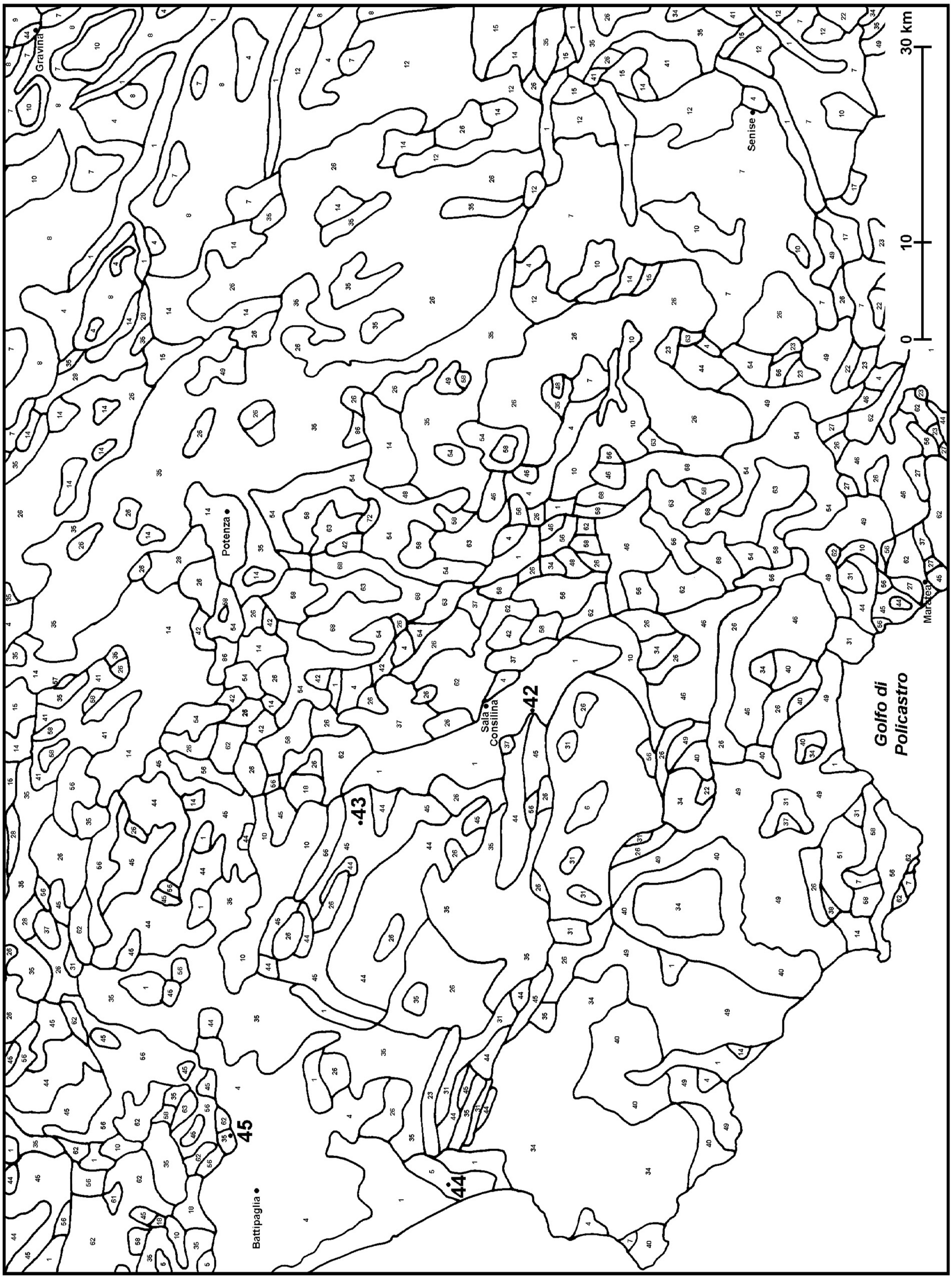


Fig. 4.4.7. Campania map (Grotta del Pino).

Fig. 4.4.8. Campania map (Vivara).

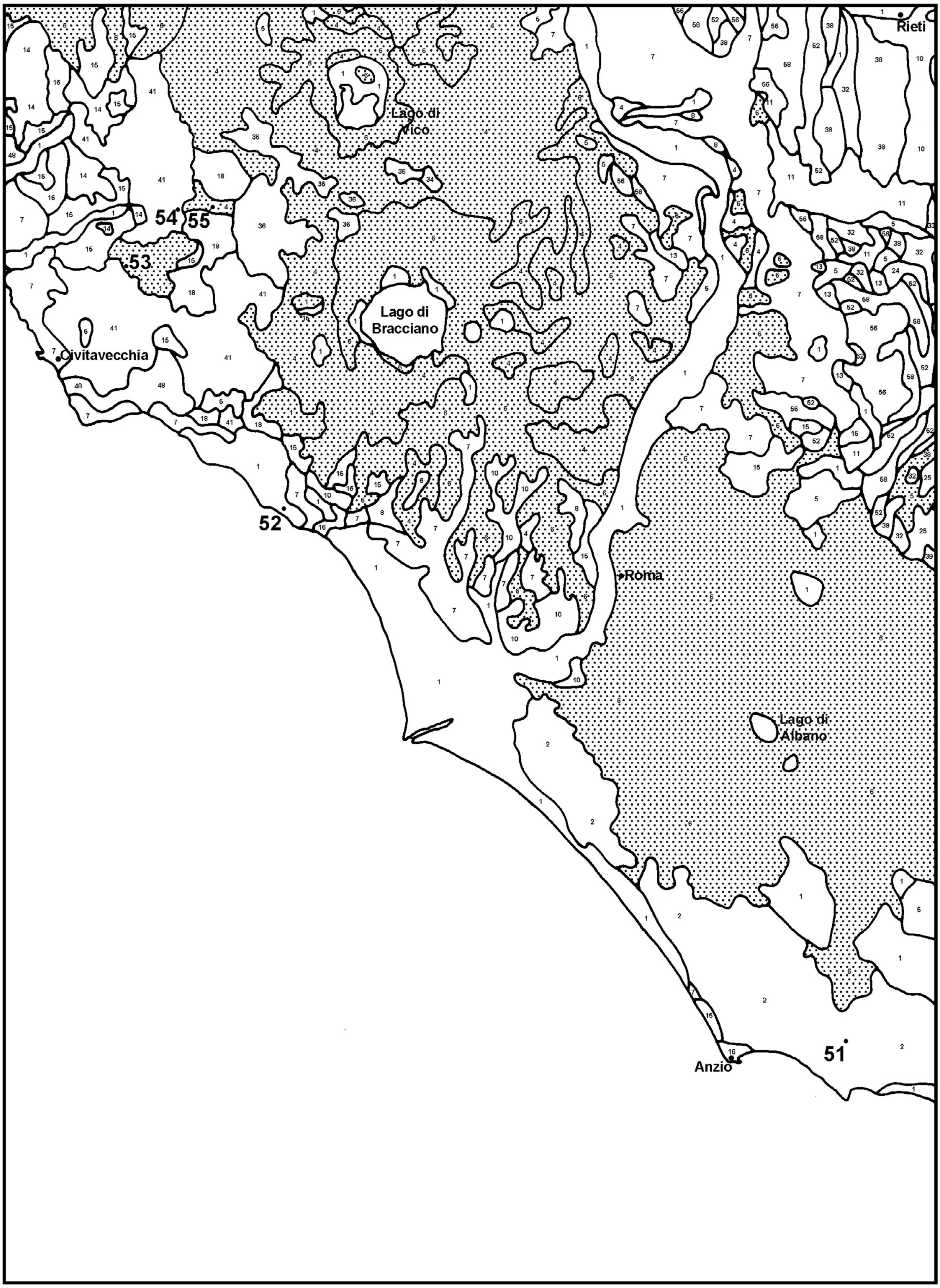


Fig. 4.4.9. Latium map.

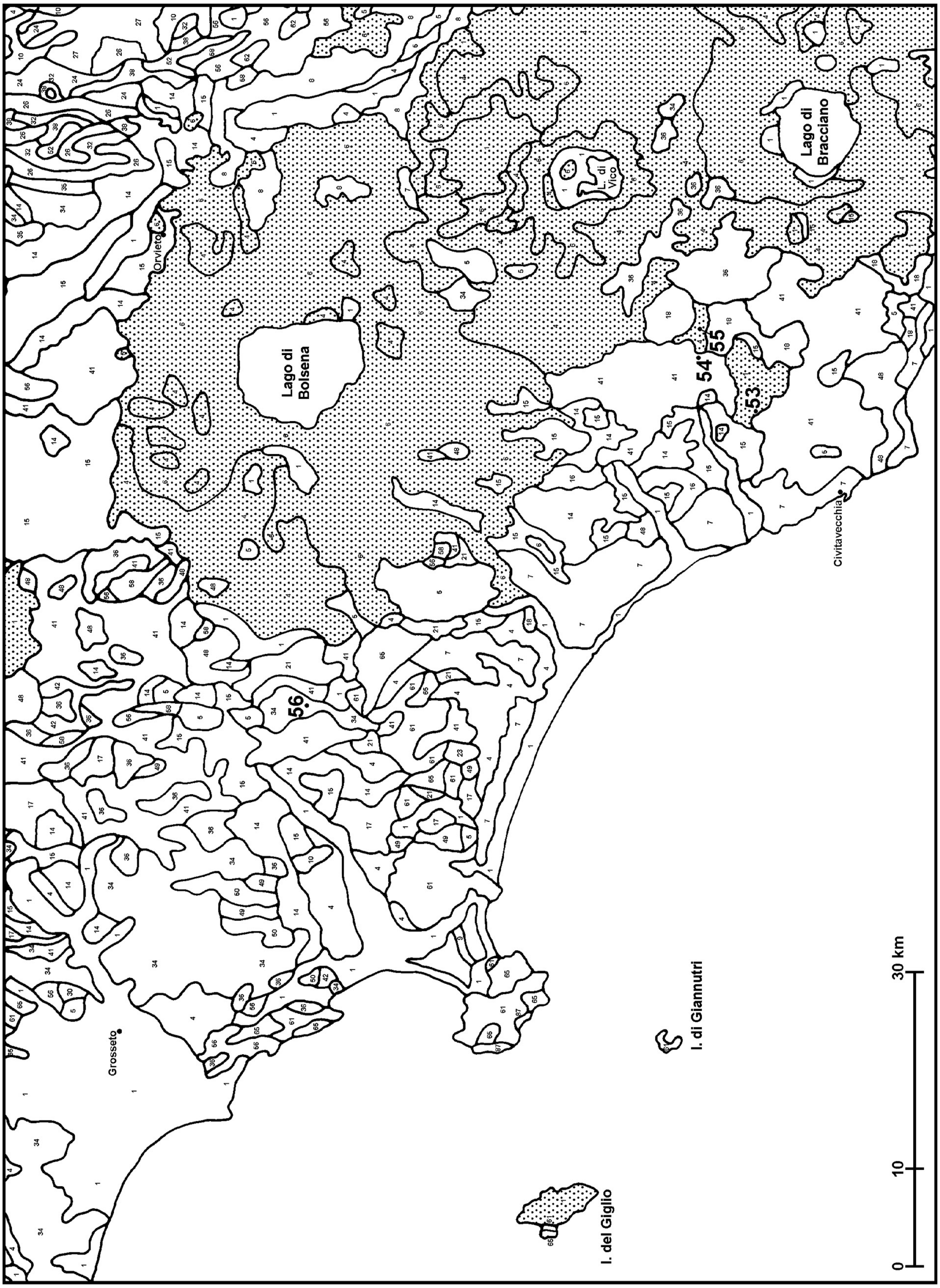


Fig. 4.4.10. Latium and Tuscany map.

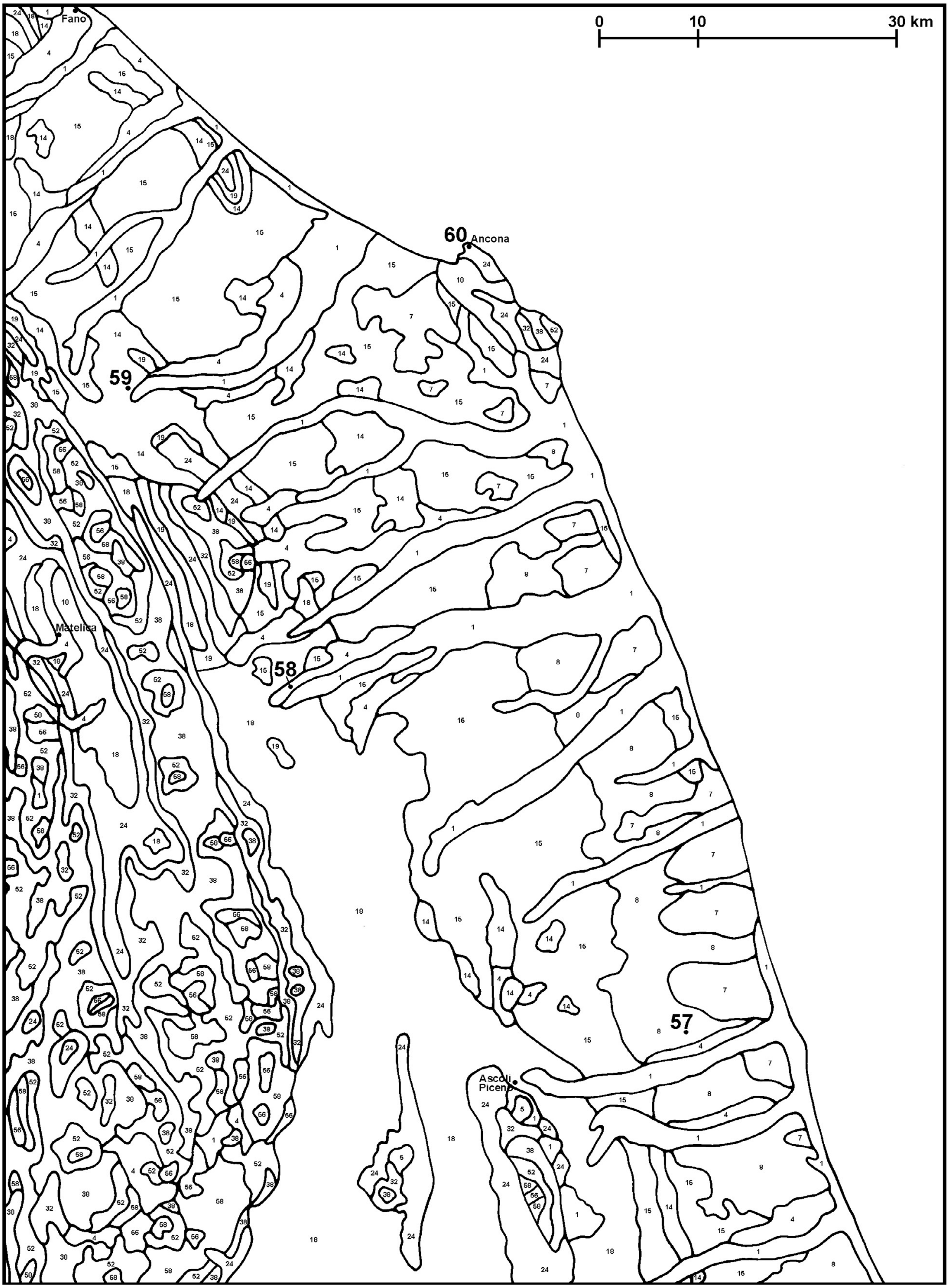


Fig. 4.4.11. Marche map.

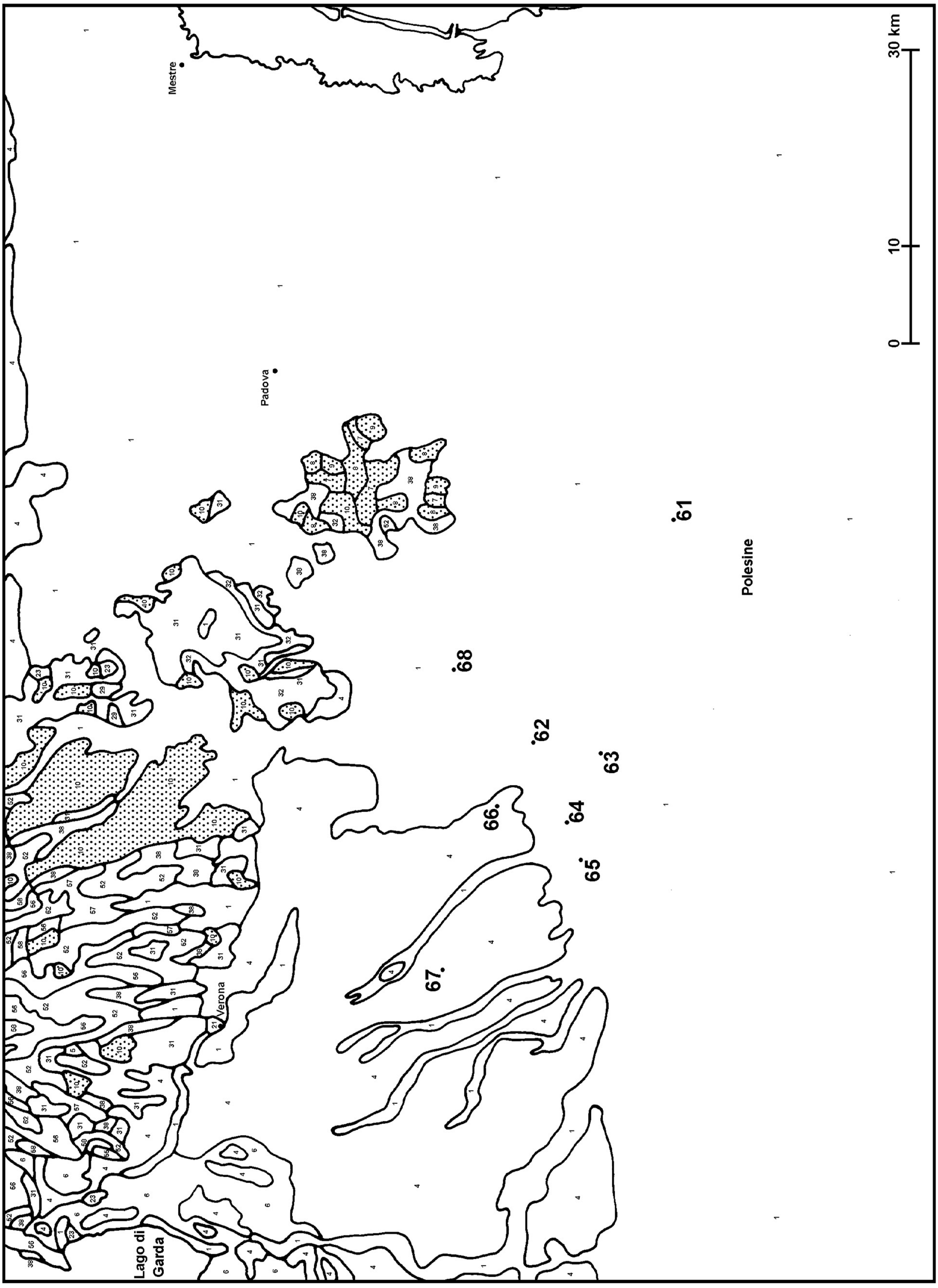


Fig. 4.4.12. Veneto (Po Valley) map.

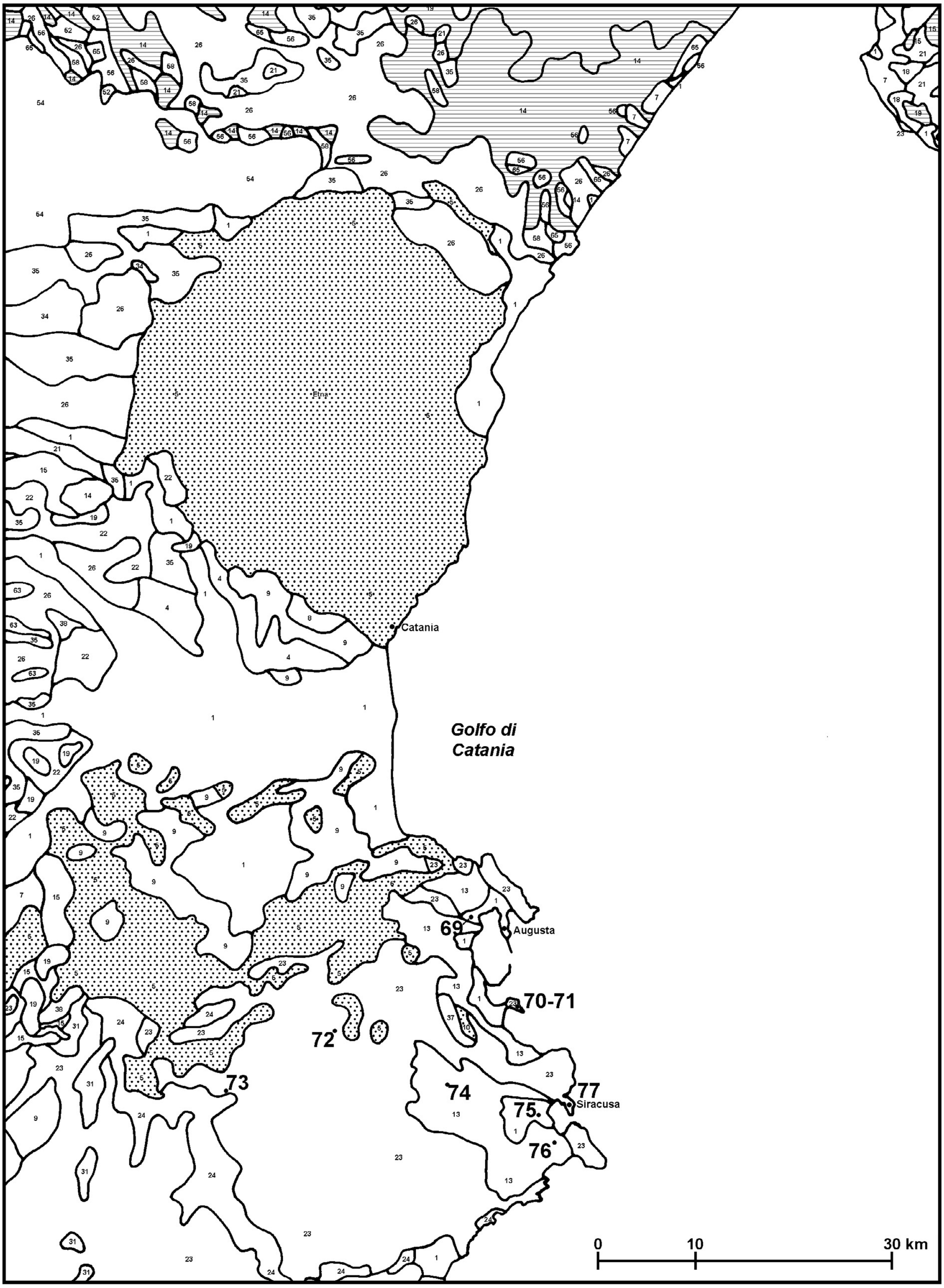


Fig. 4.4.13. East Sicily map.

Fig. 4.4.14. South Sicily map.

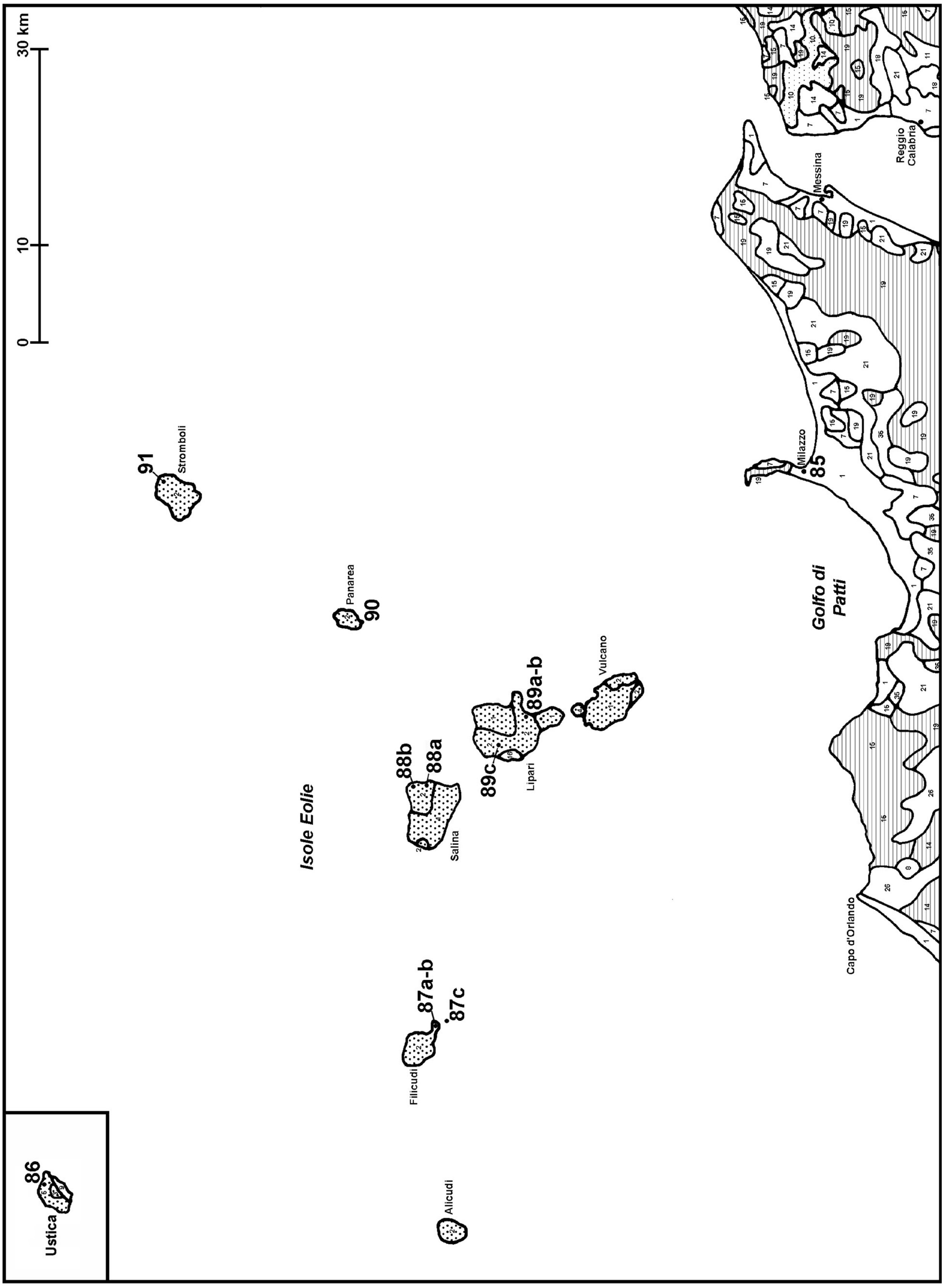


Fig. 4.4.15. North Sicily (Aeolian islands) map.

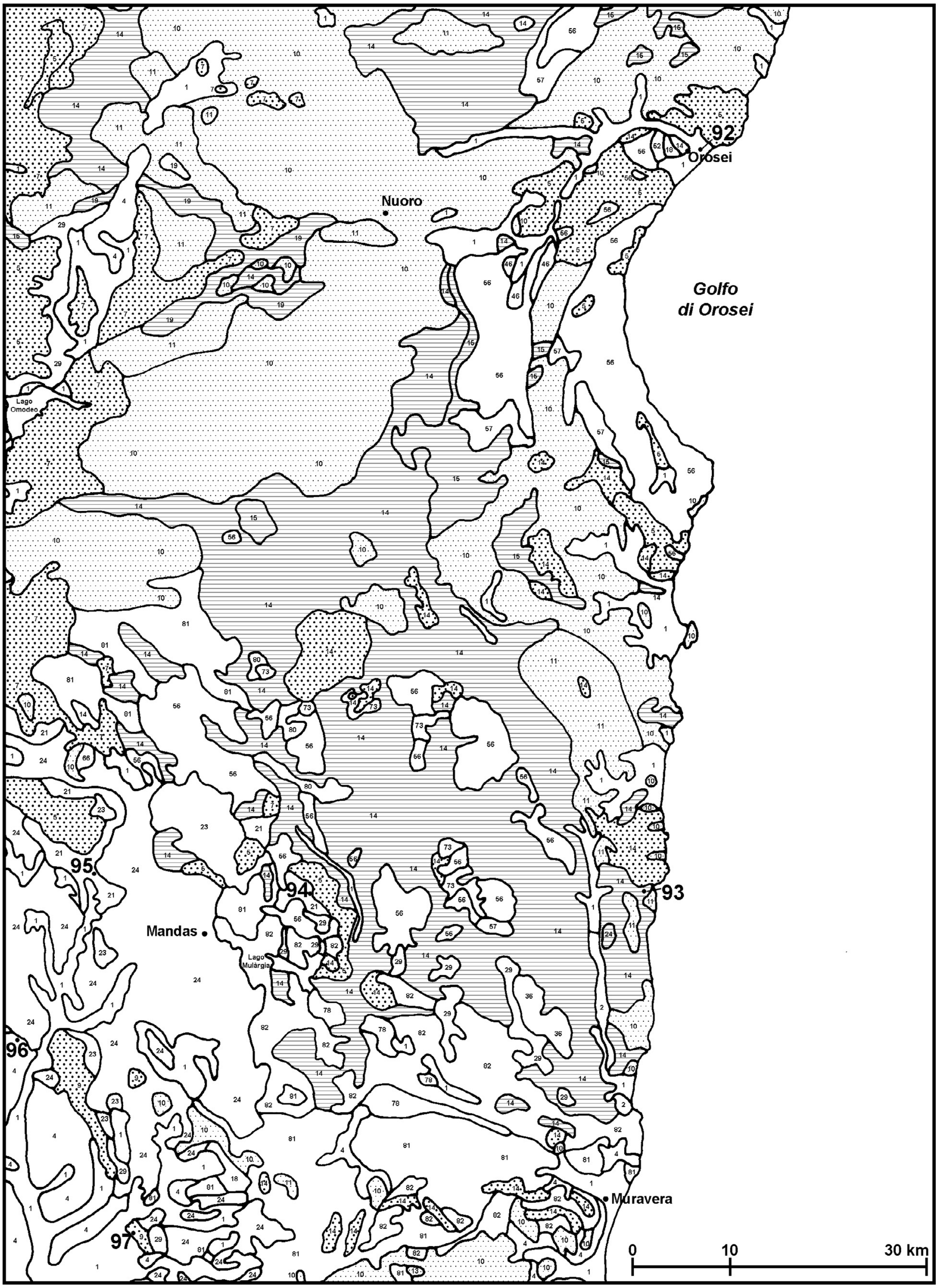


Fig. 4.4.16. East Sardinia map.

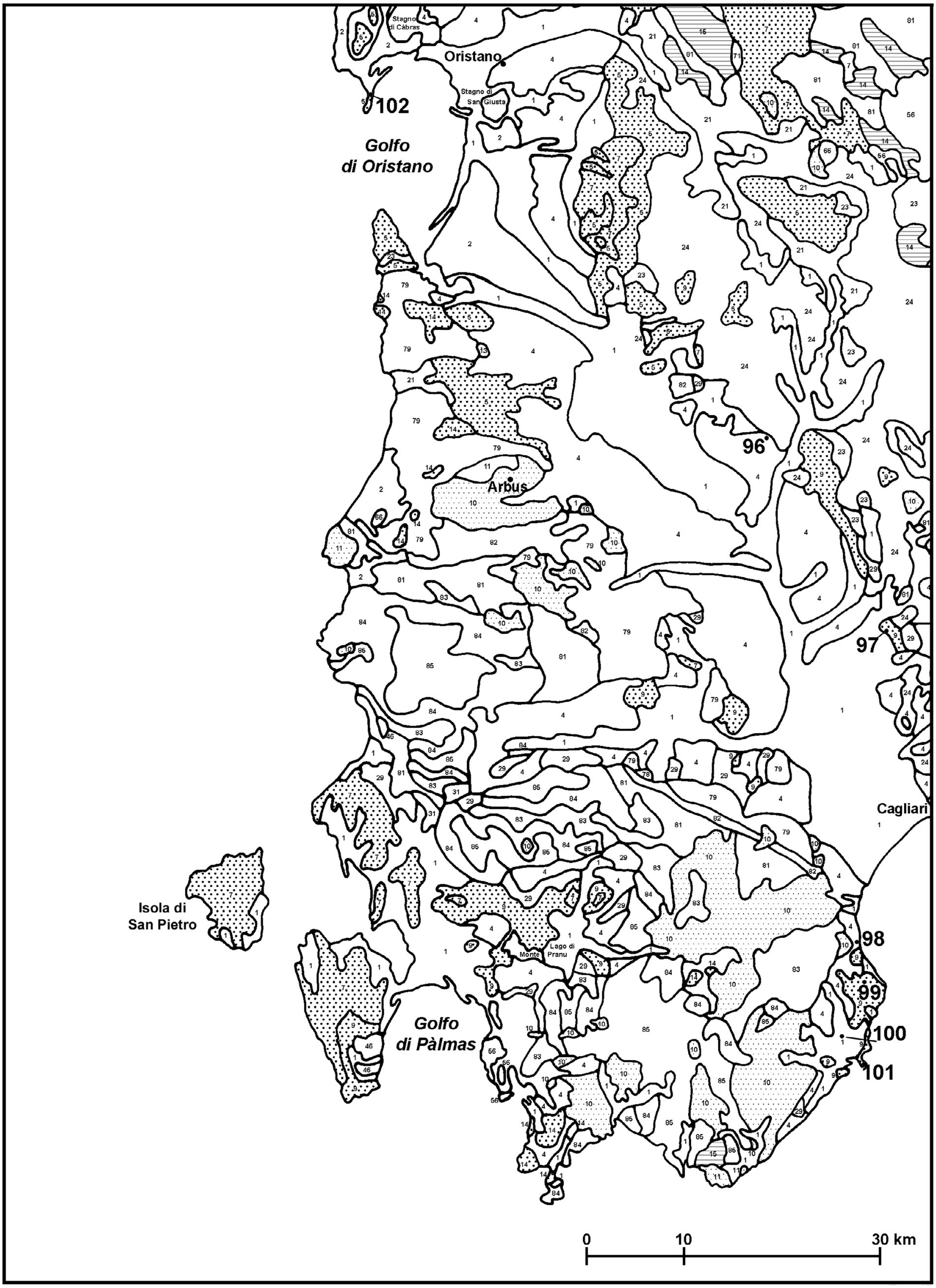


Fig. 4.4.17. South-West Sardinia map.

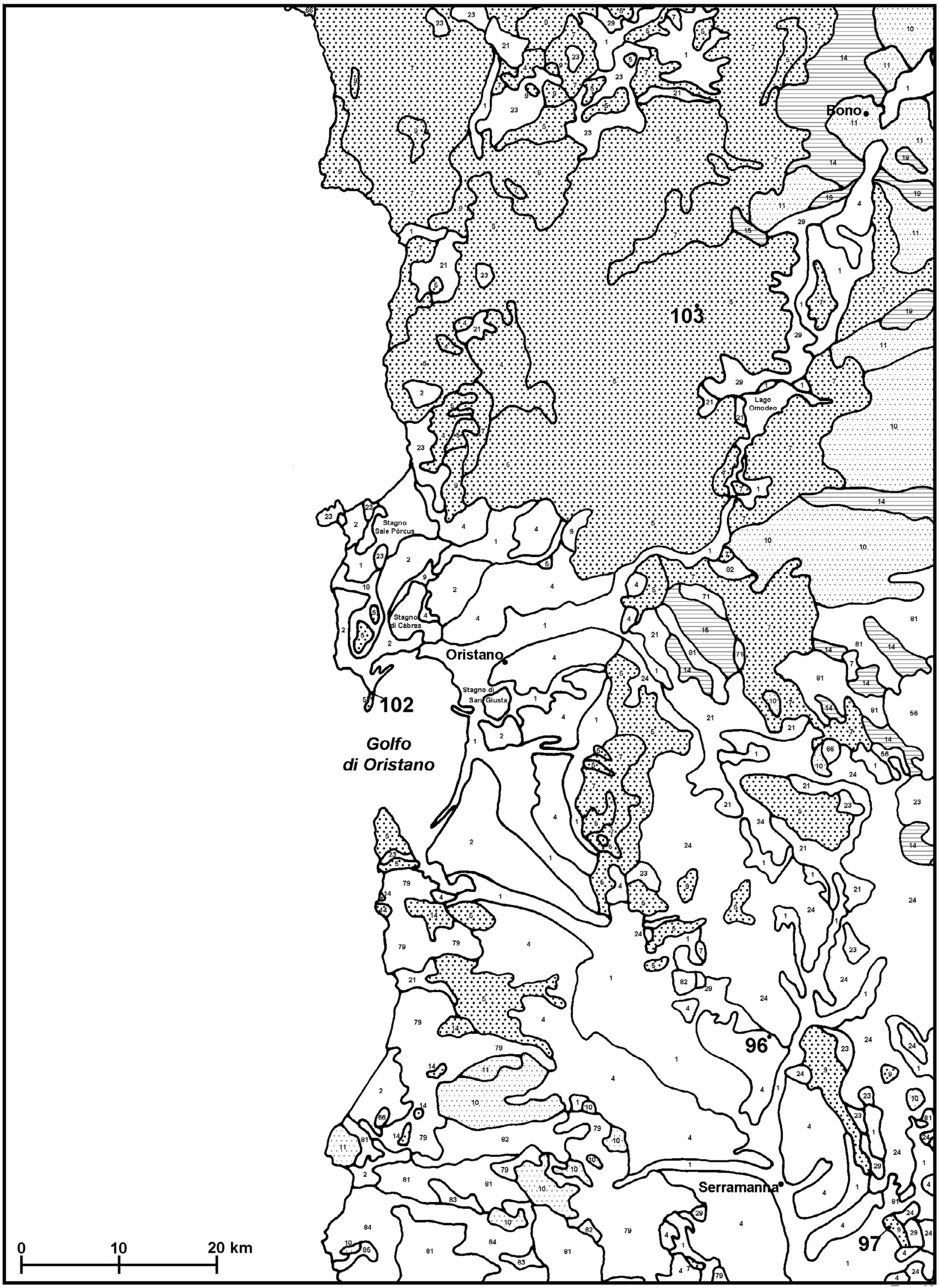


Fig. 4.4.18. West Sardinia map.

4.3. Results

4.3.1. Presentation

The results are presented below according to site on a region by region basis. The site name is followed by its number in the site gazetteer in Chapter 2.2. The site entries have a common format, setting out the technique(s) applied, the number of each ware/class examined and, where previously published, reference to publication. There is also a reference to the figure in which the sherds/vessels are illustrated. In the Tables that follow the layout is normally as follows:

Ware, Sample, Description, Date (expressed usually on the Aegean chronology (Table 1.1), Suggested Origin, and, where relevant, Publication and Inventory (or excavation) number.

The column called 'Suggested Origin', gives the consensus view emerging from the data interpretation. *The section above - Treatment of chemical data - explains the limits of this interpretation*. On the basis of composition, the association between a given sample and the Peloponnese is usually expressed as such in the Suggested Origin column, but, where there are grounds to associate more closely, the relevant entry is expressed as North or South Peloponnese. The term 'local' should normally be loosely interpreted to imply 'within the local area or region'. Only those Tables that do *not* follow this layout are numbered, such as Table 4.4 (Rocavecchia).

Some Tables carry more information, for instance that for Scoglio del Tonno which first subdivides the samples according to the analytical technique applied, and second gives a sample number *in addition to the inventory/excavation/publication/number*; that sample number is used in the graphical presentations of the data. The numerous and sometimes complex Tables in the Calabria section reflect the variety and extent of archaeometric effort in that region.

The position of each sample in the bi-variate and PC plots is normally indicated by +, but other symbols are employed where necessary, as explained in the figure caption. The number of samples treated in a given plot varies considerably. It may display all the samples analysed from either a single site or several sites within a region. There are instances in which it is necessary to treat samples from widely dispersed sites, all of them from a particular chronological period or belonging to one ware/class. In all cases, however, the aim is for clarity and to avoid overloading the plot.

The concentration scales on the bivariate plots are expressed as either (weight) percent element or parts per million (ppm) of element.

Abbreviations

These are given in Chapter 4.1.1-3 but are repeated here for convenience:

Techniques
AAS Atomic absorption spectrometry
DTA Differential thermal analysis
EMPA Electron microprobe analysis
ICP-ES inductively-coupled plasma emission spectrometry
ICP-MS inductively-coupled plasma mass spectrometry
INAA Instrumental neutron activation analysis
LA-ICP-MS Laser ablation inductively-coupled plasma mass spectrometry
OES Optical emission spectroscopy

PE Petrographic examination
SEM-EDAX Scanning electron microscopy-energy dispersive X-Ray analysis
TGA Thermogravimetric analysis
WCA Wet chemical analysis
XRF X-ray fluorescence spectrometry
XRD X-ray diffraction

Class/ware:
B Basin
BU Burnished
BR Base Ring
CW Coarse ware
D *Dolium*
G Grey
I *Impasto*
IM Italo-Mycenaean
M Mycenaean
MIN Minyan
MP Matt-painted
P Pithos
PG South-Italian Protogeometric and Geometric
V various (clay, daub, kiln/hearth fragment, mud brick)

Data treatment:
ALCA Average Link cluster analysis
DA Discriminant analysis
PCA Principal components analysis
PC principal component
WMCA Ward's method cluster analysis

4.3.2. Regional overview

The section on **Apulia** and **Basilicata** reflects well the region's importance and relevance to the project's aims. Studies by several laboratories contribute to the section; all the major sites in Apulia yielding Aegean decorated and influenced pottery have been considered, with the Taranto area attracting the most attention from laboratory-based methods. Scoglio del Tonno has provided much of the material for analysis, beginning with the small, pioneering study by de Angelis *et al.* (1960). The main part of the entry for Scoglio del Tonno is long and complex: it presents the work undertaken by the present authors at several sites in the Taranto region employing all three techniques of chemical analysis and investigating the whole range of relevant pottery from decorated Aegean and Aegean-derived pottery to *impasto*. Much of the project's work has not previously been published, but some of its early results from Torre Castelluccia, Porto Perone and Scoglio del Tonno have been reported. The traditional pottery industry of Apulia has been documented by Cuomo di Caprio (1982) who includes chemical analyses of (modern) clays and other raw materials.

Despite the complexity and length of the Apulia-Basilicata section which arises from the variety of archaeometric studies, many of them overlapping, carried out on the pottery in question, there are a number of clear outcomes which can be simply outlined. First, there is overwhelming evidence for Italo-Mycenaean production in Apulia and Basilicata, and furthermore that production, rather than being centralised, probably took place at the individual site level. Second, imports from different regions of the Aegean have been identified.

Turning to **Calabria,** the entries for the Plain of Sybaris dominate because this area has become a focal point for archaeometric work. From excavations, notably at Broglio di Trebisacce and to a lesser extent Torre Mordillo, as well as from survey, the Plain has provided substantial numbers of examples of the main pottery classes for several programmes of analysis, each with its own aims, as summarised in Table 4.7a. Clay prospection has also featured strongly. The unique combination of a rich archaeological record, created to a large extent by the long-standing fieldwork over the last three decades at Broglio, and the relative geological diversity within and around the Plain, together with the collaboration of Maurizio Sonnino, have created the right conditions to explore regional rather than site-level production and distribution of two contrasting wares, *impasto* and the Aegean-influenced *dolia* (Levi 1999; Levi *et al.* 1998a). The importance of this research for our present purposes is the solid framework of knowledge about the co-existence of the indigenous and Aegean-influenced traditions within the Plain over a two-hundred year period. Thus this section differs from most others in the prominence it gives to wares in addition to decorated Aegean. Beyond the Plain, archaeometric work has been limited to a few sites.

In **Campania** most attention has focused on Early Mycenaean imported and local pottery at Vivara; a number of smaller sites also feature. All four sites which have yielded Aegean pottery, albeit in small quantity, in **Latium** and the corresponding four in **Marche** are considered. In **Veneto** interest has centered on the small but important corpus of material of Aegean character, some of it recently found, from sites clustering between the Po and Adige rivers – Frattesina, Lovara, Fabbrica dei Soci, Fondo Paviani, Castello del Tartaro and Terranegra – and those lying to the north, in particular Crosare di Bovolone and Montagnana. Petrographic analysis has contributed much to the characterisation of the local, mainly coarser fabrics at the sites concerned. Petrographic and chemical analyses of later pottery and modern clays have provided necessary background data.

On **Sicily** results are presented, some of them for the first time, for material from Monte Grande, the Thapsos area, Milena and Cannatello. Several imports have been positively identified at these sites. In the **Aeolian Islands**, the early fundamental petrographic study of Williams (1980) has been supplemented by further work of a similar kind, much of it previously unpublished, on the *impasto* fabrics, and there has been chemical analysis of local and imported material on Salina and Lipari. The main site on **Sardinia** whose local and imported pottery has received archaeometric attention is Antigori. Material from a few other sites in the southern part of the island has also been considered, as have examples of supposed Italian *impasto* found at Kommos in Crete and tentatively assigned to Sardinia.

APULIA

Manaccora (1)

INAA (Database 2): Matt-painted 2, Mycenaean 2, Protogeometric and Geometric 1, *impasto* 4
Previously unpublished
Illustration: Fig. 4.43

Ware	Sample	Description	Date	Suggested origin	Publication
MP	MAN1	Closed vessel bichrome	I-II	Peloponnese	Marazzi 1993, fig. 1:1a
	MAN2	Closed vessel bichrome	I-II	Peloponnese	Marazzi 1993, fig. 1:1b
M	MAN3	Open vessel	IIIB-C	Peloponnese	Marazzi 1993, fig.1:2
	MAN4	Stirrup jar?	IIIB	Peloponnese	Marazzi 1993, fig. 1:3
PG?	MAN5	Undecorated body sherd		Local	
I	MAN426			Local	
	MAN431			Local	
	MAN627			Local	
	MAN1007			Local	

The Aegean type, comprising Matt-painted and Mycenaean, separates clearly from the *impasto* as well as according to date: **MAN 1-2** and **MAN 3-4**. These four samples can be confidently classified as Aegean imports, and are treated in Part 4 (Fig. 4.29) along with **MAN5** which is probably local and could be PG (cf. Baumgärtel 1953, Pl. V:7). The *impasto* shares the feature of notably high rare earth element contents with that from Grotta del Pino in Campania.

Coppa Nevigata (3)

XRF, PE, XRD (Databases 4-5) Italo-Mycenaean 48, PG, *impasto* and daub 150 (MBA-RBA)
Publications: Aldi *et al.* 1997; Boccuccia *et al.* 1995; Cioni *et al.* 2000; Levi *et al.* 1994-95, 1995, 1998, 1999a, 1999b, 2005; Levi, Cioni 1998; Recchia, Levi 1999

In *impasto* (Levi *et al.* 1994-95) clasts are calcite (spathic and micritic), pumice, grog and quartz and feldspars. Pumice comes from the Vesuvian eruption of 'Avellino pumices' dated to the end of the 18th century BC (Levi *et al.* 1998b; Cioni *et al.* 2000; Vanzetti 1998). The use of pumice as temper is more frequent immediately after the eruption in MBA1-2; calcite is the most common temper in MBA3 and at the beginning of RBA, while grog becomes predominant during the RBA. According to the relationship between function and paste preparation, calcite is preferred in closed shapes and the other materials in the open ones. An analysis of surface treatment and porosity (Aldi *et al.* 1997; Recchia, Levi 1999) revealed the use of calcite for cooking wares and pumice for the open shapes; the use of grog appears less related to vessel function.

From the petrographic analysis of 48 samples of Italo-Mycenaean, PG, Boccuccia *et al.* (1995) identified groups defined on the basis of the presence and combination of tectosilicates, mica, spathic and micritic calcite, pyroxenes and fossils; these groups were confirmed by XRD. The quantity of clasts varied from 10 to 50% and their size from 10 to 400 Greek m. Grain size was generally unimodal and the distribution homogeneous. It appears that calcite was more frequent in the PG, and the clast size tended to decrease over time. The fine-textured Italo-Mycenaean pottery showed variability in composition. In terms of chemical composition (determined by XRF on 30 samples), all classes were calcareous including the *impasto*. The Italo-Mycenaean and PG showed small differences between each other in their trace element content, and they both contrasted markedly with the *impasto* in the same trace elements and in Cassano *et al.*'s (1995) analyses (PE, XRD, XRF) of Neolithic pottery from this site are noted.

INAA (Database 2): Mycenaean 2, Italo-Mycenaean 11, Grey 2, PG 6, *impasto* 6, daub 1
ICP (Database 3): Burnished? 2, Italo-Mycenaean 14, Grey 1, PG 14, *impasto* 2, daub 2
SEM: (Chapter 5): Italo-Mycenaean 2
Publication: Jones, Levi 2012
Illustration: Fig. 4.44, Plate 1

INAA					
Ware	**Sample**	**Description**	**Date**	**Suggested origin**	**Publication**
M	CN303			Peloponnese	
	CN310	Amphora	IIIC	Peloponnese	Cassano *et al.*1987, fig. 89; Cazzella *et al.* 2012, fig. 8:33
IM	CN71			Local	
	CN72			Local	
	CN301			Local	
	CN302			Local	
	CN304			Local	
	CN305			Local	
	CN308	Jug or Amphora	III	Local	Cazzella *et al.* 2012, fig. 7:31
	CN309	Closed vessel?	III	Local	Boccuccia 1995, tav. 26:26
	CN311			Local	
	CN312			Local	
	CNS165			Local	
G	CN306			Local	
	CN307			Local	
PG	CNS125		Middle Geometric	Local	
	CNS126		Middle Geometric	Local	
	CNS147		Middle Geometric	Local	
	CNS735			Local	
	CNS1265		Early Geometric	Local	
	CNS1275		Middle Geometric	Local	
I	CN11			Local	
	CN18			Local	
	CN21*			Local	
	CN36*			Local	
	CN98			Local	
	CN115			Local	
V	CN2*	Daub		Local	

ICP					
Ware	**Sample**	**Description**	**Date**	**Suggested origin**	**Publication**
BU?	CN2013	Open vessel, burnished?	IIIC?	Local	Cazzella *et al*. 2012, fig. 12:76
	CN2014	Open vessel? Burnished?	IIIC?	Local	Cazzella *et al*. 2012, fig. 12:77
IM	CN69			Local	
	CN313			Local	
	CN314			Local	
	CN315			Local	
	CN316			Local	
	CN2001	Necked jar	IIIC	Local	Cazzella *et al*. 2012, fig. 10:61
	CN2002	Necked jar	IIIC	Local	Cazzella *et al.* 2012, fig. 10:60g
	CN2003	Necked jar	IIIC	Local	Cazzella *et al*. 2012, fig. 10:60h
	CN2004	Necked jar	IIIC	Local	Cazzella *et al*. 2012, fig. 6:16
	CN2007	Necked jar	IIIC	Local	Cazzella *et al*. 2012, fig. 6:13
	CN2008	Deep bowl	IIIC	Local	Cazzella *et al*. 2012, fig. 6:14
	CN2010	Closed vessel	IIIC	Local	Cazzella *et al*. 2012, fig. 10:62
	CN2011	Bowl/cup	IIIC?	Local	Cazzella *et al*. 2012, fig. 6:15
	CN7337	Necked jar	IIIC	Local	Taylour 1958, pl. 15:3
G	CN2005	Base, painted?		Local	
PG	CNS507		Protogeometric	Local	
	CNS508		Middle Geometric	Local	
	CN510		Protogeometric	Local	
	CNS555		Early Geometric	Local	
	CNS777		Early Geometric	Local	
	CN1172			Local	
	CNS1263		Middle Geometric	Local	
	CNS1264		Protogeometric	Local	
	CNS1267		Middle Geometric	Local	
	CNS1270		Geometric	Local	
	CNS1280		Geometric	Local	
	CN2006		Protogeometric	Local	
	CN2009		Protogeometric	Local	
	CN2012			Local	
I	CN11*			Local	
	CN21*			Local	
	CN36*			Local	
V	CN2*	Daub		Local	
	CN3	Daub		Local	

Analysed by both techniques *

a. INAA

In the PC plot (Fig. 4.4a) the majority of samples comprising Italo-Mycenaean, Grey and PG form a broad cluster which is likely to represent local production; one Mycenaean, **CN310**, stands apart. The *impasto* lies either just outside this cluster or, in the case of three examples with high negative scores on PC2 and differing petrographic compositions, **CN11**, **36** and **115**, well outside. There is a case for considering one further sample, **CN303**, as non-local because of its high Cr and Co contents, and this together with **CN310** is treated in Part 4.

Levi *et al.* (1994-95) found considerable variability in the compositions of *impasto* and daub, as indicated by those examples analysed chemically which were characterised by the presence of: **CN2**: pumice and micritic calcite; **CN3**: calcite, pumice, grog; **CN11**: quartz and feldspars; **CN18**: grog; **CN21**: pumice; **CN36**: spathic calcite; **CN98**: pumice; **CN115**: quartz, feldspars, sandstone, grog.

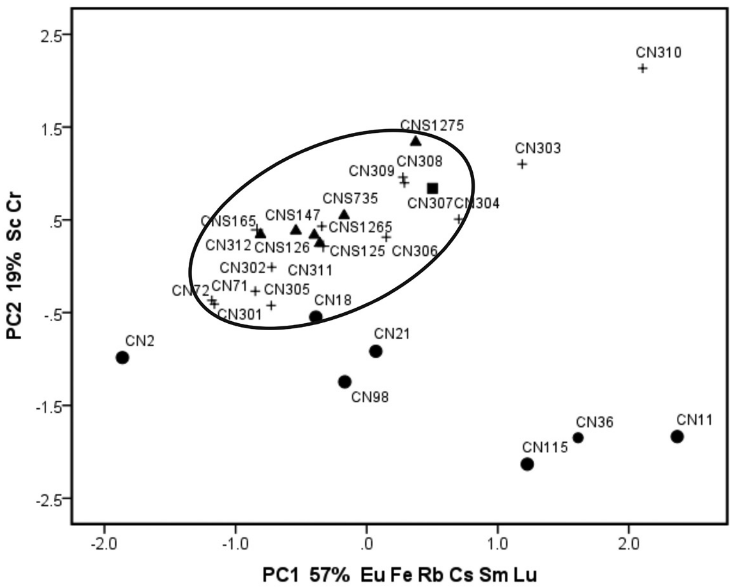


Fig. 4.4a. PC plot of the INAA compositions at Coppa Nevigata. Mycenaean and Italo-Mycenaean +, *impasto* ●, Grey ■, PG ▲. Some PG samples have a CNS code. The Appendix (section 3f) gives a comparison of those compositions also analysed by XRF by Boccuccia *et al.* (1995).

b. ICP

All the wares including *impasto* (apart from **CN11**) and daub are calcareous. In the PC plot of the Italo-Mycenaean, Grey, PG wares (Fig. 4.4b), some of the Italo-Mycenaean, forming Cluster A, have positive scores on PC2 reflecting higher Ca contents, but there is no evident differentiation between the three wares within Cluster B. There are a few outliers.

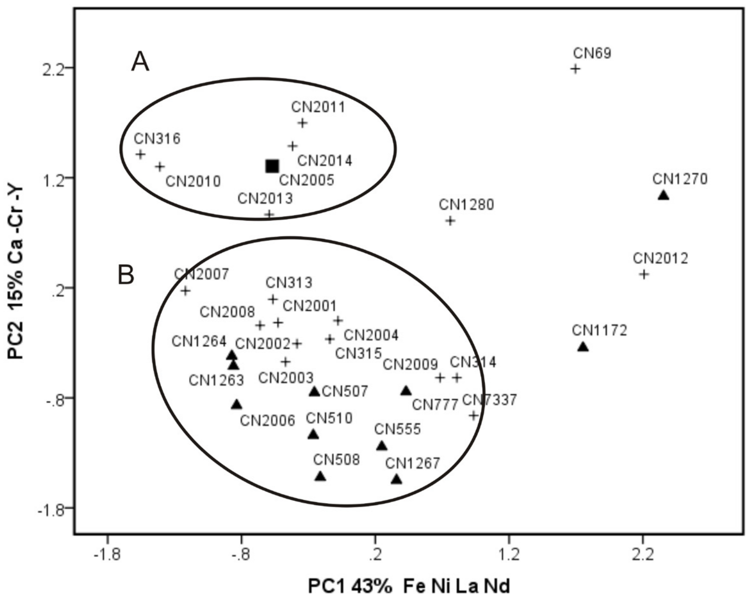


Fig. 4.4b. PC plot of the ICP compositions at Coppa Nevigata, except i*mpasto* and daub. Italo-Mycenaean +, Grey ■, PG ▲. Log transformed data.

Madonna del Petto (5)

XRF, SEM, PE, XRD (Databases 4-5)
DTA, TGA: Italo-Mycenaean 1, *dolia* 4, PG 3, *impasto* and daub 10 (all FBA)
Publication: Laviano *et al.* 1995a; Eramo *et al.* 2002

The Italo-Mycenaean sherd, PG and *dolia* all had a micaceous fabric with inclusions of fine-grained calcite, feldspars, quartz, biotite and poorly crystallised Fe-oxides or hydroxides. There were rare pyroxenes, trachytic rock fragments, chert and volcanic glass. The *impasto* differed in being somewhat less calcareous and containing coarse-grained grog; occasional pyroxenes, hornblende and garnet were noted. Analyses of pelitic deposits of the nearby River Ofanto suggested a different texture of the fluvial materials exploited for the different wares, and excluded the exploitation of the *Argille subappennine*. Firing temperatures were low, generally less than 800°C; only three samples (not *impasto*) had firing temperature reaching 900-1050°C. The XRF data further supports local/regional production for the Mycenaean sherd.

Egnatia (11)

XRF, PE, XRD: *Impasto* 44 (MBA)
Publication: Cinquepalmi *et al.* 2003

Petrographic analysis revealed great uniformity. Dominant clastic constituents were quartz (mono- and polycrystalline), feldspars, grog, mica (muscovite more than biotite) and iron-oxides/hydroxides. Augitic pyroxenes, Fe-pisoliths of lateritic origin and sometimes chert, zircon, amphibole and garnet were rare. Clasts were mainly rounded or subrounded. Matrix and lithics were more abundant in the MBA1-2 samples, while grog was more abundant among the MBA3 samples. There was more quartz in the carinated bowls and dishes not used as cooking-ware than in the coarse wares. The chemical data indicated the use of a non-calcareous clay, perhaps a local *terra rossa*.

Chiancudda (12)

ICP (Database 3): Mycenaean 1
Previously unpublished
Illustration: Fig. 4.44

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
M	CH1	Deep bowl	IIIB-C	Peloponnese	Bettelli 2010b, n.17.21, 332	E44218

The composition is treated in Part 4.

Torre Santa Sabina (13-14)

ICP (Database 3): Mycenaean 8, Italo-Mycenaean 6, *impasto* 7
Publication: Bettelli *et al*. 2010
Illustration: Fig. 4.45

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
M	TSS2	Closed vessel	IIIB-C	Peloponnese	Coppola, Raimondi 1995, tav. LVI:22	30399
	TSS3			Peloponnese	Coppola, Raimondi 1995, 385, n. 11	30413
	TSS5			N. Peloponnese	Coppola, Raimondi 1995, n. 11	30516
	TSS6	Open vessel	IIIB-C	N.Peloponnese	Coppola, Raimondi 1995, tav. LVI:21	30400
	TSS7	Cup or deep bowl		N. Peloponnese	Coppola, Raimondi 1995, 392	30402
	TSS8	Wall, uncertain		N. Peloponnese	Coppola, Raimondi 1995, 393	30404
	TSS11	Deep bowl? Krater?	IIIC	N. Peloponnese	Coppola, Raimondi 1995, tav. LII:13	30390
	TSS13	Necked jar	IIIC middle/ late	N. Peloponnese	Coppola, Raimondi 1995, tav. LVI:12	30396
IM	TSS1			Local	Coppola, Raimondi 1995, 385 n. 11	30410
	TSS4			Probably local	Coppola, Raimondi 1995, 385 n. 11	30415
	TSS9	Basin	IIIC	Local	Coppola, Raimondi 1995, tav. LVI:18	30338
	TSS10	Open vessel	IIIB-C	Local	Coppola, Raimondi 1995, tav. LVI:24	30395
	TSS12	Closed vessel	IIIC	Local	Coppola, Raimondi 1995, tav. LVI:14	30394
	TSS21	Lid (Tomb 5)	III	Local	Cinquepalmi 1998a, 9.005	27231
I	TSS14			Local		
	TSS15			Local		
	TSS16			Local		
	TSS17			Local		
	TSS18			Local		
	TSS19			Local		
	TSS20			Local		

Classification of the compositions by PCA of the compositions gives three groups (Fig. 4.5). Unlike the situation at Coppa Nevigata, the *impasto* (in Group C) is low calcareous. In the PC plot the Mycenaean divides into main groups, A and B, with some subtle distinctions within A:

a. **TSS, 6, 8, 11** and **13**
b. **TSS 5, 7**
c. **TSS 2, 3**

Group B is likely to be local. The members of both Groups A and B are treated in Part 4.

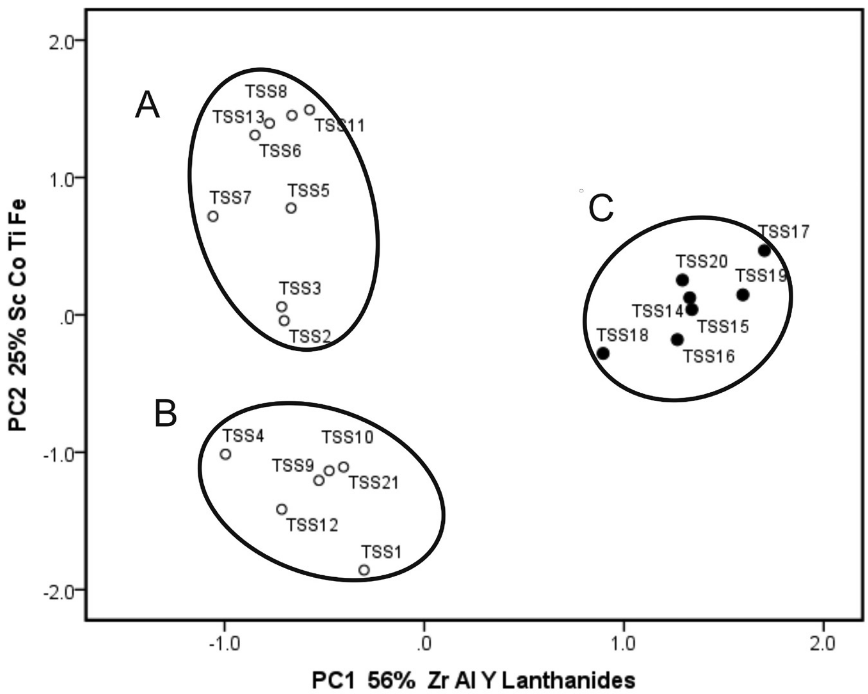


Fig. 4.5. PC plot of the ICP compositions at Torre Santa Sabina. Mycenaean and Italo-Mycenaean +, *impasto* ●. The three clusters are marked A, B and C.

Punta le Terrare (16)

INAA (Database 2): Mycenaean 1, Italo-Mycenaean 1, *impasto* 5
Publication: Bettelli *et al.* 2010
Illustration: Fig. 4.45

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. n.
M	PT1	Jar	IIIA1	Probably Peloponnese	Franco 1996, tav. I:7	41131
IM	PT2	Jug (?)	IIIB-C	Local	Franco 1996, tav. II:8	41133
I	PTI1			Local		
	PTI2			Anomalous		
	PTI3			Local		
	PTI4			Local		
	PTI5			Local		

The two Mycenaean examples, which are treated in Part 4, differ in composition; **PT1** is a likely Aegean import, while **PT2** is close to the *impasto*, although it has an anomalous composition with respect to several elements, especially Co, Cs and Eu.

XRF, PE, XRD: *Impasto* 24, daub 7 MBA (Protoapennine and Apennine)
Publication: Laviano *et al.* 1995a

The *impasto* was made of a *terra rossa*, quartz-rich and containing grog and ferruginous nodules; it was non-calcareous, and fired probably in the range 600-800°C. The daub was coarser.

Rocavecchia (17)

ICP (Database 3): Matt-painted 1, Burnished 1, Minyan 2, Mycenaean 18, Italo- Mycenaean 17, *dolia* 4, basins 2, Grey 4, PG 3, *impasto* 11, Other 2
PE: Mycenaean and Italo-Mycenaean 5, *dolia* and basins 5, Grey 2, PG 3, *impasto* 11
SEM: Mycenaean 11
Publication: Guglielmino *et al.* 2010
Illustration: Figs. 4.46-50, Plate 2

Ware	Sample	Description	Date	Suggested origin	Publication
MP	RO34	Necked jar	I-II	N. Peloponnese	Guglielmino *et al*. 2010, fig. 8:34
BU	RO36	Kantharos? Jar ?	I-II	Import	Guglielmino *et al*. 2010, fig. 8:36
MIN	RO356	Kantharos	I-II	Import	Guglielmino *et al*. 2010, fig. 10:356
	RO360	Bowl? Kantharos?	I-II	Import	Guglielmino *et al*. 2010, fig. 10:360
M	RO23	Krater	IIIB2-C	N. Peloponnese	Guglielmino *et al*. 2010, fig. 8:23
	RO25	Krater	IIIB-C	N. Peloponnese	Guglielmino *et al*. 2010, fig. 8:25
	RO26	Deep bowl	IIIB2	N. Peloponnese	Guglielmino *et al*. 2010, fig. 8:26
	RO35	Deep bowl	IIIB2	N. Peloponnese	Guglielmino *et al*. 2010, fig. 8:35
	RO37	Goblet	IIB-IIIA	N. Peloponnese?	Guglielmino *et al*. 2010, fig. 8:37
	RO38	Mycenaean; burnt?		N. Peloponnese?	
	RO39	Deep bowl	IIIC late	N. Peloponnese	Guglielmino *et al*. 2010, fig. 9:39
	RO49	Stemmed bowl	IIIB2	N. Peloponnese	Guglielmino *et al*. 2010, fig. 9:49
	RO6P	Decorated fragment		N. Peloponnese	Guglielmino *et al*. 2010, fig. 6:6
	RO10P	Decorated fragment		Peloponnese?	Guglielmino *et al*. 2010, fig. 6:10
	RO42	Stirrup jar	IIIC late	C. Greece/C. Crete?	Guglielmino *et al*. 2010, fig. 9:42
	RO8P	Decorated fragment		C. Greece/C. Crete?	Guglielmino *et al*. 2010, fig. 6:8
	RO11P	Decorated fragment		C. Greece/C. Crete?	Guglielmino *et al*. 2010, fig. 6:11
	RO364	Coarse ware stirrup jar	IIIB	W. Crete	Guglielmino *et al*. 2010, fig. 11:364
	RO430	Coarse ware stirrup jar	IIIB	W. Crete	Guglielmino *et al*. 2010, fig. 11:430
	RO531	Coarse ware stirrup jar	IIIB	W. Crete	Guglielmino *et al*. 2010, fig. 11:531
	RO461	Stirrup jar	IIIB	Not Cretan	Guglielmino *et al*. 2010, fig. 11:461
	RO5P	Decorated fragment		Peloponnese?	Guglielmino *et al*. 2010, fig. 6:5
IM	RO22	Deep bowl	IIIC late	Probably local	Guglielmino *et al*. 2010, fig. 8:22
	RO32	Fragment with band		Local	
	RO33	Closed shape	IIIC late	Local	Guglielmino *et al*. 2010, fig. 8:33
	RO48	Amphora (?)	IIIC middle	Probably local/ regional	Guglielmino *et al*. 2010, fig. 9:47
	RO47	Decorated closed shape	IIIB-C	Local	Guglielmino *et al*. 2010, fig. 11:48

Ware	Sample	Description	Date	Suggested origin	Publication
IM	RO55	Closed shape	IIIA-B	Local	Guglielmino *et al*. 2010, fig. 9:55
	RO74	Cup	IIIA	Local	Guglielmino *et al*. 2010, fig. 10:74
	RO101	Krater	IIIB-C	Local	Guglielmino *et al*. 2010, fig. 10:101
	RO151	Necked jar	IIIC	Local	Guglielmino *et al*. 2010, fig. 10:151
	RO282	Carinated cup monochrome	IIIC	Probably local/ regional	Guglielmino *et al*. 2010, fig. 10:282
	RO353	Carinated cup monochrome	IIIC	Local	Guglielmino *et al*. 2010, fig. 10:353
	RO1P	Decorated fragment		Local	Guglielmino *et al*. 2010, fig. 6:1
	RO2P	Decorated fragment		Local	Guglielmino *et al*. 2010, fig. 6:2
	RO3P	Decorated fragment		Local	Guglielmino *et al*. 2010, fig. 6:3
	RO4P	Decorated fragment		Local	Guglielmino *et al*. 2010, fig. 6:4
	RO7P	Decorated fragment		Local	Guglielmino *et al*. 2010, fig. 6:7
	RO9P	Decorated fragment		Local	Guglielmino *et al*. 2010, fig. 6:9
D	RO1	*Dolium* (coarse)		Local	
	RO10	*Dolium*		Local	
	RO12	*Dolium*		Local	
	RO13	*Dolium*		Local	
B	RO11	Painted basin		Local	
	RO14	Basin		Local	
G	RO27	Carinated bowl		Local outlier	
	RO28	Carinated bowl		Local	
	RO31	Grey		Local	
PG	RO5	Painted Protogeometric		Local	
	RO15	Painted Protogeometric		Local	
	RO16	Painted Protogeometric		Local	
I	RO2	Jar		Local	
	RO3	Small jar		Local	
	RO4	Jar		Local	
	RO6	Bowl		Local	
	RO7	Decorated cup		Local	
	RO8	Necked jar		Local	
	RO9	Bowl		Local outlier	
	RO18	Jar		Local	
	RO19	Jar		Local	
	RO20	Necked jar		Local	
	RO365	Light with shells		Local outlier	
V	RO21	Kiln lining		Local	
C	RO17	Decorated fragment		Peloponnese	

The series 1P-11P was selected for technological examination reported in Chapter 5. Fig. 4.6 shows a plot of the first two PCs in which four clusters are apparent. Table 4.4 sets out the membership of each cluster. Owing to its high calcium content, **RO365**, which is surely a local product, was omitted from the PCA.

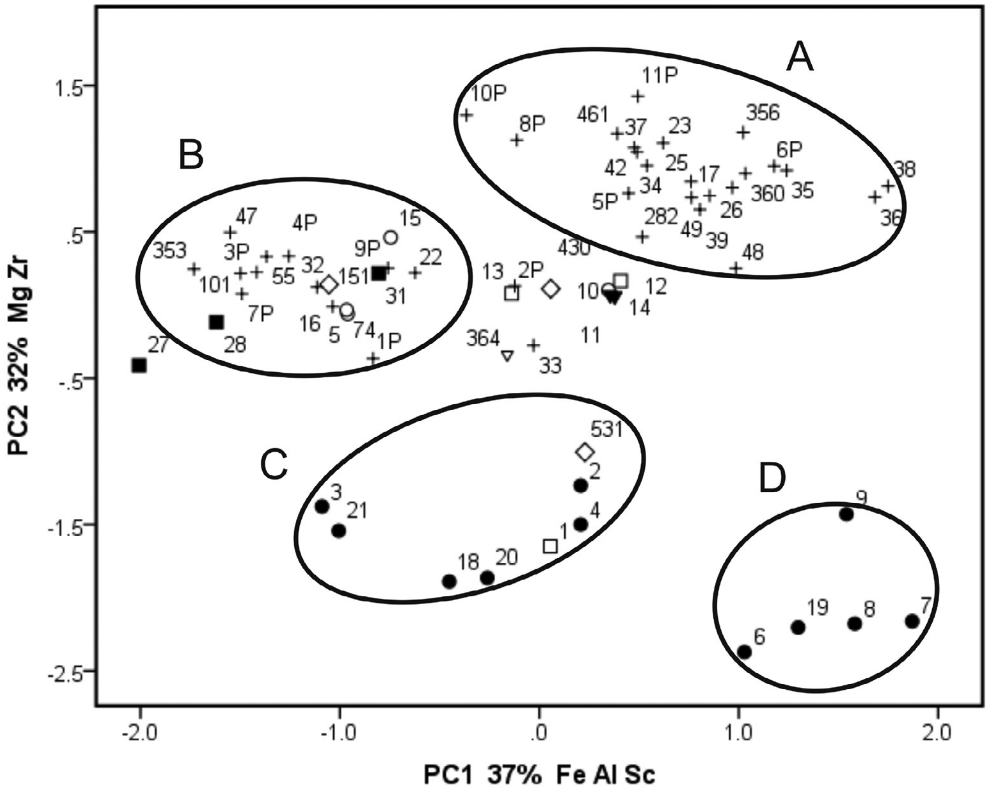


Fig. 4.6. PC plot of the ICP compositions of all samples (except RO365) at Rocavecchia, showing four clusters (A-D). Log transformed data. Mycenaean +, Coarse Ware stirrup jar ◊, *dolium* □, *impasto* ●, Grey ■, Basin ▼, PG o.

Cluster	Members
A	Matt-painted **34**; Burnished **36**; Minyan **356, 360**; Mycenaean **23, 25, 26, 35, 37, 38, 39, 42, 49, 461, 5P, 6P, 8P, 10P, 11P**; Classical **17**
Between A and B	Italo-Mycenaean **33, 48, 282, 2P**, Cretan stirrup jars **364, 430**, *dolia* **10, 12, 13,** Basins **11, 14**
B	Italo-Mycenaean **22, 32, 33, 47, 55, 74, 101, 151, 353, 1P, 3P, 4P, 7P, 9P**; Grey **28, 31**; Protogeometric and Geometric **5, 15, 16**; Grey **27** is an outlier
C	Cretan stirrup Jar **531**; *dolium* **1**; *impasto* **2, 3, 4, 18, 20**; Kiln lining **21**
D	*Impasto* **6, 7, 8, 9, 19**

Table 4.4 Membership of the clusters at Rocavecchia.

Members of Cluster A are candidate Aegean imports. Clusters B, C and D represent probable variant *local* productions. The *dolia* and basins form a compact group between Clusters A and B. Cluster D has a typical non-calcareous *impasto* composition but with significantly higher rare earth element contents than the other local clusters, while Cluster C is generally more calcareous but with low Mg. On the other hand, Cluster B, dominated by decorated Italo-Mycenaean and other Aegean-influenced wares, is more calcareous again and richer in Mg and Fe. The imports and the proposed Italo-Mycenaean are treated in Parts 4 and 5.

Turning to the petrographic analyses whose results are summarised below, Valentina Cannavò defined the granulometry of the paste of the *dolium* in *impasto* and *impasto* pottery using Digital Image Processing (DIP) in order to quantify some structural parameters, that is, the relationship matrix/voids/clasts (Table 4.5).

Mycenaean and Italo-Mycenaean (RO22, 23, 24, 25, 26)

The samples show a fine matrix brown with homogeneous and isotropic texture. Small inclusions of quartz are present with angular mono-crystals, fresh flakes of muscovite, biotite, iron oxides and carbonates.

Dolia and Basins (RO10, 11, 12, 13, 14)

The matrix is fine, light brown with homogeneous and isotropic texture. Quartz is present with angular mono-crystals, fresh flakes of muscovite, biotite, feldspars, pyroxene and carbonates. Few natural inclusions are present, probably argillaceous rock fragments (ARF).

Grey (RO27, 28)

The matrix is fine, light grey with homogeneous and isotropic texture. Abundant fossils and carbonates are present; few quartz with sub-rounded mono-crystals, fresh (or little?) quartz is present with sub-rounded mono crystals, fresh flakes of muscovite, feldspars and iron oxides.

South-Italian Protogeometric (RO5, 15, 16)

The matrix is fine, light brown with homogeneous and isotropic texture. Quartz is present with sub-rounded/angular mono-crystals, fresh flakes of muscovite, feldspars, iron oxides, pyroxene, fossils and carbonates. Few natural inclusions are present, probably argillaceous rock fragments (ARF).

Dolium in *impasto* (RO1)

Matrix (68%): light brown with homogeneous and isotropic texture. Abundant sub-rounded/angular mono and poly-crystalline quartz, fresh flakes of muscovite, few biotite, feldspars, iron oxides and carbonates. Clasts (14 %) are sub-rounded and calcareous. Voids (12%) are oriented channels.

Impasto (RO2, 3, 4, 6 7, 8, 9, 18, 19, 20, 21)

Matrix (74-97%): generally brown or black with homogenous and isotropic texture. Some small inclusions are present: mono and poly-crystalline quartz, chert, calcite, few fossils, fresh flakes of muscovite, feldspars, pyroxenes and amphiboles. Clasts (211%): silicate, carbonate clasts, calcite, ARF, and iron oxides. Sometimes grog and clay pellets. Voids (3-12%) are oriented channels and vughs, sometimes filled with secondary calcite.

Samples are listed from coarse to fine. For the coarser samples with clasts the % of the different clast sizes is added. Matrix <0.0625 mm; very fine sand 0.0625-0.125 mm; fine sand 0.125-0.25 mm; medium sand 0.25-0.5 mm; coarse sand 0.5-1 mm; very coarse sand 1-2 mm.

Italo-Mycenaean **RO22** is characterised by the presence of fossils in contrast to the Mycenaean examples which are chemically defined as imported (**RO23**, **24**, **25** and **26**). The two Grey carinated bowls, **RO27** and **28**, have in common abundant fossils, but **RO27** differs in having a very low percentage of minerals. The PG group is also characterised by the presence of fossils (**RO16** with

	CLASTS							
SAMPLE	% MATRIX	% VOIDS	% CLASTS	% VERY FINE SAND	% FINE SAND	% MEDIUM SAND	% COARSE SAND	% VERY COARSE SAND
RO1	73	12	14	1			7	7
RO18	74	15	11	2	3	1	1	3
RO7	68	27	5	1			3	
RO9	86	11	3	1			3	
RO19	85	13	2	2				
RO8	84	14	2	1		1		
RO21	76	22	2	2				
RO2	87	13						
RO3	88	12						
RO4	93	7						
RO20	95	5						
RO6	97	3						

Table 4.5. Digital Image Processing of *impasto* and *dolium* in *impasto* showing the percentage of the different components.

two very large ones). The *dolia* and basins group, which is also chemically coherent, shows a significant abundance of muscovite and biotite compared to the other wares. The granulometry of clasts shows the presence of added temper in *dolium* **RO1** and *impasto* **RO7**, **8**, **9** and **18**. All the raw materials are locally available.

Otranto (18b)

INAA (Database 2): Mycenaean 1
Previously unpublished

WARE	SAMPLE	DESCRIPTION	DATE	SUGGESTED ORIGIN
M	OTR2			Peloponnese?

The sample is treated with those from the Taranto area.

Capo Santa Maria di Leuca (19a)

PE: Mycenaean 5, PG 4, *impasto* 3 (FBA)
Publication: Boschian 1996

Local production was inferred for the Italo-Mycenaean and PG samples which contained fine-grained, micaceous pastes, common quartz, frequent plagioclase and K-feldspar, occasional chert. Silicate temper ranged from 12 to 18%. Calcite was always present (micrite) in the range 5-20%; in one case (Protogeometric) sparite was found. Planctonic foraminifera and marine shells were common. The clay was probably from the late Pliocene-Quaternary silicoclastic formations of the Bradanic Trench. The *impasto*, by contrast, was a coarse non-calcareous *terra rossa* with dominant quartz, common K-feldspar, few plagioclase, very few pyroxene and muscovite. Concretions of Fe/Mn oxides and pedorelicts were frequent. The thin sections are illustrated in Boschian 1996, Fig. 7.

Torre Castelluccia (24)

AAS (Database 1): Mycenaean 2, Grey 2
INAA (Database 2): Mycenaean 1?, *dolia* 4, basins 4, PG 7, *impasto* 3
ICP (Database 3): *Dolia* 6, *impasto* 3
Publication: Jones, Levi 2002 and previously unpublished
Illustration: Fig. 4.51

AAS						
Ware	**Sample**	**Description**	**Date**	**Suggested origin**	**Publication**	**Inv. N.**
M	TCA1	Closed vessel	IIIC	C. Crete/C. Greece?	Fisher 1988, n. 250?	55033
IM	TCA22	Bowl/cup	IIIB?	Local	Fisher 1988, n. 260	55036
G	TCA23			Uncertain		53790
	TCA24			Local?		55817
INAA						
IM?	TCA13	Painted		Local		43749
D	TCA2*			Local		43739
	TCA3*			Local		43765b
	TCA5*			Local		43825
	TCA14			Local		43827
B	TCA6*	Painted		Local		43824b
	TCA7*	Painted, burnt?		Local		43741
	TCA8	Painted		Local		43742
	TCA11	Painted		Local		43738b
PG	TCA9	Jar with slip		Local		43822
	TCA10	Bowl painted		Local		43736a
	TCA12	Jar painted, burnt?		Local		43348a
	TCA15	Carinated cup painted		Local		43737a
	TCA19			Local		68107a
	TCA20			Local		20077+55079
	TCA 21			Local		F5/16
I	TCA16*	Red burnished		Local		
	TCA17*	Black burnished		Local		
	TCA18*	Red coarse		Atypical local		
ICP						
D	TCA2*			Local		
	TCA3*			Local		
	TCA5*			Local		
B	TCA6*	Painted		Local		
	TCA7*	Painted, burnt?		Local		
I	TCA16*	Red burnished		Local		
	TCA17*	Black burnished		Local		
	TCA18*	Red coarse		Local		

Sample numbers are different in Jones, Levi (2002); * = analysed by both INAA and ICP.

The results are presented with those from the Taranto area.

Porto Perone and Satyrion (25a-b)

AAS (Database 1): Matt-painted 1, Pithos 1, Italo-Mycenaean 12, IM-PG? 1, *dolium* 1, Grey 4, PG 3, Greek PG? 1
INAA (Database 2): Matt-painted 1, Pithoi 2, Italo-Mycenaean 5, *dolium* 1
ICP (Database 3): Matt-painted 1, Pithoi, 2, *dolium* 1
Publications: Jones 1993a; Jones, Levi 2002; previously unpublished
Illustration: Figs. 4.51-53

AAS						
Ware	**Sample**	**Description**	**Date**	**Suggested origin**	**Publication**	**Inv. N.**
MP	PP16*	Amphora	I-II	Peloponnese	Lo Porto 1963, fig. 47	120920
P	PP17*	Pithos		Atypical local	Lo Porto 1963, fig. 53	121138
IM	PP2	Closed vessel, handle	III	Probably local	Lo Porto 1964, fig. 19:6	120161
	PP3	Jar/amphora	IIIC	Local	Lo Porto 1964, fig. 18:9	120163
	PP4	Open vessel	IIIC	Local	Lo Porto 1964, fig. 18:4	120166
	PP5	Closed vessel	IIIC	Local	Lo Porto 1964, fig. 18:5	120169 or 159
	PP8	Jug	IIIC	Local	Lo Porto 1964, fig. 17	120216
	PP10	Closed vessel	IIIC	Local	Lo Porto 1963, fig. 54:3	120333
	PP11	Cup	IIIC?	Local	Lo Porto 1963, fig. 54:1	120336
	PP15	Closed vessel	IIIC	Local	Lo Porto 1963, fig. 55:4	120681
	PP18	Jug?	IIIC	Local	Lo Porto 1963, fig. 69:9	55397
	PP20	Closed vessel	IIIA?	Local	Lo Porto 1963, fig. 69:2	5551
	PP21	Carinated cup	IIIC	Atypical local	Biancofiore 1967, fig. XXXVI:1	5567
	PP22	Carinated cup same as 21		Atypical local	Lo Porto 1963, fig. 69:4	5568
IM-PG?	PP1	Closed vessel	IIIC?	Local	Lo Porto 1964, fig. 20:3	119993
D	PP12*	Pithos		Local	Lo Porto 1963, fig. 16:9	120437*
G	PP6	Dish		Atypical local	Lo Porto 1964, fig. 15:8	120196
	PP7	Handle		Atypical local	Lo Porto 1964, fig. 15:10	120197
	PP9	Grey?		Local	Lo Porto 1963, fig. 48:6	120324
	PP13			Local	Lo Porto 1963, fig. 48:5	120546
PG	PP14			Local	Biancofiore 1967, fig. XXIX:328	120678
	PP19			Local		55407
	PP29			Local	Lo Porto 1964, 30:3	119987
Greek PG?	PP30			Import	Lo Porto 1964, 42:1	7687
INAA						
MP	PP16*	Amphora matt-painted	I-II	Peloponnese	Lo Porto 1963, fig. 47	120920
P	PP17*	Pithos		Atypical local?	Lo Porto 1963, fig. 53	121138
	PP23*	Transport amphora or pithos	IIIB	Uncertain	Lo Porto 1963, fig. 52	120137
IM	PP24	Closed vessel	IIIC	Local	Lo Porto 1963, fig. 69:3	5563

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
IM	PP25	Open vessel (Krater?)	IIIC	Local	Lo Porto 1964, fig. 20:6	120133
	PP26	Closed vessel	IIIC	Local	Lo Porto 1964, fig. 20:4	120175
	PP27	Jar/amphora	IIIC	Local	Lo Porto 1963, fig. 54:10	120326
	PP28	Closed vessel	IIIC	Local	Lo Porto 1964, fig. 20:2	120171
D	PP12*			Local	Lo Porto 1963, fig. 16:9	120437
ICP						
MP	PP16*	Amphora	I-II	N. Peloponnese	Lo Porto 1963, fig. 47	120920
P	PP17*	Pithos		Atypical local?	Lo Porto 1963, fig. 53	121138
	PP23*	Transport amphora or pithos	IIIB	Uncertain	Lo Porto 1963, fig. 52	120137
D	PP12*			Local	Lo Porto 1963, fig. 16:1	120437

* = sample analysed by more than one technique; sample numbers are different in Jones, Levi (2002)

Taranto: S. Domenico (26a)

INAA (Database 2): *Dolium*? 1, PG 1, *impasto* 1
ICP (Database 3): PG 1
Previously unpublished

Ware	Sample	Description	Suggested origin
D?	SDO2		Local
PG	SDO3	Jug painted	Local
I	SDO1*		Local
	LV2		Local

* SDO1 analysed by both techniques. LV=Lugovivo site at Taranto

The data set is treated with those from other sites in the Taranto area.

Taranto: Scoglio del Tonno (26b)

WCA, PE, density and porosity measurements, DTA: Mycenaean 5?, local clay 1
Publication: De Angelis *et al.* (1960)

Sample	Description	Publication
TA1	IIIB coarse ware dark-on-light stirrup jar	
TA2	Three-handled piriform jar fragment with grey-green fabric	Biancofiore 1967, Tav XXI 97a-b
TA3	Amphora fragment	
TA4	Krater fragment	Biancofiore 1967, Tav XIII 55
TA5	Jug	Biancofiore 1967, Tav XIX 85

De Angelis *et al.* (1960) proposed that the contrast in composition between the (modern) Pulsano clay and the samples from Scoglio del Tonno and the correspondence of the latter with their Aegean reference material (from Mycenae, Tiryns and Rhodes) pointed to their status as Aegean imports. Jones (1986a, 515f) has shown that the data was more consistent with an origin in the Argolid than on Rhodes.

AAS (Database 1): Mycenaean 23, Mycenaean? 1, Italo-Mycenaean 3, Grey 3, PG 2, *impasto* 8
INAA (Database 2): Mycenaean 13, Uncertain 3, Italo-Mycenaean 3, Grey 1, *impasto* 6
ICP (Database 3): Burnished 1, Mycenaean 7, Coarse ware 4, Italo-Mycenaean 2, Grey 7, Kiln lining 1, *dolia* 4, *impasto* 8
PE (Database 5): Coarse ware 4, *dolia* 4, *impasto* 5, Kiln 1 (SDT201-219)
Publications: Jones 1986, 513-6; Jones, Levi 2002; Gorgoglione *et al.* 2006 (for SDT201-219); previously unpublished
Illustration: Figs. 4.54-60, Plate 3

The AAS and INAA data sets considered separately here concern the material sampled in the Taranto Museum in 1989 from Scoglio del Tonno (ST), Porto Perone and Satyrion (PP) and Torre Castelluccia (TCA). Only the results for the *dolia*, Grey ware, PG and *impasto* have been published (Jones, Levi 2002). More recently taken samples have been analysed by ICP.

AAS						
Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
M	ST1	Piriform jar	IIIA2	Peloponnese	Taylour 1958, pl. 10:3-6; Biancofiore 1967, tav. XIII:55	18617a
	ST2	Piriform jar	IIIA2	Peloponnese	Biancofiore 1967, tav. IV:5	18631
	ST3	Piriform jar	IIIA2	Peloponnese	Biancofiore 1967, tav. V:7	18632
	ST4	Jug with cutaway neck	IIIA2	Peloponnese	Biancofiore 1967, tav. XV:68	18639c*
	ST7	Cup	IIIB-C?	Peloponnese?	Biancofiore 1967, tav. XIV:63	18846
	ST21	Deep bowl?	IIIB-C	Peloponnese	Vagnetti, Jones 1988, fig. 1.1	7133
	ST23	Deep bowl/ Krater?	IIIB-C	Peloponnese	Fisher 1988, fig. 25:155	7138
	ST25	Cup with wishbone handle	III	Peloponnese?	Biancofiore 1967, tav. XXXIVa+b	7146
	ST26	Piriform jar	IIIB	Peloponnese	Biancofiore 1967, tav. II:98	7150
	ST30	Stirrup jar	IIIB	Peloponnese	Biancofiore 1967, tav. X:140	7179
	ST31	Goblet	IIIA2-B	Peloponnese	Biancofiore 1967, tav. XII:141	7180
	ST33	Piriform jar	IIIA	Peloponnese	Biancofiore 1967, tav. IV:14	7195
	ST35	Kalathos	IIIA?	Peloponnese	Biancofiore 1967, tav. XXV:176	7202
	ST27	Basin	IIIC?	Atypical Peloponnese; closer to C Crete or C Greece	Drago 1940, tav 1:1	7157
	ST5	Basin or kalathos	IIIB?	Rhodes	Biancofiore 1967, tav. XIV:151	18778
	ST6	Mug	IIIB	Rhodes	Biancofiore 1967, tav. XXV:180	18831

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
M	ST8	Stirrup jar	III	Rhodes	Biancofiore 1967, tav. XI:34	18855a*
	ST9	Alabastron?	IIIC	Rhodes	Biancofiore 1967, tav. XLI:o	18902
	ST10	Piriform jar or alabastron	IIIA?	Rhodes	Biancofiore 1967, tav. XIX:84	18916cd
	ST32	Stirrup jar	IIIC	Rhodes	Biancofiore 1967, tav. VIII:129	7193*
	ST34	Stirrup jar	IIIC	Rhodes	Biancofiore 1967, tav. XXIII:113	7197*
	ST36	Stirrup jar	IIIC	Rhodes	Biancofiore 1967, tav. XXIII:115, cfr. ST 57	7205
	ST92	Krater	IIIC	Rhodes	Taylour 1958, tav. 13:7; Biancofiore 1967, tav. XXIV:155	7174
IM	ST22	Necked jar/ amphora	IIIC	Uncertain	Vagnetti 2000-01, fig. 20	7136*
	ST24	Piriform jar or Krater	IIIB?	Probably local?	Fisher 1988, fig. 9:39	7139
	ST28	Piriform jar	IIIC?	Local?	Biancofiore 1967, tav. XVI:73	7164*
	ST29	Bowl/cup	IIIB	Local	Biancofiore 1967, tav. XV:142	7178
	ST11	Closed vessel	IIIC-Submyc.	Atypical local?	Biancofiore 1967, tav. XLI:e	203151
	ST12	Closed vessel	IIIC-Submyc.	Atypical local?	Biancofiore 1967, tav. XLI:e	203151
I	ST14	Red		Local		5718*
	ST15	Red/black		Local		5737*
	ST16	Black		Local		5889*
	ST17	Black		Local		7050*
	ST18	Black		Local		7073*
	ST19	Red		Local		7075*
	ST20	Black		Local		7077*
	ST37	Figurine		Local	Biancofiore 1967, tav. XXXIV:I	7214
INAA						
M	ST42	Piriform jar	IIIA2	Peloponnese	Gorgoglione 1982, tav. XII:3	18660A
	ST43	Piriform jar	IIIA?	Peloponnese	Biancofiore 1967, tav. III:5	18751
	ST44	Piriform jar	IIIA2	Peloponnese	Biancofiore 1967, tav. XX:94-95	18604C
	ST54	Jug with cutaway neck	IIIA2	Peloponnese	Biancofiore 1967, tav. XV:68	18639*
	ST47	Jug? stirrup jar?	IIIA2	Peloponnese	Biancofiore 1967, tav. XV:69	18634
	ST41	Piriform jar	IIIC	C. Greece	Biancofiore 1967, tav. XXV:169	18746*
	ST40			Rhodes	Not. ill.	18919*
	ST48	Necked jar	Archaic?	Rhodes	Biancofiore 1967, tav. XIX:85	7141
	ST50	Stirrup jar	III	Rhodes	Biancofiore 1967, tav. XI:34	18855A*
	ST52	Krater	IIIC	Rhodes	Gorgoglione 1982, tav. XIII:5	7200*
	ST57	Stirrup jar	IIIC	Rhodes	Biancofiore 1967, tav. XXIII:114, cfr. ST 36	18845

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
M	ST58	Stirrup jar	IIIC	Rejected because of incomplete composition	Biancofiore 1967, tav. XXIII:113	7197*
	ST46	Necked jar	IIIC	S. Cyprus	Biancofiore 1967, tav. XXXV:n	18891B*
	ST49	Necked jar	IIIC	S. Cyprus	Biancofiore 1967,tav. XXXV:i	18896
	ST55	Jug or amphora	IIIC	Uncertain	Drago 1940, tav. I:6	7135
	ST56	Piriform jar	IIIA2	Import (but problem of incomplete composition)	Biancofiore 1967, tav. V:8	18615
IM	ST28	Piriform jar	IIIC?	Local	Biancofiore 1967, tav. XVI:73	7164*
	ST45	Krater	IIIC	Local	Biancofiore 1967, tav. XXXV:a	18882
	ST51	Bowl	IIIC	Local	Biancofiore 1967, tav. XXXVh	18888A
G	ST53			Local	Gorgoglione 2002a, fig. 1.1	7217*
I	ST14			Local		5718*
	ST15			Local		5737*
	ST16			Local		5889*
	ST17			Local		7050*
	ST19			Local		7075*
	ST20			Local		7077
				ICP		
BU	ST87	Cup		Local	Gorgoglione *et al.* 2006, fig. 4:3	203313 (old SDT215)
M	ST59	Jug? Stirrup jar?	IIIA2	Peloponnese	Biancofiore 1967, tav. XV:69	18634
	ST60 =ST41	Piriform jar	IIIC	C. Greece?	Biancofiore 1967,tav. XXV:169	18746*
	ST61 =ST46	Necked jar	IIIC	Rhodes	Biancofiore 1967, tav. XXXV:n	18891B*
	ST40			Rhodes?	Not ill.	18919*
	ST63 =ST32	Stirrup jar	IIIC	Rhodes	Biancofiore 1967, tav. VIII:129	7193*
	ST64 =ST58	Stirrup jar	IIIC	Rhodes	Biancofiore 1967, tav. XXIII:113	7197*
	ST65 =ST52	Krater	IIIC	Rhodes	Gorgoglione 1982, tav. XIII:5	7200*
CW	ST83	Tripod		Aegina	Gorgoglione *et al.* 2006, fig. 5:3	203329 (old SDT211)
	ST84	Tripod	IIIC	Rhodes	Gorgoglione *et al.* 2006, fig. 5:4	203322 (old SDT212)
	ST85	Tripod		Local	Gorgoglione *et al.* 2006, fig. 5:1	203326 (old SDT214)

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
CW	ST86	Tripod		Local	Gorgoglione *et al.* 2006, fig. 5:2	203328 (old SDT213)
IM	ST62 =ST22	Necked jar/ amphora	IIIC	Probably local	Vagnetti 2000-01, fig. 20	7136*
	ST90	Carinated cup	IIIC	Local	Gorgoglione *et al.* 2006, fig. 4:4	203319 (old SDT218)
G	ST66			Local		7216*
	ST67	Carinated cup		Local	Gorgoglione 2002a, fig. 1.1	7217
	ST68	Carinated cup		Local	Biancofiore 1967, tav. I:b	7218
	ST69	Carinated cup		Local, but see text	Gorgoglione 2002b, fig. 1.2	7219
	ST88	Jar three-handled?		Local	Gorgoglione *et al.* 2006, fig. 4:5	203300 (old SDT216)
	ST89	Carinated cup		Local	Gorgoglione *et al.* 2006, 1136	203291 (old SDT217)
	ST91	Horizontal handle		Local	Gorgoglione *et al.* 2006, fig. 4:6	203287 (old SDT219)
DF	ST76	Band and impressed cordons		Local	Gorgoglione *et al.* 2006, fig. 2:3	5841 (old SDT204)
DI	ST75	Decorated cordon		Local	Gorgoglione *et al.* 2006, fig. 2:2	5690 (old SDT202)
	ST80	Cordons		Local	Gorgoglione *et al.* 2006, fig. 4:2	5969 (old SDT208)
	ST81	Jar		Local	Gorgoglione *et al.* 2006, 1132	5987 (old SDT209)
I	ST70 =ST18			Local, but see text		5889*
	ST71 =ST18			Local		7073*
	ST72 =ST19			Local		7075
	ST73	Bucket		Local	Gorgoglione *et al.* 2006, fig. 3:1	5907 (old SDT201)
	ST74	Bucket		Local	Gorgoglione *et al.* 2006, fig. 3:2	5906 (old SDT202)
	ST78	Foot		Local	Gorgoglione *et al.* 2006, fig. 3:3	16985 (old SDT206)
	ST79	Jar		Local		5803 (old SDT207)

WARE	SAMPLE	DESCRIPTION	DATE	SUGGESTED ORIGIN	PUBLICATION	INV. N.
I	ST82	Bowl		Local	Gorgoglione *et al.* 2006, fig. 4:1	5807 (old SDT210)
V	ST77	Kiln fragment		Local	Gorgoglione *et al.* 2006, figs. 1:2, 2:1	5689 (old SDT205)

* = analysed by more than one technique; ST11 and 12 are two separate samples from the same vessel; ST22, 32, 41, 46, 52 and 58 have been reanalysed with fresh samples and given new ST numbers (ST60-65). Sample numbers in brackets, SDT series, refer to the labels published in Jones, Levi (2002).

DI *dolium* in *impasto*, see Plate 3; DF *dolium* in figulina.

The results are treated according to technique with those for other sites in the Taranto area.

Results for the Taranto area sites

a. AAS

In the Mg-Cr oxide plot (Fig. 4.7a) and the corresponding PC plot (not shown here) nine samples — **ST5, 6, 8, 9, 10, 32, 34, 36** and **92** — separate clearly from the remainder, the character of whose compositions is shown in Part 4 to be probably Rhodian. **TCA1** also stands out as an outlier. In the absence of this sample and the proposed Rhodian examples, the situation is as shown in Fig. 4.7b, c for the Scoglio del Tonno and the other Taranto area samples respectively. In both cases there are two groups — **A** and **B** — which may be taken as broadly corresponding to local and imported production. In the corresponding PC plot (Fig. 4.7d) there seem to be three weakly defined groupings:

A. Calcareous, probably local;
B. Calcareous, mainly imports;
C. Local non-calcareous *impasto*.

That Figs. 4.7b-d offer no clear-cut distinction between what is and is not 'local' is reflected by the number of Uncertain, Atypical and Probably Local classifications in the Tables above. While progress is made in Part 4 in considering many of the likely imports, the assignments presented in the columns Suggested Origin in the Tables represent a *consensus* picture.

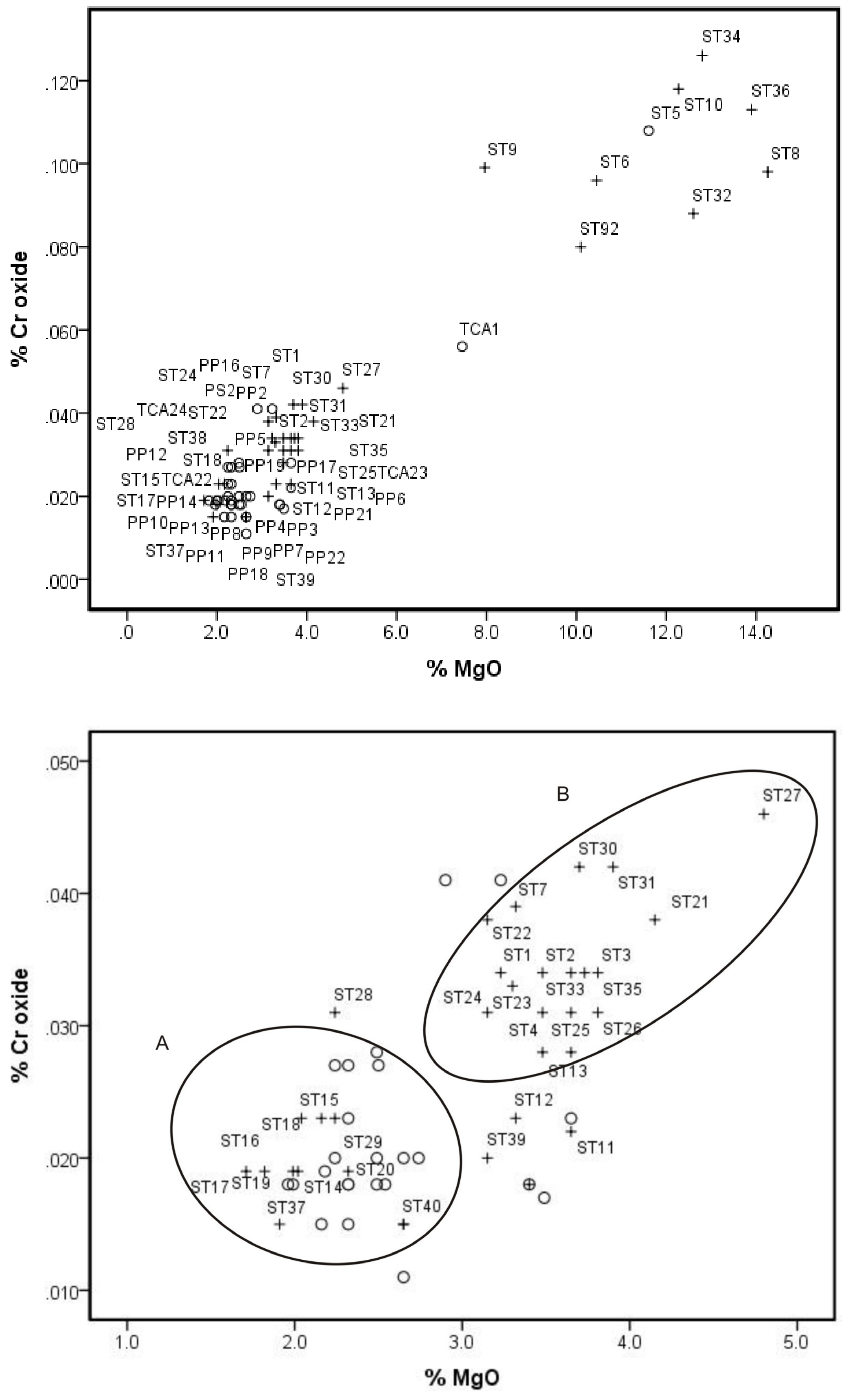


Fig. 4.7. (a) Mg-Cr oxide plot for all the samples from the Taranto area, and (b) Mg-Cr oxide plot at expanded scales highlighting the Scoglio del Tonno (+ ST) samples (excluding the Rhodian imports). AAS data.

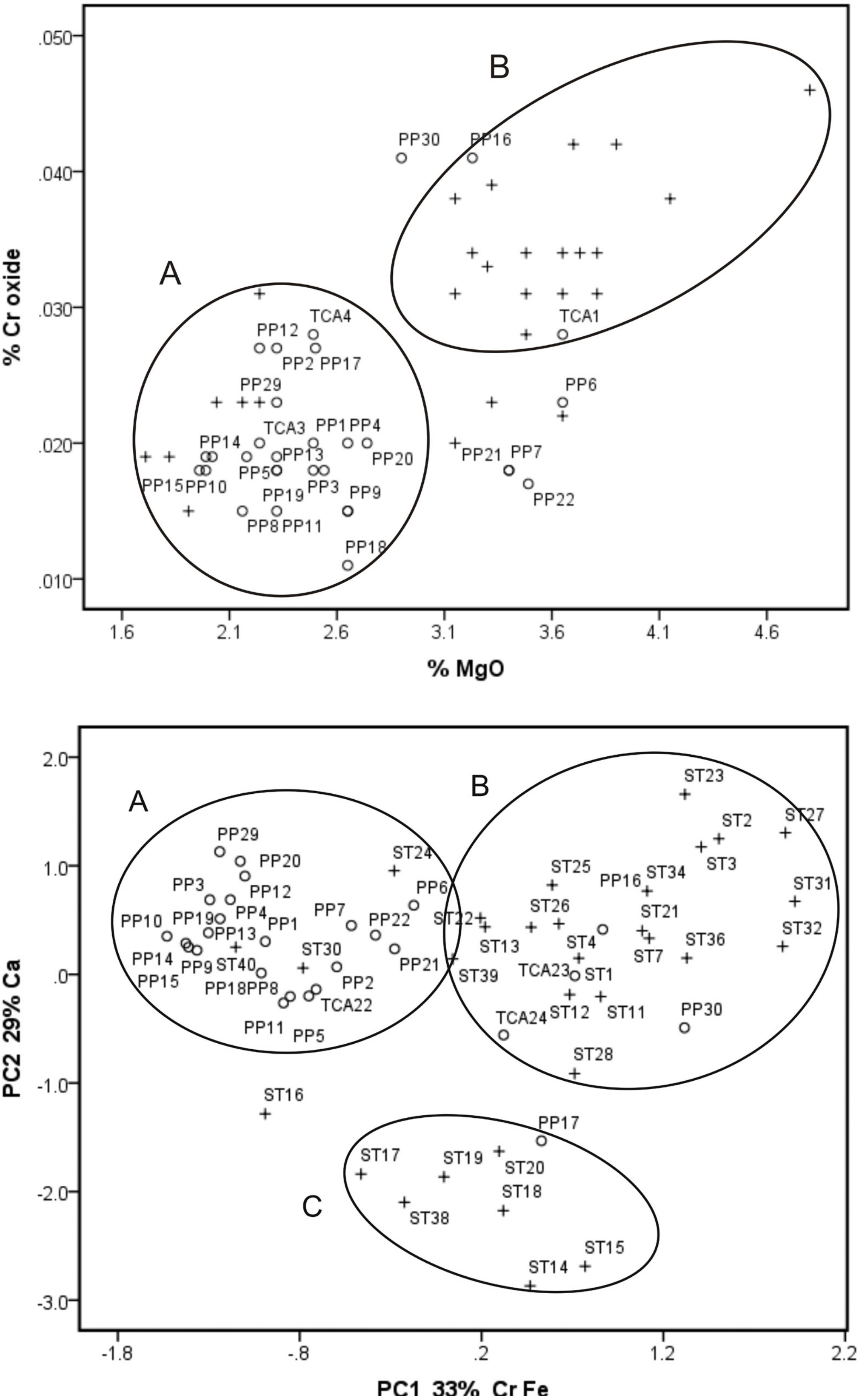


Fig. 4.7. (c) Mg-Cr oxide plot highlighting the samples from Porto Perone (PP) and Torre Casteluccia, and (d) PC plot of the AAS compositions of pottery from the Taranto area excluding the Rhodian imports and TCA1. Al and Ti omitted. Clusters 1 (calcareous probably local), 2 (mainly imports) and 3 (*impasto*) are shown. In both plots Scoglio del Tonno samples are marked +. AAS data.

b. INAA

As with the AAS data set, some of the INAA compositions stand well apart from the main cluster (Fig. 4.8a). Having removed the seven outliers from the data set — **ST40, 46, 48, 49, 50, 52** and **57** —, there is in the PC plot (Fig. 4.8b) a separation of those samples (in Cluster A) with high positive scores on PC2 dominated by the two origin-sensitive elements, Cr and Co, from those forming the majority having lower or, in the case of *impasto*, negative scores on PC2 (Cluster B). This offers a classification, albeit crude, of likely imports and local products respectively. **ST14** and **15**, both *impasto*, have anomalous rare earth contents. The imports, which should include **ST54**, are discussed collectively in Part 4.

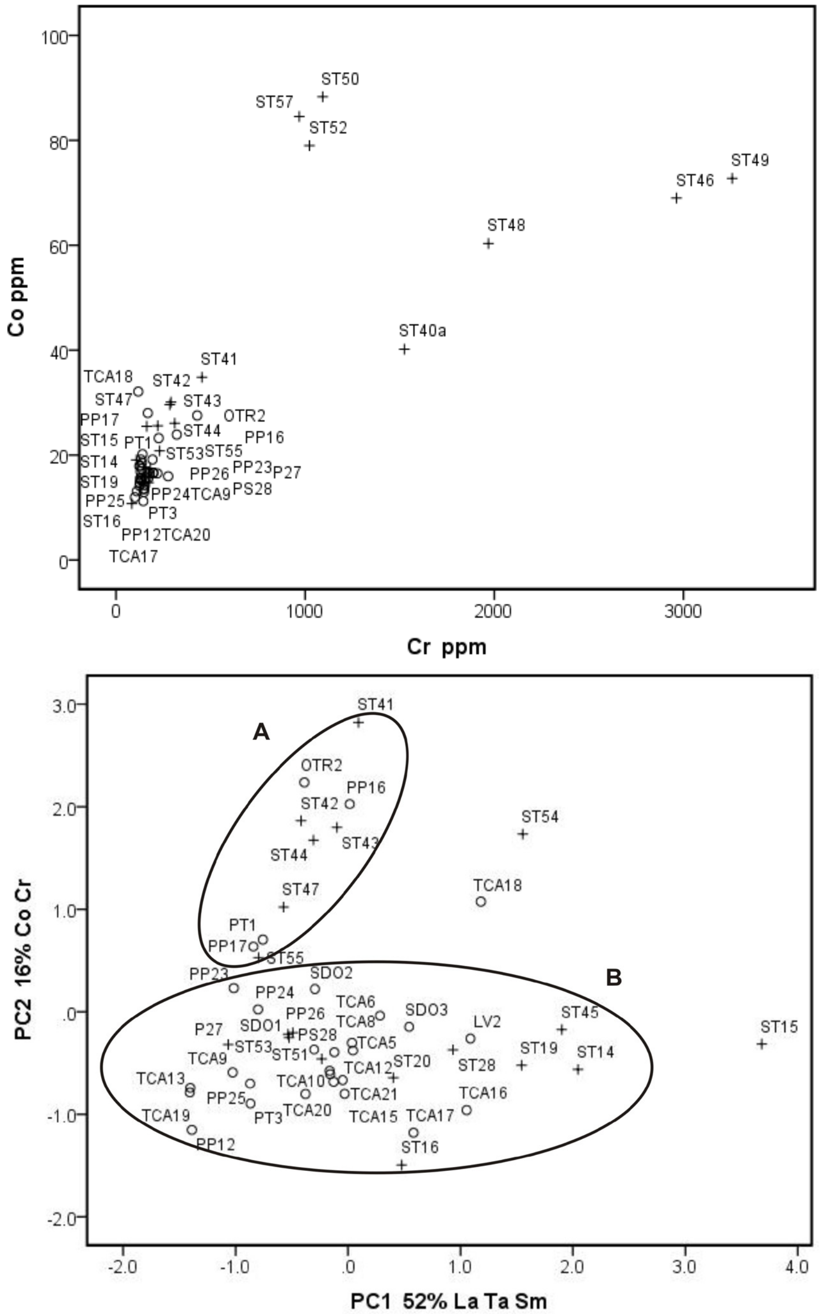


Fig. 4.8. (a) Cr-Co plot for the samples from the Taranto area, and (b) PC plot of the INAA compositions of pottery from the Taranto area without the Rhodian imports. Clusters A and B encompass the proposed Aegean imports and local products respectively. Scoglio del Tonno samples are marked +.

c. ICP

There are four, perhaps five likely Rhodian samples: **ST61, 63, 64, 65** and **?40**. With the exception of two highly calcareous samples, **ST73** and **74**, the *impasto* is non- or low calcareous. **ST84** has an anomalous composition with high Fe, Cr and Ni contents, similar to **ST92** (**ST7174**) analysed by AAS, and should be Rhodian.

On removing **ST84**, one large cluster, B, one small one, A, and the possible Rhodian outlier, **ST40**, are evident in the PC plot (Fig. 4.9). Cluster B comprises **ST59**, **60** and **PP16** which are discussed in Part 4 together with a broad spectrum of samples representing 'local' manufacture. **PP17**, a pithos, appears to have an atypical local composition, but this view should be treated cautiously until the petrographic compositions of this and other pithos jars as well as **PP23** become available.

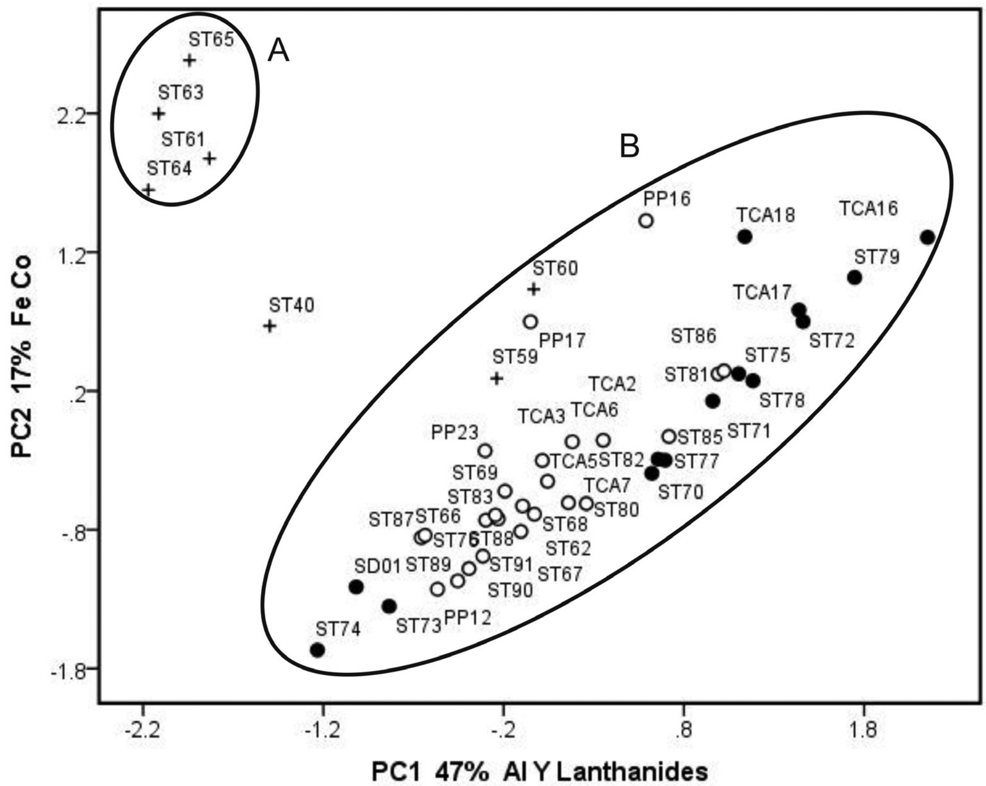


Fig. 4.9. PC plot of the ICP compositions of pottery from the Taranto area. ST84 removed. SD01 is from Taranto San Domenico. Mycenaean +, *Impasto* ●, remainder o.

For those samples analysed by more than one technique – **PP12, 16, 17, ST22(=62), 28, 32(=63), 40, 46(=61), 52(=65)** and **58(=64)** and the *impasto* **ST15, 16, 17, 18, 19** and **20** – there is satisfactory agreement in their respective origin assignments with the exception of **46(=61)**. **ST22** cannot be assigned with confidence, and *impasto* **TCA18** has an atypical composition.

Finally in this section, we return to the coarse wares at Scoglio del Tonno to examine their petrographic and chemical compositions, the former being summarised in Table 4.6. The presence of volcanics in **ST83** marks it out as a potential import and this is considered in Part 4. **ST84** containing chert stands apart owing to anomalously high Cr, Ni and Co; for the remaining samples there is good correlation between the petrographic groups and the chemical data (Fig. 4.10).

Ware	Sample	Sample in Gorgoglione *et al.* 2006	Suggested origin	PE
CW	ST83	SDT211	Aegina?	Volcanics and micritic calcite
	ST84	SDT212	Rhodes?	Chert
	ST86	SDT213	Local	Quartz and feldspars
	ST85	SDT214	Local	
DF	ST76	SDT204	Local	Fossiliferous mudstone and fossils
DI	ST75	SDT203	Local	Quartz and feldspars
	ST80	SDT208	Local	Quartz and very abundant feldspars
	ST81	SDT209	Local	Grog, quartz and feldspars
I	ST73	SDT201	Local?	Fossils
	ST74	SDT202	Local?	Fossils
	ST78	SDT206	Local	Grog, quartz and feldspars
	ST79	SDT207	Local	Grog, quartz and feldspars
	ST82	SDT210	Local	Quartz and feldspars
kiln	ST77	SDT205	Local	Quartz and feldspars

Table 4.6. Summary of PE of coarse wares at Scoglio del Tonno (Gorgoglione *et al.* 2006). DF *dolium* in figulina; DI *dolium* in *impasto*.

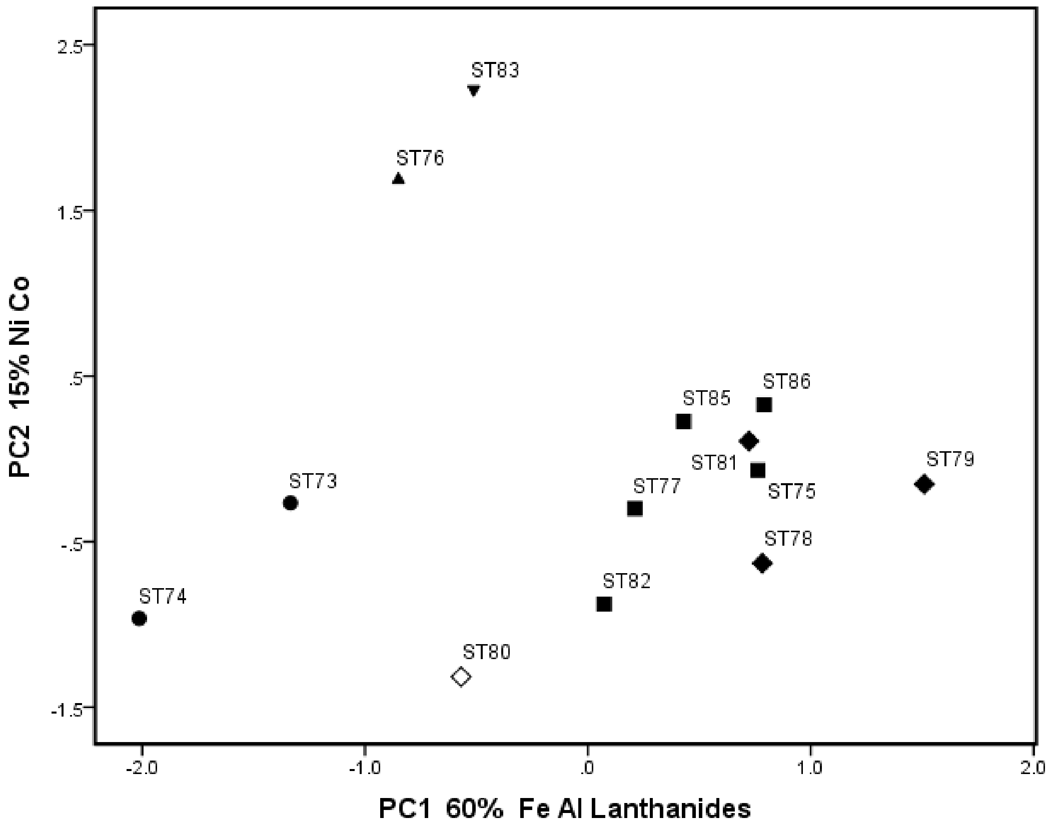


Fig. 4.10. PC plot of the ICP compositions of *impasto* and related samples from Scoglio del Tonno: fossils (●), grog (♦), siliceous (■), fossiliferous mudstone (▲), volcanic & calcareous (▼) and quartz-very abundant feldspars (◊). **ST84** excluded.

BASILICATA

This short section is dominated by the entry for Termitito.

San Vito (29)

AAS (Database 1): Italo-Mycenaean 1, Protogeometric 2
Previously unpublished
Illustration: Fig. 4.61

The samples are treated with those from Termitito below.

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
IM	SV3	Deep bowl?	IIIB2	Local	De Siena 1986, fig. 19	149675 sv 32
PG	SV1			Local		149679 sv 42
	SV2			Local		149681 sv 45

Termitito (30)

AAS (Database 1): Mycenaean 1, Italo-Mycenaean 43, PG 3, *impasto* 10
Publication: Jones 1986 (for T1-23 and T49-54)
Illustration: Figs. 4.61-62

The compositions of the Italo-Mycenaean form a reasonably coherent group, well separated from the non-calcareous *impasto*. There are two Mycenaean samples at Termitito (**T32, 37**) and one from San Vito (**SV2**) with high calcium contents; **SV1** has an *impasto*-type composition. Apart from **T37** (**147207**), a stirrup jar which stands out in the Mg-Cr oxide plot in Fig. 4.11 and is likely to be an Aegean import, the remaining Mycenaean samples are candidates for local production in view of the similarity with the compositions of later pottery from Metapontum (**MP2**, see also Jones 1986a, 351 and 689-90) and San Vito (**SV2** and **3**). The two examples with Pictorial Style decoration, **T39** and **T40**, belong to this local group.

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
M	T37	Stirrup jar	IIIB-C	N. Peloponnese		147207
IM	T1	Stirrup jar?	IIIC	Local		47181
	T2	Closed vessel	IIIC	Local		47182
	T3	Deep bowl	IIIB-C	Local		47184
	T4	Cup	IIIC	Local		47180
	T5		IIIB-C	Local		47183
	T6			Local		47144
	T7	Closed vessel?	IIIC	Local		47151
	T8	Closed vessel?	IIIB-C	Local		47150
	T9	Deep bowl	IIIB-C	Local	De Siena, Bianco 1982, tav. XXV:6	47114

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
IM	T10	Vertical handle, closed vessel	IIIB-C	Local		47115
	T11	Horizontal handle, open vessel	IIIB-C	Local		47117
	T12	Base	III	Local		47119
	T13	Closed vessel, base	IIIB-C	Local		47106
	T14	Krater?	IIIB-C	Local		47111
	T15	Uncertain shape	IIIB-C	Local		47082
	T16	Uncertain shape	IIIB-C	Local		47080
	T17	Closed vessel	IIIC	Local		47073
	T18	Uncertain shape	III	Local		47074
	T19	Open vessel?	IIIC	Local		47079
	T20	Closed vessel	IIIB-C	Local		47066
	T21	Open vessel	IIIB-C	Local		47039
	T22	Uncertain shape	IIIB-C?	Local		47045
	T23	Open vessel?	IIIB-C	Local		47041
	T24	Necked Jar?	IIIC	Local		322269
	T25	Uncertain shape	III	Local		
	T26	Uncertain shape	III	Local		
	T27	Open vessel (cup?)	IIIB-C?	Local		
	T28	Uncertain shape	III	Local		322267
	T29	Deep bowl?	IIIB-C	Local		
	T30	Closed vessel	III	Local		
	T31	Krater?	IIIB-C	Local		
	T32	Uncertain shape	III	Local		
	T33	Lid?	IIIB-C	Local		
	T35	Cup	IIIC	Local		
	T38	Closed vessel (jar)	IIIC	Local	De Siena 1986, fig. 12	147212
	T39	Deep bowl pictorial	IIIB	Local	De Siena, Bianco 1982a, tavv. XXII:2; XXIII:2: Vagnetti 2000-01, fig. 3	147216 (48098)
	T40	Deep bowl pictorial	IIIC	Local	De Siena 1986, fig. 6; Vagnetti 2000-01, fig. 7	147202
	T41	Shallow carinated bowl	IIIB-C	Local	De Siena 1986, fig. 13	147211 (48105)
	T42	Base	IIIB-C	Local		147210
	T43	Amphora	IIIC	Local	De Siena 1986, fig. 11	147206
PG	T34		PG	Local		
	T36		PG	Local		
	T44			Local		

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
I	T45			Local		
	T46			Local		
	T47			Local		
	T48			Local		
	T49			Local		47174
	T50			Local		47175
	T51			Local		47173
	T52			Local		47172
	T53			Local		47907
	T54			Local		47133
PG from Metapontum	MP1		7thc	Local		147156
	MP2		7thc	Local		147152

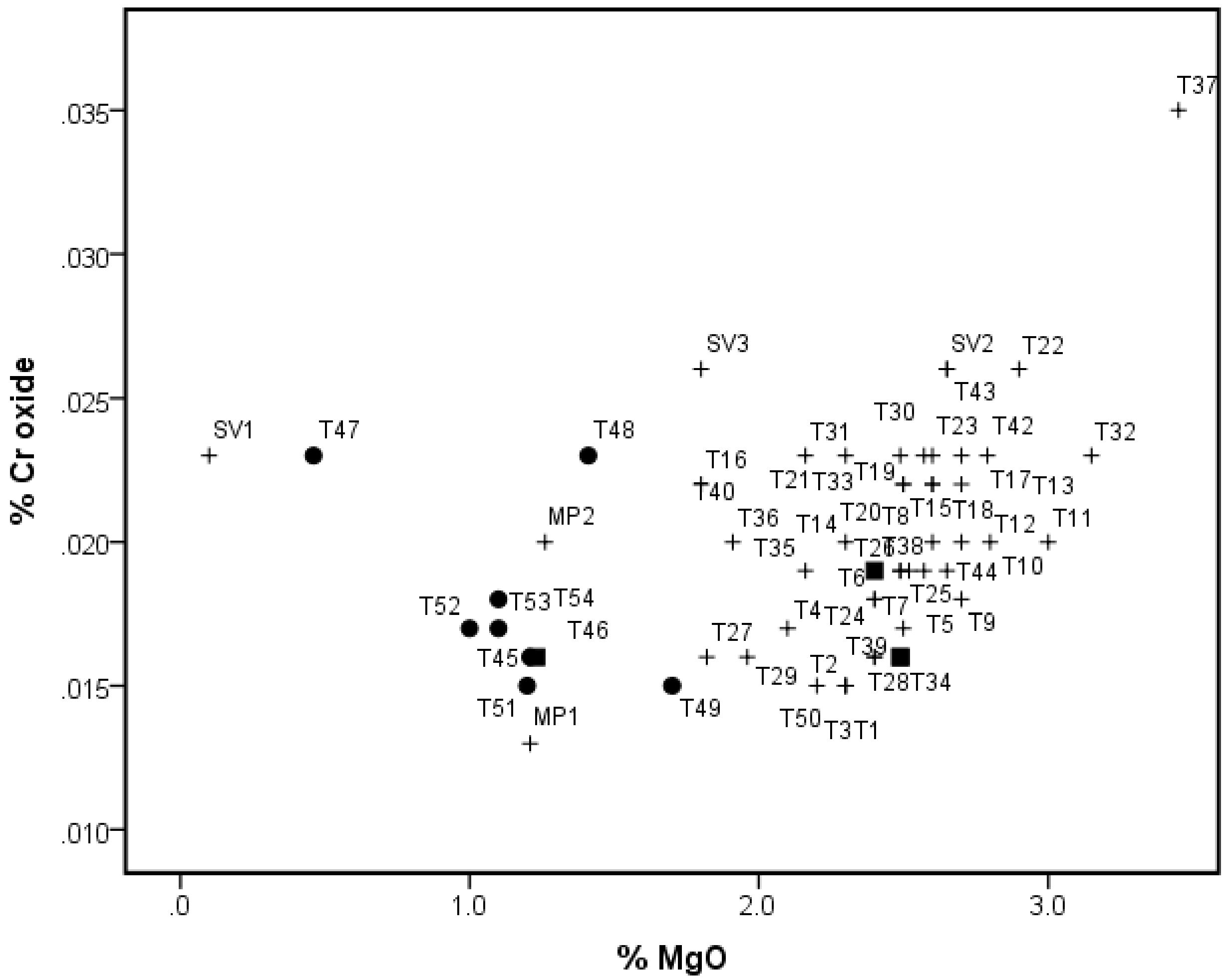


Fig. 4.11. Mg-Cr oxide plot of samples from Termitito (T), San Vito (SV) and Metapontum (MP). Mycenaean and Italo-Mycenaean +; Pictorial Style ■; *impasto* ●. AAS data.

Tursi: Castello and San Martino

INAA (Database 2): *Dolia* 6, Grey 1, *impasto* 3, daub 1, clay 1
PE: *Dolia* 7, *impasto* 3, daub 1, clay 1
Publication: Levi 1999

SITE	WARE	SAMPLE	DESCRIPTION	DATE	SUGGESTED ORIGIN	PUBLICATION
Tursi Castello	D	TUC1		FBA	Local	De Siena 1986, fig. 19
		TUC3		FBA	Local	
	I	TUC4			Local	
	V	TUC2	Daub		Local	
Tursi S. Martino	D	TUM1		FBA	Local	
		TUM2		FBA	Local	
		TUM3		FBA	Local	
		TUM4		FBA	Local	
		TUM5		FBA	Local	
	G	TUM7	Grey		Local	
	I	TUM6			Local	
		TUM8			Local	
	V	TUM9	Clay		Local	

These two neighbouring sites lie in the Sinni valley to the north of Broglio di Trebisacce. Apart from the clays, all the samples came from surface finds (see Levi 1999, Figs. 26, Pl. 4). The chemical data, while comparable with the range of data encountered in the Plain of Sybaris, suggest that the *dolia* may be distinguished in composition from those produced in the Plain proper (Levi 1999, Figs. 37, 40). Siltstone is the most common petrographic feature among the samples:
Siltstone: **TUC3, T4, TUM2, 4, 5, 6, 8**. Siltstone and microfossils bearing siltstone: **TUM1**. Siltstone and sandstone: **TUM3**. Mica and fossils are present in the clay and abundant in the pottery. Fossiliferous calcareous fine clay with quartz and mica. Tursi S. Martino: **TUM9** (clay).

CALABRIA

Plain of Sybaris

As explained at the start of Part 2, there has been exceptional archaeometric effort in this region of Calabria in part because of the prominence given to wares other than Mycenaean. The layout of this section is also different, treating the Plain as a whole and discussing the data in the following order:
(1) Tables listing and describing all the samples from the different sites,
(2) geological introduction,
(3) petrographic and related data and finally,
(4) chemical data.

Programme (and duration)	Main purpose and publications	Site(s)	Techniques
1 (1986-92)	To characterise the main pottery classes, in particular the Aegean type. **Publication**: Jones *et al.* 1994 **Illustration**: Figs. 4.63-75	Broglio di Trebisacce Table 4.7b	**AAS** (Database 1): Mycenaean10, Italo-Mycenaean 47, Coarse ware? 2, *dolia* 9, Grey 28, PG 3, *impasto* 7, various 4, clays 3 **INAA** (Pavia, Database 2): Mycenaean 5, *dolia* 6, Grey 15, *impasto* 12, clays and reference materials 4 **PE** (Database 5): Mycenaean 17, *dolia* 17, Grey 15, Protogeometric and Geometric 3, *impasto* 52 **XRD** (Database 5): Mycenaean 22, *dolia* 29, Grey 15, PG 5, *impasto* 32, rocks 7, clays 3
		Torre Mordillo Table 4.7f	**AAS** (Database 1): Italo-Mycenaean 1, *dolium* 1, Grey 1 **PE** (Database 5): Italo-Mycenaean 1 **XRD** (Database 5): Italo-Mycenaean 1, *dolium* 1, Grey 1
		Amendolara Table 4.7i	**INAA** (Pavia, Database 2): brick 1 **PE** (Database 5): *Dolium* 1, Grey 3 **XRD** (Database 5): Grey 3
2 (1990-1995)	To identify the status of the Aegean type. **Publication**: Jones 2001 **Illustration**: Figs. 4.75-77	Torre Mordillo Table 4.7g	**AAS** (Database 1): Mycenaean 4, Italo-Mycenaean 30, *dolia* 2, Grey 9, PG 1, *impasto* 8 **ICP** (Database 3): Italo-Mycenaean 3, marked * in Table 4.7g

Programme (and duration)	Main purpose and publications	Site(s)	Techniques
3 (1995-2002)	Regional survey investigating production and distribution of different wares (mainly *impasto* and *dolia*) throughout the Plain. **Publications**: Levi *et al.* 1998a; Levi 1999; Jones, Levi 2002a; Levi, Sonnino 2006; previously unpublished. Plates 4-5.	Broglio di Trebisacce Table 4.7c	**INAA** (Database 2): Mycenaean 2, Italo-Mycenaean 9, Coarse ware? 2, *dolia* 16, Grey 9, PG 49, *impasto* 18, tuyère 1, daub 2, clays 2 **PE** (point counting see Database 5): *dolia* 80, *impasto* 236, kiln 1, tuyère 1, daub 2, clays 2 **XRD** (Database 5): *Dolia* 5, *impasto* 5
		Francavilla Marittima Table 4.7e	**INAA** (Database 2): *Impasto* 5, *dolium* 1, PG 4, Classical 2, loomweight 1 **PE** (Point counting, see Database 5): *Impasto* 7, *dolium* 1, loomweight 1
		Torre Mordillo Table 4.7h	**INAA** (Database 2): *Dolium* 1, Grey 4, PG 2, *impasto* 9, daub 1, clay 1 **PE:** *Impasto* 16, kiln 1, daub 1, clay 1
		Zone A S.Cavalcatore (Amendolara), Timpone Golla,Tarianne, Timpone Lacco **Zone B** Valle Carlodraga, (Broglio di Trebisacce), Villapiana **Zone C** Timpa del Castello di Francavilla, Timpone Motta di Francavilla, Monte S.Nicola, Pietra Castello di Cassano Ionio, Raganello **Zone D** Torre Mordillo **Zone E** Serra Castello, Serra Cagliano, Acri, Bisignano, Fontana del Finocchio, Rosa Russa **Zone F** Basili di Rossano, Strange Tables 4.7j, k	**INAA** (Database 2): *Dolia* 2, Grey 1, PG 1, *impasto* 25, clays 7 **PE** (Point counting, see Database 5): *Dolia* 10, Grey 1, PG 1, *impasto* 109, daub 4, clays 11
4 (1996-2003)	Technological characterisation of the main pottery classes, especially the Mycenaean type. **Publication**: Buxeda i Garrigós *et al.* 2003	Broglio di Trebisacce and other sites Table 4.7d	**INAA** Demokritos (Database 2) and Bonn (Appendix Table 10): Mycenaean 2, Italo-Mycenaean 4, *dolia* 6, Grey 6, PG 6, *impasto* 6 **SEM**: see Chapter 5
5 (2004-present)	Extension of enquiry from Programme 3. Work in progress, previously unpublished	Broglio di Trebisacce and other sites Table 4.7c	**ICP** (Database 3): Italo-Mycenaean 9 (and other wares in progress)

Table 4.7a. Programmes of analysis in the Plain of Sybaris.

Programme 1 (see illustrations in Figs. 4.61-74)

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	AAS	INAA	PE	XRD
M	A23	A24	Jug?	IIIB	Peloponnese	*EMS*, tav. 74:2		x			
	A24	A23	Jug?	IIIB	Peloponnese	*EMS*, tav. 73:13		x			
	A40		Necked jar?	IIIC	Peloponnese	*EMS* tav., 72:3	773	x			
	A51		Necked jar?	IIIC middle?	Peloponnese	*N.Ric.*, tav. 49:1	772	x		x	
	A53		Deep bowl?	IIIB2-C	Peloponnese	*EMS*, tav. 71:1	1120? 1121?	x			
	A54	BT703	Stirrup jar	IIIC	Peloponnese	*EMS*, tav. 75:11	628	x			
	A63	BTA068			Peloponnese				x	x	x
	A48	A49, BT704, BTA003	Necked jar	IIIB	C. Greece/C. Crete?	*EMS*, tav. 73:12		x			
	A49	A48, BT704 BTA003	Necked jar	IIIB	C. Greece/C. Crete?	*EMS*, tav. 73:12		x			
	A56		Alabastron/ jar?	IIIA1	C. Greece/C. Crete?	*Ric.1*, tav. 24:3	17036	x			
CW	A11	A34, BT707	Jar		Import?	*Ric.2*, tav. 26:9, 28:3-4		x		x	x
	A34	A11, BT707	Jar		Import?	*Ric.2*, tav. 26:9, 28:3-4		x			
IM	A1		Necked jar	IIIB	Local/regional	*N.Ric.*, tav. 48:2		x		x	x
	A2		Necked jar	IIIB-C	Local/regional	*Ric.2*, tav. 23:9		x			
	A3	BT702	Jar	IIIA1	Atypical local/ regional	*Ric.2*, tav. 24:2		x			
	A4		Necked jar	IIIB	Local/regional	*Ric.2*, tav. 24:7		x			
	A5		Necked jar	IIIB-C	Local/regional	*Ric. 2* tav. 24:5		x			
	A6		Carinated cup	IIIC	Local/regional	*Ric.2*, tav. 23:11		x			
	A7		Open shape base	III	Local/regional	*Ric.2*, tav. 24:4		x			
	A8	A33, BTA005	Necked jar	IIIB	Local/regional	*N.Ric.*, tav. 48:1		x			
	A9	A65, BT705, BTA004	Necked jar	IIIC	Local/regional	*N.Ric.*, tav. 49:3		x		x	x
	A10		Closed vessel		Local/regional	*Ric.2*, tav. 26:3		x			
	A12		Closed vessel		Local/regional	*Ric.1*, tav. 24:6		x			

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	AAS	INAA	PE	XRD
IM	A13	BT706, BTA001	Necked jar	IIIB	Local/regional	*N.Ric.*, tav. 46:3		x		x	x
	A14		Deep bowl	IIIB-C	Local/regional	*Ric.3*, tav. 44:1		x			
	A15	A37	Necked jar	IIIB	Local/regional	*Ric.3*, tav. 45:3	86-17045a	x			
	A16		Deep bowl	IIIC	Local/regional	*EMS*, tav. 78:3	638	x			
	A17		Amphoroid Krater?	III	Local/regional	*EMS*, tav. 78:17	85	x			
	A18		Amphora/jar?	IIIB	Local/regional	*EMS*, tav. 74:5	1230b	x		x	x
	A19		Carinated bowl (LM type)	IIIB	Local/regional	*EMS*, tav. 72:18	(95)124	x			
	A20		Necked jar?	IIIC	Local/regional	*EMS*, tav. 74:4		x			
	A21		Necked jar	IIIB-C	Local/regional	*EMS*, tav. 75:3	132	x			
	A22		Alabastron/ piriform jar	IIIA	Atypical local	*N.Ric.*, tav. 47:8	881	x			
	A25		Necked jar	IIIB-C	Local/regional	*EMS*, tav. 70:12	625	x			
	A26		Closed vessel	(MBA3 context)	Local/regional	*EMS*, cat. 27		x			
	A27		Necked jar	IIIB-C	Local/regional	*EMS*, tav. 76:3	130	x			
	A28		Mug	IIIB-C	Local/regional	*EMS*, tav. 75:4	145	x			
	A29		Necked jar	IIIB-C	Local/regional	*EMS*, tav. 73:2	410	x			
	A30		Necked jar	IIIA	Local/regional	*N.Ric.*, tav. 46:1		x		x	
	A31		Closed vessel	IIIB-C	Local/regional	*EMS*, tav. 71:8	394	x			
	A32		Amphora/jar	IIIC	Local/regional	*N.Ric.*, tav. 50:3		x			
	A33	A8, BTA005	Necked jar	IIIB	Local/regional	*N.Ric.*, tav. 48:1		x			
	A35		Necked jar?	IIIB?	Local/regional	*EMS*, tav. 75:7	133	x			
	A36		Deep bowl	IIIC	Local/regional	*N.Ric.*, tav. 45:7	830	x			
	A37	A15	Necked jar	IIIB	Local/regional	*Ric.3*, tav. 45:4		x			x
	A38		Carinated cup	IIIC	Local/regional	*N.Ric.*, tav. 51:2	563-17049bis	x		x	x
	A39		Stirrup jar?	IIIB	Local/regional	*N.Ric.* , tav. 45:6	301	x			

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	AAS	INAA	PE	XRD
IM	A41		Closed vessel	IIIB-C	Local/regional	*EMS*, tav. 72:1	590	x			
	A42		Open vessel	IIIC?	Local/regional	*Ric.3*, tav. 41:3	438-17054	x			
	A43		Necked jar?	IIIC	Local/regional	*Ric.2,* tav. 26:6	73	x		x	x
	A44		Necked jar		Local/regional	*EMS*, tav. 78:10	894	x			
	A45		Jar		Local/regional	*EMS*, tav. 73:1	464	x			
	A46		Bowl/cup	IIIC	Local/regional	*EMS*, tav. 78:9	850	x			
	A47		Necked jar	IIIC	Local/regional	*N.Ric.*, tav. 45:3		x			
	A50	BT701	Necked jar	IIIA?	Local/regional	*N.Ric.*, tav. 54:9; EMS, tav. 76:2	CAT90	x			
	A52		Base	III	Local/regional	*Ric.3*, tav. 39:15		x			
	A55		Closed vessel	IIIB-C	Local/regional	*EMS*, tav. 75:13	126	x			
	A57		Closed vessel	IIIC?	Local/regional	*EMS*, tav. 70:1	1227	x			
	A60				Local/regional				x	x	x
	A69	BTA069			Local/regional				x	x	x
	A72				Local/regional				x	x	x
	A74 (G12)		Jug		Atypical local	*Ric.3*, tav. 44:6		x			
	A58		Necked jar	IIIB-C		*Ric.3*, tav. 41:2					x
	A59		Closed vessel	IIIC		*Ric.3,* tav. 42:7				x	x
	A61										x
	A62										x
	A65	A9, BT705, BTA004	Necked jar	IIIC		*N.Ric.*, tav. 49:3				x	x
	A66		Necked jar	IIIB-C		*N.Ric.*, tav. 50:1-2					x
	A67		Open vessel			*N.Ric.*, tav. 55:9					x
	A68		Necked jar	IIIB		*N.Ric.*, tav. 45:2					x
	A70										x
	A71									x	x
	A73		Necked jar	IIIB-C		*N.Ric.*, tav. 49:2				x	
D	D1		Decorated	RBA	Local/regional	*Ric.2*, tav. 19:1		x			

WARE	SAMPLE	DUPL.	DESCRIPTION	DATE	SUGGESTED ORIGIN	PUBLICATION	INV. N.	AAS	INAA	PE	XRD
D	D2		Decorated	RBA	Local/regional	*Ric.2*, tav. 18:4		x			
	D3		Rim	FBA	Local/regional	*Ric.2*, tav. 22:6		x			
	D4		Decorated	FBA	Local/regional	*Ric.2*, tav. 22:1		x			
	D5		Type 3b	FBA	Local/regional	*EMS*, tav. 66:2		x			
	D6		Type 3b	FBA	Local/regional	*EMS*, tav. 66:2		x			
	D7		Fragment with coil		Local/regional	*EMS*, tav. 63:14		x			
	D8		Decorated	RBA	Local/regional	*EMS*, tav. 64:4		x			
	D9		Type 23		Local/regional	*EMS*, tav. 64:1		x			
	D10		Type 3b, 14a, 20	FBA		*EMS*, tav. 66:1				x	x
	D11	BTD062	Type 3a, 20	FBA		*EMS*, tav. 65:1				x	x
	D12		Decorated	FBA		*EMS*, tav. 69:4					x
	D13		Decorated	RBA		*EMS*, tav. 62:9					x
	D14									x	x
	D15									x	x
	D16	BTD063			Local/regional				x	x	x
	D17									x	x
	D18		Rim and decoration	FBA	Local/regional	*Ric.2*, tav. 21:1			x	x	x
	D19		Type 1a, 17, 23	RBA	Local/regional	*N.Ric.*, tav. 41:4			x	x	x
	D20		Decorated	RBA		*N.Ric.*, tav. 40:7				x	x
	D21		Type 17, 21	RBA		*N.Ric.*, tav. 40:3					x
	D22		Decorated	FBA		*Ric.1*, tav. 21,:5					x
	D23		Decorated	FBA		*Ric.1*, tav. 21:4					x
	D24		Decorated	FBA		*Ric.1,* tav. 21:6					x
	D25		Decorated	FBA		*Ric.1*, tav. 22:2					x
	D26		Decorated	FBA		*Ric.1*, tav. 20:1					x
	D27		Rim and decoration	FBA	Southern plain of Sybaris	*Ric.2*, tav. 19:2				x	x
	D28									x	x

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	AAS	INAA	PE	XRD
D	D29		Unicum	RBA		*EMS*, tav. 64:6					x
	D30		Decorated	RBA		*EMS*, tav. 64:2				x	x
	D31		Type 7	RBA		*EMS*, tav. 58:2				x	x
	D32									x	x
	D33		Decorated	FBA		*EMS*, tav. 59:6				x	x
	D34		Type 3a, 14b, 20	FBA		*EMS*, tav. 65:2				x	x
	D35				Local/regional				x	x	x
	D36				Local/regional				x	x	x
	D37									x	x
	D38				Local/regional				x		x
G	G1		Painted		Local/regional	*N.Ric.*, tav. 37:3		x			
	G2		Painted		Local/regional	*N.Ric.*, tav. 37:10		x			
	G3		Necked jar		Local/regional	*Ric.2,* tav. 13:7		x			
	G4		Jug		Local/regional	*Ric.2*, tav. 12:5		x			
	G5		Cup		Local/regional	*Ric.2*, tav. 14,6		x			
	G6		Cup		Local/regional	*Ric.2,* tav. 14:5		x			
	G7		Carinated cup		Local/regional	*Ric.2*, tav. 12:3		x			
	G8	BT604	Jar	RBA1/2	Local/regional	*Ric.2*, tav. 15:1		x			
	G9		Bowl		Local/regional	*Ric.1*, tav. 18:1		x			
	G10	BT606	incised handle	RBA	Local/regional	*Ric.3*, tav. 11:6		x			
	G11		Jar?		Local/regional	*Ric.2*, tav. 15:6?		x			
	G13		Painted jar?		Local/regional	*EMS*, tav. 57:25		x			
	G14		Painted cup?		Local/regional	*N.Ric.*, tav. 37:4		x			
	G15		Painted jar?		Local/regional	*EMS*, tav. 57:19		x			
	G16		Cup with handle		Local/regional	*EMS*, tav. 54:12		x			
	G17		Painted		Local/regional			x			
	G18		Painted cup?		Local/regional	*EMS*, tav. 57:17		x			

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	AAS	INAA	PE	XRD
G	G19				Local/regional			X			
	G20				Local/regional			X			
	G21				Local/regional			X			
	G22				Local/regional			X			
	G23		Painted jar?		Local/regional	*EMS*, tav. 57:35		X			
	G24	BT602	Cup	RBA2	Local/regional	*N.Ric.*, tav. 3:8		X			
	G25	BT603	Large bowl	RBA2	Local/regional	*N.Ric.*, tav. 33:4		X			
	G26	BT605	Cup	RBA2	Local/regional	*N.Ric.*, tav. 32:4		X			
	G27	BT601	Carinated cup with handle	RBA2	Local/regional	*N.Ric.*, tav. 35:1		X			
	G28		Paste A4		Local/regional				X	X	X
	G29		Paste A2		Local/regional				X	X	X
	G30		Paste A2		Local/regional				X	X	X
	G31		Paste A1		Local/regional				X	X	X
	G32				Local/regional				X	X	X
	G33	BTG071			Local/regional				X	X	X
	G34				Local/regional				X	X	X
	G35				Local/regional				X	X	X
	G36		Painted		Local/regional				X	X	X
	G37		Painted		Local/regional				X	X	X
	G38				Local/regional				X	X	X
	G39				Local/regional				X	X	X
	G40				Local/regional				X	X	X
	G41	BTG067			Local/regional				X	X	X
	G42				Local/regional				X	X	X
PG	F1		Decorated fragment	FBA/EIA		*Ric.1*, tav. 36:13				X	X
	F2		Decorated handle	EIA		*Ric.3,* tav. 7:1				X	X
	F3		Jar	FBA		*Ric.3*, tav. 57:10					X
	F4		Necked jar	FBA/EIA	Local/regional	*EMS*, tav. 115:16				X	X
	F5		Jar	FBA/EIA		*EMS*, tav. 115:36					X
	F6		Jar	EIA	Local/regional	*EMS*, tav. 116:47		X			
	F7		Zoomorphic handle	FBA	Local/regional	*EMS*, tav. 113:24		X			
	F8		Basin	FBA	Local/regional	*Ric.3,* tav. 57:16		X			
I	I1			MBA	Local			X			

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	AAS	INAA	PE	XRD
	I2			MBA	Local			X			
	I3			MBA	Local				X	X	X
	I4			MBA	local					X	X
	I5			MBA	Local				X	X	X
	I6			MBA	Local				X	X	X
	I7			MBA	Local					X	X
	I8			MBA	Local					X	X
	I9			MBA	Local					X	X
	I10			MBA	Local					X	X
	I11	BTI070		MBA	Local				X	X	X
	I12		Jug	MBA	Local	*Ric.2*, tav. 6:9		X			
	I13		Carinated cup	MBA	Local	*Ric.2*, tav. 6:5		X			
	I14		Carinated cup	MBA	Local	*Ric.2*, tav. 8:1		X			
	I15			MBA	Local			X			
	I16			MBA	Local			X			
	I17			RBA						X	
	I18			RBA						X	X
	I19			RBA						X	X
	I20			RBA						X	X
I	I21		Wheel-made jar	RBA		*N.Ric.*, tav. 15:1					X
	I22			RBA	Local				X		X
	I23			RBA						X	
	I24			RBA						X	
	I25			RBA						X	X
	I26			RBA						X	X
	I27			RBA						X	
	I28			RBA						X	
	I29			RBA						X	
	I30			RBA						X	
	I31			RBA	Local				X	X	X
	I32	BTI066		RBA	Local				X	X	X
	I33			RBA						X	
	I34			RBA						X	
	I35			RBA						X	X
	I36			RBA						X	
	I37			RBA						X	
	I38			RBA	S. Plain of Sybaris?					X	
	I39			RBA						X	X
	I40			RBA						X	X
	I41			RBA	Local				X	X	

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	AAS	INAA	PE	XRD
I	I42			RBA						X	
	I43			RBA						X	
	I44			FBA-EIA	Local				X	X	X
	I45			FBA-EIA						X	X
	I46			FBA-EIA						X	X
	I47			FBA-EIA						X	X
	I48			FBA-EIA						X	X
	I49	BTI065		FBA-EIA	Local				X	X	X
	I50			FBA-EIA						X	X
	I51			FBA-EIA	S. Plain of Sybaris				X	X	X
	I52		Carinated cup	FBA-EIA?		*Ric.2*, tav. 5:15					X
	I53		Jar	FBA-EIA	Local	*Ric.2*, tav. 35:2			X	X	X
	I54		Jar	FBA-EIA		*Ric.2*, tav. 35:7					X
V	M1		Over-fired fragment		Local			X			
	M2		Kiln waster		Local				X		X
	M3		Kiln waster								X
	M4		kiln	FBA		*EMS*, tav. 106:4					X
	ARG1		Clay Trebisacce -10 m					X			
	ARG2		Clay Trebisacce -4 m					X			
	ARG3		Clay Trebisacce, surface					X			
	MC2		Furnace tile Corigliano					X			
	MC3		Modern brick Corigliano					X			

Table 4.7b. Broglio di Trebisacce (**32**).

INAA (+ICP, PE, XRD) Programmes 3+5 (Illustration: Figs. 4.63-74, Plates 4-5)

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	ICP	PE	PC	XRD
M	BT703	A54	Stirrup jar	IIIC	Peloponnese	*EMS*, tavv. 75:11;80:3c	628				
	BT704	A48	Necked jar	IIIB	C. Greece	*Ric.3*, tav. 42:,11; EMS, tavv. 73:12; 80:2					
CW?	BT707	A11, A34	Jar		Import?	*Ric.2*, tavv. 26:9; 28:3-4		X			
	BT712		Closed vessel		Import?		6945	X			
IM	BT701	A50	Necked jar	IIIA?	Local/regional	*EMS*, tav. 76:2	CAT90	X			
	BT702	A3	Jar	IIIA1	Atypical Local/ regional	*Ric.2*, tav. 24:2					
	BT705	A9, A65, BTA004	Necked jar	IIIC	Local/regional	*N.Ric.*, tav. 49:3		X			
	BT706	A13, BTA001	Necked jar	IIIB	Local/regional	*N.Ric.*, tav. 46:3		X			
	BT709		Closed vessel	IIIA?	Local/regional	Bettelli 2002, fig.67:61	1500				
	BT710		Jar	IIIB-C	Local/regional	Bettelli 2002, fig.63:22	702	X			
	BT711		Amphora	IIIB-C	Local/regional	Bettelli 2002, fig.70:90	6369	X			
	BT713		Necked jar	IIIB-C	Local/regional		12480	X			
	BT714		Piriform jar	IIIA2?	Local/regional		10787	X			
D	BT905		Decorated	RBA	N. Plain	Levi 1999, fig. 145	245		A1	X	X
	BT921	BT952	Decoration	FBA	N. Plain	Levi 1999, fig. 148, pl. 12	295		B1	X	
	BT927		Decoration	FBA	S. Plain	Levi 1999, fig. 80, pl. 9, pl. 12	479		Δ	X	X
	BT932		Decoration	RBA	S. Plain	Levi 1999, fig. 79, pl. 9	20		Δ	X	X
	BT940	D10	3B	FBA	N. Plain	Levi 1999, fig. 147			AF3-2		
	BT942	D1	Decoration	RBA	N. Plain	Levi 1999, fig. 147, pl. 12			AKb1	X	
	BT943	D2	Type 1A, decoration	RBA	N. Plain	Levi 1999, fig. 147, pl. 12			AF2		
	BT944	D7		FBA-EIA	S. Plain	Levi 1999, fig. 80			Δ	X	
	BT945	D8	Decoration	RBA	N. Plain	Levi 1999, fig. 149, pl. 12			FKb1		

WARE	SAMPLE	DUPL.	DESCRIPTION	DATE	SUGGESTED ORIGIN	PUBLICATION	INV. N.	ICP	PE	PC	XRD
D	BT946	D3	?5A	FBA	N. Plain	Levi 1999, fig. 148			B1		
	BT947	D27	Decoration	FBA	S. Plain	Levi 1999, fig. 80, pl. 9			Δ	X	
	BT948		Rim	FBA	S. Plain	Levi 1999, fig. 80	3249		Δ	X	
	BT949		Type 1C, decoration	RBA	S. Plain	Levi 1999, fig. 79	2788		Δ	X	
	BT950		Decoration	RBA	N. Local	Levi 1999, fig. 149, pl. 12	253		Ka1	X	X
	BT956		Type 2	FBA	S. Plain	Levi 1999, fig. 80	2598		Δ	X	
	BT957		Base, decoration	FBA	N. Plain	Levi 1999, fig. 149	810		F3		X
G	BT601	G28	Carinated cup	RBA2	Local/regional	*N.Ric.*, tav. 35,1					
	BT602	G25	Cup	RBA2	Local/regional	*N.Ric.*, tav. 34,8					
	BT603	G26	Cup	RBA2	Local/regional	*N.Ric.*, tav. 33,4					
	BT604	G8	Necked jar	RBA1/2	Local/regional	*Ric. 2*, tav. 15,1					
	BT605	G27	Cup	RBA2	Local/regional	*N.Ric.*, tav. 32,4					
	BT606	G10	Incised handle	RBA	Atypical local/ regional	*Ric. 3*, tav. 11,6					
	BT614		Jar or Cup	FBA	Local/regional	Bettelli 2002, fig. 81:38	255				
	BT639		Carinated cup	RBA	Atypical local/ regional		2795				
	BT640		Necked jar		Local/regional	Bettelli 2002, fig. 90:144	3335				
PG	BT708		Bichrome	EIA?	Atypical local/ regional		3378				
	BT801		Incised fragment	FBA?	Local/regional		2829				
	BT803	F2	Handle	EIA	Local/regional	*Ric. 2*, tav. 37,1					
	BT804		Decorated frag.	EIA	Local/regional		1666				
	BT806		Decorated frag.	EIA	Local/regional		1641				
	BT808		Decorated frag.	EIA	Local/regional		1531				
	BT810		Bowl	EIA	Local/regional		2452				
	BT811		Necked jar	EIA	Local/regional		2367				
	BT813		Decorated frag.	EIA	Local/regional		2411				
	BT814		Jar	EIA	Local/regional		122				

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	ICP	PE	PC	XRD
PG	BT818		Neckled jar	EIA	Local/regional		2484				
	BT819		Necked jar	EIA	Local/regional	*EMS*, tav. 117:4					
	BT820		Jar	FBA	Local/regional		2793				
	BT821		Jar	FBA	Local/regional		2464				
	BT823	BT849	Jar	FBA	Local/regional		829				
	BT824		Jar	FBA	Local/regional		2241				
	BT825		Jar	FBA	Local/regional		2767				
	BT826		Necked jar	EIA	Local/regional	*EMS*, tav. 117:3					
	BT830		Necked jar		Local/regional	Ric.1, tav. 37:2					
	BT833		Necked jar	EIA	Local/regional		2450				
	BT835		Basin	FBA	Local/regional	*EMS*, tav. 119:6					
	BT836		Necked jar	FBA	Local/regional		2471/ 2487				
	BT838		Bowl		Local/regional		459				
	BT839		Bowl		Local/regional		482				
	BT840		Bowl		Local/regional		2001				
	BT841		Bowl		Local/regional	*EMS*, tav. 116:22					
	BT842		Bowl		Local/regional		1541				
	BT843		Bowl		Atypical local/ regional		1702				
	BT844		Bowl		Local/regional		2323				
	BT846		Necked jar		Local/regional		1135				
	BT847		Necked jar		Local/regional		1109				
	BT848		Necked jar		Local/regional	*EMS*, tav. 113:22					
	BT850		Necked jar		Local/regional		1443				
	BT851		Necked jar	EIA	Atypical local/ regional		2358				
	BT852		Necked jar	EIA	Atypical local/ regional		2451				
	BT854		Basin	FBA	Local/regional	*EMS*, tav. 119:5					
	BT855				Local/regional		2360				
	BT856			EIA	Local/regional		3400				
	BT858		Skyphos	EIA	C. Greece/Attica?		1673				
	BT859		Skyphos	EIA	C. Greece/Attica?		3601				
	BT860		Basin	FBA	Local/regional		4250				
	BT861		Bowl	FBA	Local/regional	*EMS*, tav. 119:2	957				
	BT862			FBA	Local/regional		937672				
	BT863		Bichrome n. 1	EIA?	Local/regional						

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	ICP	PE	PC	XRD
PG	BT864		Bichrome n. 2	EIA?	Local/regional						
	BT865		Bichrome	EIA?	Local/regional		1517				
	BT866		Bichrome		Local/regional	*EMS*, tav. 114:16					
	BT867		Bowl	EIA?	Local/regional		4581				
	BT868		Necked jar	EIA?	Local/regional		4582				
I	BT404		Jar	BM	S. Plain	Levi 1999, fig. 77, pl. 9	2324/ 2449		Δ	X	
	BT409		Necked jar	BM	N. Plain	Levi 1999, fig. 134, pl. 10	2682		AF1		
	BT420		Bowl	BM	N. Plain	Levi 1999, fig. 141	109		KX2-3		
	BT435		Necked jar	BM	S. Plain	Levi 1999, fig. 77	108		Δ	X	
	BT436		Necked jar	BM	N. Plain	Levi 1999, fig. 133	2127		A1		
	BT442	BT445	Necked jar	BM	N. Plain	Levi 1999, fig. 134	3274		AF1		
	BT445	BT442	Necked jar	BM	N. Plain	Levi 1999, fig. 134, pl. 10	3274		AF1	X	X
	BTP1			MBA	Local				A1		
	BTP3			MBA	Local				A3		
	BT206		Wheel-made necked jar	RBA	N. Plain	Levi 1999, fig. 134			ABF2		
	BT208	I13	Carinated cup	RBA	N. Plain	Levi 1999, fig. 142			KX2	X	
	BT209	I12	Jug	RBA	N. Plain	Levi 1999, fig. 140, pl. 11			BKX1	X	
	BT210	I14	Carinated cup	RBA	N. Plain	Levi 1999, fig. 142, pl. 11			KX2-1		X
	BT247		Jar	RBA/ FBA?	S. Plain	Levi 1999, fig. 77	406		Δ		
	BT1		Bowl	FBA	N. Plain	Levi 1999, fig. 137			AK1	X	X
	BT7		Bowl	FBA	N. Plain	Levi 1999, fig. 139, pl. 11			B1	X	X
	BT9		Bowl	FBA-EIA	S. Plain	Levi 1999, fig. 143			KX2 atypical	X	X
	BT10		Jar	FBA-EIA	S. Plain	Levi 1999, fig. 78			Δ	X	
	BT11		Jar	FBA	N. Plain	Levi 1999, fig. 139, pl. 2			F1	X	
	BT14		Carinated cup	FBA-EIA	S. Plain	Levi 1999, fig. 140, pl 11			Δ	X	
V	BT1302		Tuyere		Local						

Ware	Sample	Dupl.	Description	Date	Suggested origin	Publication	Inv. N.	ICP	PE	PC	XRD
V	BT1011		Daub		Local				X		
	BT1012		Daub		Local				X		

Table 4.7c . Broglio di Trebisacce (**32**).
PE Results for dolia and impasto which had been analysed by INAA (see Levi 1999, dolia: figs. 29c, 30, 117, 145-149, plates 9, 12; Impasto: figs. 29b, 30, 85, 133-144, plates 9-11). PC = point counting. A = dark brown siltstone, B = light fossil-bearing siltstone, C = mica, D = spathitic calcite, F = micritic calcite, K = sandstone (Ka = arkosic sandstone, Kb = calcareous sandstone), X = quartz feldspars polygenic sands, "0" = absence of visible tempers, Δ= clasts of primarily plutonic but also metamorphic nature from the Sila area. Temper density and size are indicated with a number: 1 = abundant quantity and medium to large grain size, 2 = average quantity and fine grain size, 3 = small quantity and very fine grain size. When two numbers are given, the former indicates quantity and the latter the size. **BT710-714** only ICP.

Programme 4

Ware	Sample	Duplicate	Description	Date	Suggested origin
M	BTA003	A48, BT704	Necked jar	IIIB	Peloponnese
	BTA068	A63			Peloponnese
IM	BTA001	A13, BT706	Necked jar	IIIB	Local/regional
	BTA004	A9, A65, BT705	Necked jar	IIIC	Local/regional
	BTA005	A8, A33	Necked jar	IIIB	Local/regional
	BTA069	A69			Local/regional
D	BTD030				Local/regional
	BTD034				Local/regional
	BTD035				Local/regional
	BTD036				Local/regional
	BTD062	D11	Type 3a, 20	FBA	Local/regional
	BTD063	D16			Local/regional
G	BTG022				Local/regional
	BTG024				Local/regional
	BTG025				Local/regional
	BTG026				Local/regional
	BTG067	G42			Local/regional
	BTG071	G34			Local/regional
PG	BTF021				Local/regional
	BTF037		Early Geometric	EIA	Local/regional
	BTF039		Protogeometric	FBA	Local/regional
	BTF041				Local/regional
	BTF042				Local/regional
	BTF043				Local/regional
I	BTI050			MBA	Local
	BTI055			FBA	Local
	BTI065	I49		FBA-EIA	Local
	BTI066	I32		RBA	Local
	BTI070	I11		MBA	Local
	BTI059		From Rosa Russa	MBA	Local

Table 4.7d. Broglio di Trebisacce. INAA (Demokritos).

INAA and PE (PC=point counting) in **Programme 3** (Levi 1999, fig. 26, 29a, 30, 72, plates 5-6)

Ware	Sample	Description	Date	Suggested origin	Publication	PC
D	FMA8	Rim		S. Plain	Levi 1999, pl. 5	X
PG	FMA6			Local/regional		
	FMA7		EIA?	Local/regional		
	FMA13			Local/regional		
	FMA17			Local/regional		
I	FMA5			S. Plain		
	FMA9	Handle	MBA-RBA	Local		
	FMA12			Local	Levi 1999, pl. 6	X
	TMF1	Jar	FBA-EIA	Local	Levi 1999, fig. 72	
	TMF2	Cup	RBA?	Local	Levi 1999, fig. 72	
V	FMA11	Loom weight		Local		
C	FMA1	Hydria	7th cent	Local/regional		
	FMA2	Hydria	late 6th cent	Local/regional		

Table 4.7e. Francavilla Marittima (**33**). C= Classical. See Plate 5.

AAS, PE and XRD. **Programme 1** (see illustration in Fig. 4.75)

Ware	Sample	Description	Date	Suggested origin	Publication	AAS	PE	XRD
IM	TDM1, 2	Closed vessel	IIIB-C	Local/regional	*Ric.1,* tav. 24:7	X	X	X
D	TDM4	Rim and decoration	FBA	Local/regional	*Ric.1*, fig. 17	X		X
G	TDM3	Necked jar		Local/regional	*EMS*, tav. 151:12	X		X

Table 4.7f. Torre Mordillo (**34**).

AAS. **Programme 2** (see illustrations in Figs. 4.75-77)

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
M	TM10	Alabastron	IIIA	Import?	Trucco, Vagnetti 2001, fig. 95:27	156
	TM15	Handle, open vessel	I-II	Import?	Trucco, Vagnetti 2001, fig. 95:36	157
	TM45	Cup	IIIB-C	Import?	Trucco, Vagnetti 2001, fig. 96:51	1079
	TM56	Open vessel	IIIC?	Import?	Trucco, Vagnetti 2001, fig. 96:63	1102
IM	TM1	Deep bowl	IIIB-C	Local/regional	*EMS II*, tav. 151:9-10	
	TM2	Bowl/cup	IIIC	Local/regional	Trucco, Vagnetti 2001, fig. 101:142	173
	TM6	Deep bowl	IIIC middle	Local/regional	Trucco, Vagnetti 2001, fig. 96:46	155
	TM8	Deep bowl	IIIB	Local/regional	Trucco, Vagnetti 2001, fig. 95:23	165
	TM9	Stirrup jar		Local/regional	Trucco, Vagnetti 2001, fig. 95:28	158
	TM11	Closed vessel	IIIB-C	Local/regional	Trucco, Vagnetti 2001, fig. 95:34	167

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
IM	TM12	Closed vessel	IIIB-C	Local/regional	Trucco, Vagnetti 2001, fig. 95:30	169
	TM18	Closed vessel	IIIC	Local/regional	Trucco, Vagnetti 2001, fig. 95:19	178
	TM20	Bowl	IIIC	Local/regional	Trucco, Vagnetti 2001, fig. 94:2	176
	TM21	Alabastron/ piriform jar	IIIA2	Local/regional	Trucco, Vagnetti 2001, fig. 95:38	181
	TM22	Closed vessel	IIIC	Local/regional?	Trucco, Vagnetti 2001, fig. 101:141	177
	TM43	Stirrup jar?	IIIB	Local/regional?	Trucco, Vagnetti 2001, fig. 100:137	1076
	TM44	Cup	IIIB-C	Local/regional	Trucco, Vagnetti 2001, fig. 94:8	1078
	TM47	Closed vessel		Local/regional	Trucco, Vagnetti 2001, fig. 96:49	1083
	TM51*			Local/regional		
	TM61	Bowl/cup	IIIB	Local/regional	Trucco, Vagnetti 2001, fig. 97:68	1828
	TM70	Closed vessel	IIIA?	Local/regional	Trucco, Vagnetti 2001, fig. 94:10	1812
	TM71			Local/regional		
	TM72	Mug	IIIB	Local/regional	Trucco, Vagnetti 2001, fig. 97:70	1830
	TM73	Closed vessel	IIIB-C	Local/regional	Trucco, Vagnetti 2001, fig. 100:132	1835
	TM75	Closed vessel		Atypical local	Trucco, Vagnetti 2001, fig. 101:140	1840
	TM78*			Local/regional		
	TM79	Open vessel	IIIC	Local/regional	Trucco, Vagnetti 2001, fig. 101:143	2219
	TM82			Local/regional		
	TM83	Carinated cup	IIIC middle	Atypical regional	Trucco, Vagnetti 2001, fig. 99:103	3097
	TM84*			Local/regional		
	TM86	Open vessel	IIIB-C	Local/regional?	Trucco, Vagnetti 2001, fig. 99:114	3153
	TM88	Open vessel	IIIB-C	Atypical regional	Trucco, Vagnetti 2001, fig. 99:115	3209
	TM89	Closed vessel	IIIC middle?	Local/regional	Trucco, Vagnetti 2001, fig. 100:119	3459
	TM91			Local/regional		
	TM92			Local/regional		
	TM93			Local/regional		
D	TM29			Local/regional		
	TM30			Local/regional		
G	TM24			Local/regional		
	TM25	Painted		Local/regional		
	TM27			Local/regional		
	TM28			Local/regional		
	TM48	Closed vessel		Atypical regional	Trucco, Vagnetti 2001, fig. 103: 1089	1089

G	TM49	Closed vessel		Local/regional	Trucco, Vagnetti 2001, fig. 103: 1088	1088
	TM57			Local/regional		
	TM94	Painted		Atypical regional		
	TM95	Open vessel		Local/regional	Trucco, Vagnetti 2001, fig. 103: 1852	1852
PG	TM26	PG		Local/regional		
I	TM31			Local		
	TM35			Local		
	TM36			Local		
	TM37			Local		
	TM38			Local		
	TM39			Local		
	TM40			Local		
	TM41			Local		

Table 4.7g. Torre Mordillo. *TM51, 78, 84 also analysed by ICP.

INAA. **Programme 3** (Levi 1999 figs. 26, 29a, 30, 72-73, pl. 6)

Ware	Sample	Inv.	Excav. area	Description	Date	PE	PC	Suggested origin	Publication
D	TM96							Local/ regional	
G	TDM20	1121	Surf.	Necked jar	RBA1/2			Local/ regional	*EMS II*, tav. 151:16
	TDM21	749	Surf.	Carinated cup	RBA1			Local/ regional	*EMS II*, tav. 151:19
	TDM22	843	Surf.	Jar	RBA			Local/ regional	*EMS II*, tav. 151,:17
	TDM23	350	Surf.	Base sherd	RBA			Local/ regional	*EMS II*, tav. 151:15
PG	TDM17	825			FBA-EIA			Local/ regional	
	TDM18	845			FBA-EIA			Local/ regional	
I	TDM2	641	Surf.	Biconical jar	FBA	X	X	Local	Levi 1999, fig. 73, pl. 6
	TDM3	739	Surf.	Bowl	FBA-EIA	X		Local	Levi 1999, fig. 73
	TDM6		Surf.	Incised fragment	FBA	X		N. Plain of Sybaris	Levi 1999, fig. 73, pl. 6
	TDM7	85-817	Surf.	Necked jar	MBA	X		Local	Levi 1999, fig. 72
	TDM8	85-804	Surf.	Cup	MBA	X		Local	Levi 1999, fig. 72, pl. 6
	TDM11	85-839	Surf.	Handle	MBA	X		Local	Levi 1999, fig. 72

I	TDM14	812	Surf.	Carinated cup	RBA	X		Local	Levi 1999, fig. 72
	TDM15	835	Surf.	Necked jar	MBA?	X	X	Local	Levi 1999, fig. 73, pl. 6
	TDM19		Surf.	Carinated cup	RBA	X		Local	Levi 1999, fig. 73
V	TDM24		Surf.	Daub		X		Local	

Table 4.7h. Torre Mordillo. (PC=point counting). See Plate 5.

Programme 1

Ware	Sample	Description	Suggested origin	AAS	INAA	PE	XRD
D	AM4		Local			X	
G	AM1		Local		X	X	X
	AM2		Local		X	X	X
	AM3		Local		X	X	X
V	MC1	Brick	Local	X			

Table 4.7i. Amendolara.

PE and INAA in **Programme 3** (Levi 1999, figs. 26-28, 29a, 30, 70-76, pl. 4-8)

Zone	Site	Ware	Sample	Description	Date	Suggested origin	Publication	PC
A	S.Cavalcatore	I	SCAV2			S. Plain	Levi 1999, pl. 4	
			SCAV3	Jar		N. Plain	Levi 1999, pl. 4	
	Tarianne	I	TA2	Jar	MBA	N. Plain	Levi 1999. fig. 70, pl. 4	
			TA4	Carinated cup	MBA	N. Plain	Levi 1999. fig. 70	
B	Villapiana	I	VP2	Cup handle	MBA	N. Plain	Levi 1999. fig. 70, pl. 5	X
			VP3	Cup zoomorphic handle	RBA	S. Plain	Levi 1999. fig. 70, pl. 5	X
C	Timpone Motta Cerchiara	G	TMC1	Handle	RBA	Local	*EM S II*, tav.123, 2	
		I	TMC2	Handle	RBA	N. Plain	Levi 1999. fig. 71, pl. 5	X
D	Timpa Castello Francavilla	I	TCF1	Carinated cup	MBA-RBA	N. Plain	Levi 1999, fig. 71, pl. 5	
			TCF3	Jar	?	S. Plain	Levi 1999, fig. 72	X
			TCF7	Jar	EIA	Local	Levi 1999, fig. 71, pl. 5	
	Monte S.Nicola	I	MSNC2	Biconical jar	EIA	Local	Levi 1999, fig. 72	
			MSNC3	Bowl	FBA (EIA)	Local	Levi 1999, fig. 72	
E	Serra Castello	PG	SCS5		EIA	Local		
		I	SCS4	Jar	EIA	S. Plain	Levi 1999, fig. 74	
			SCS6	Jar	EIA	S. Plain	Levi 1999, fig. 74, pl. 7	X
			SCS9	Bowl	EIA	S. Plain	Levi 1999, fig. 74	
	Serra Cagliano	I	SCG1	Necked jar	MBA	S. Plain	Levi 1999, fig. 74, pl. 7	X

Zone	Site	Ware	Sample	Description	Date	Suggested origin	Publication	PC
E	Fontana Finocchio	I	FF1	Bowl	FBA-EIA	S. Plain	Levi 1999, fig. 75, pl. 8	
			FF7	Jar	FBA-EIA	S. Plain	Levi 1999, fig. 75	X
	Rosa Russa	I	RR4	Cup	MBA	S. Plain	Levi 1999, fig. 75, pl. 8	X
			RR7	Cup	MBA	S. Plain	Levi 1999, fig. 76	
			RR9	Necked jar	MBA	S. Plain	Levi 1999, fig. 76	X
			RRP1			Local		
			RRP3			Local		
F	Basili di Rossano	D	BRS1	Undiagnostic sherd (figulina)	RBA?	Local	Levi 1999, fig. 76, pl. 8	X
			BRS2	Undiagnostic sherd	RBA?	Local		
		I	BRS3	Jar	RBA	Local	Levi 1999, fig. 76	
			BRS4	Jar	RBA	Local	Levi 1999, fig. 76, pl. 8	X
	Strange	I	STR4	Handle	MBA	Local	Levi 1999, fig. 76	
			STR5	Handle	MBA	Local	Levi 1999, fig. 76, pl. 8	

Table 4.7j. Plain of Sybaris Regional survey. (PC=point counting). See Plate 5.

Clays and Siltstones
Straface (*BT 1136*): calcareous clay with quartz and muscovite.
Avena, Fig. 24 (*BT1117*): fossiliferous silty clay with quartz and muscovite.
Trebisacce (*BT1102, BT1106*): large quarry between Broglio and Trebisacce. On the northern side the clay is fine and grey-blue, on the southern side it is silty and yellowish. The clay contains fossils, quartz, calcite, muscovite.
Canale Marzuca (*BT1104*): small deposits on Torrente Marzuca, immediately north of Broglio near the "Sellata di Broglio". It is a silt and sand-rich clay (with quartz and muscovite) and contains large clasts of siltstone (with microfossils and calcite) (cfr. *BT1109*).
Villapiana: alternating silt and clay layers, the clay contains a lot of fossils (*BT1111*).
Civita (*BT1119*): clay with siltstone (quartz, calcite, muscovite).
Cassano allo Ionio (*BT1120*): clay with quartz, calcite and muscovite.
Near Torre Mordillo - Valle Saetta (*BT1121*): clay and siltstone with calcite, fossils, quartz, rarely feldspars.
Near Torre Mordillo - Spezzano Albanese (*BT1122*): siltstone with fossils, calcite, quartz, feldspars. Corigliano Le Varie (*BT1123*): clay and carbonatic siltstone with fossils, quartz, pyroxene.
Corigliano, quarry for brickworks (*BT1124*): clay/siltstone with macro- and microfossils, quartz, muscovite.
Strange (Trionto) (*BT1126*): calcareous clay with fossils, quartz, feldspars, muscovite, glauconite, chlorite.

Sands
Straface (*BT1134*): marls, siltstones, arkosic sandstones, calcite, quartz.
Avena (*BT1133*): siltstones (sometimes fossil-bearing), calcite, arkosic sandstones, quartz.
Saraceno (*BT1108*): calcareous sandstones, calcite; sparse siltstones, quartz, chert.
Mizofato (*BT1125*): high grade metamorphic rocks, quartz, micas, garnet (about 5%), granites.
Trionto (*BT1127*): low grade metamorphic rocks (prevalent), granites, quartz, micas, limestones with sparse chert.

Table 4.7k. Raw materials sampled in **Programme 3** (Levi 1999 figs 22-25, pl. 3).

Geological background

The Plain of Sybaris lies at the junction between two large and contrasting geological structures (Fig. 4.12): the mountainous heights (Pollino, Calabro-Lucan Apennine, *etc.*) belonging to the Apennine Chain, to the North; and to the South, the Sila, which belongs to the Calabro-Peloritan Arc.

The Apennine Chain consists of sedimentary rocks, of very varied ages and types. The tectonic and stratigraphic succession of the Calabro-Lucan Apennine consists of carbonatic units, the Liguride complex, and post-orogenic units. The carbonatic units are essentially limestone, dolomitic limestone, calcilutites and calcirudites. The Sila essentially comprises intrusive and metamorphic rocks, with a thin covering of sedimentary rocks. The intrusive rocks are gabbro up to granodiorites (Messina *et al.* 1994); these complexes are cut by a great number of dykes (microgranitic, aplitic and pegmatitic). The metamorphic series show a very wide spectrum of genesis and composition from low-grade metamorphism (phyllites, green schist or epimetamorphites) to high-grade metamorphism (gneiss, gabbro, diorite, granulite); regional metamorphism (alpine) and contact metamorphism (up to cornubianites). In various metamorphic lithotypes (mica schist and gneiss) garnets are frequently present (up to 2 cm in size). In the Sila area there are also rocks deposited after the building of the massif, such as the Corigliano clays.

In more recent times, thick alluvial sheets have formed, sometimes associated with beach deposits (such as the sands and conglomerates that in part constitute the hill of the Broglio di Trebisacce site). Their composition is not at all uniform given the extreme variability of the source-rocks. Nevertheless, for each formation one or more distinct petrographic characteristics may be identified, for which it is possible to determine the source-rocks of a specific sedimentary deposit.

The map (Fig. 4.12) groups various lithologies. Group 1 comprises actual and fossil beach deposits, alluvial deposits, detritus, landslides, *etc.* Clays (Group 2) date to the Pliocene or Pleistocene (5-1 million years) and are often silty or contain lenses or strata of sands. The gypsum (Group 3) may be well-crystallized or microcrystalline alternating with clays. Group 4 contains all the well-cemented detritus rocks (sandstones and conglomerates), with an important carbonatic component. Groups 5 and 6 essentially comprise flysch, i.e. alternating sandstone and pelite. Group 7 comprises limestones (and marls). The igneous rocks (Group 8) are almost exclusively intrusive, except for the few effusive ones. All varieties of metamorphic rock belong to Group 9.

Minero-Petrographic data

1a. Broglio Programme 1 (Table 4.7b)

Lazzarini and Mariottini (in Jones *et al.* 1994) summarised their findings as follows:
The majority of pottery was produced with local illitic clay naturally containing (or tempered with) local sediments (mainly silts and sandstones). Some pots (eg. **I38**, **I51**) contain garnet which is typical of the southern Plain of Sybaris.

- Mycenaean: the compositions are not homogeneous and probably represent regional rather than local production. However, two samples are local: **A65** which is overfired, and **A72** with siltstone.
- *Dolia*: illitic-marly clay with many minerals and local tempers (mainly siltstone, sandstone and calcite), fired around 830°C
- Grey is quite homogeneous with illitic-marly clays rich in foraminiferous and organic material; locally produced (shale and siltstone), fired at 800-850°C.
- *Impasto*: locally produced with shale, siltstone, sandstone and grog. Medium-high firing temperature

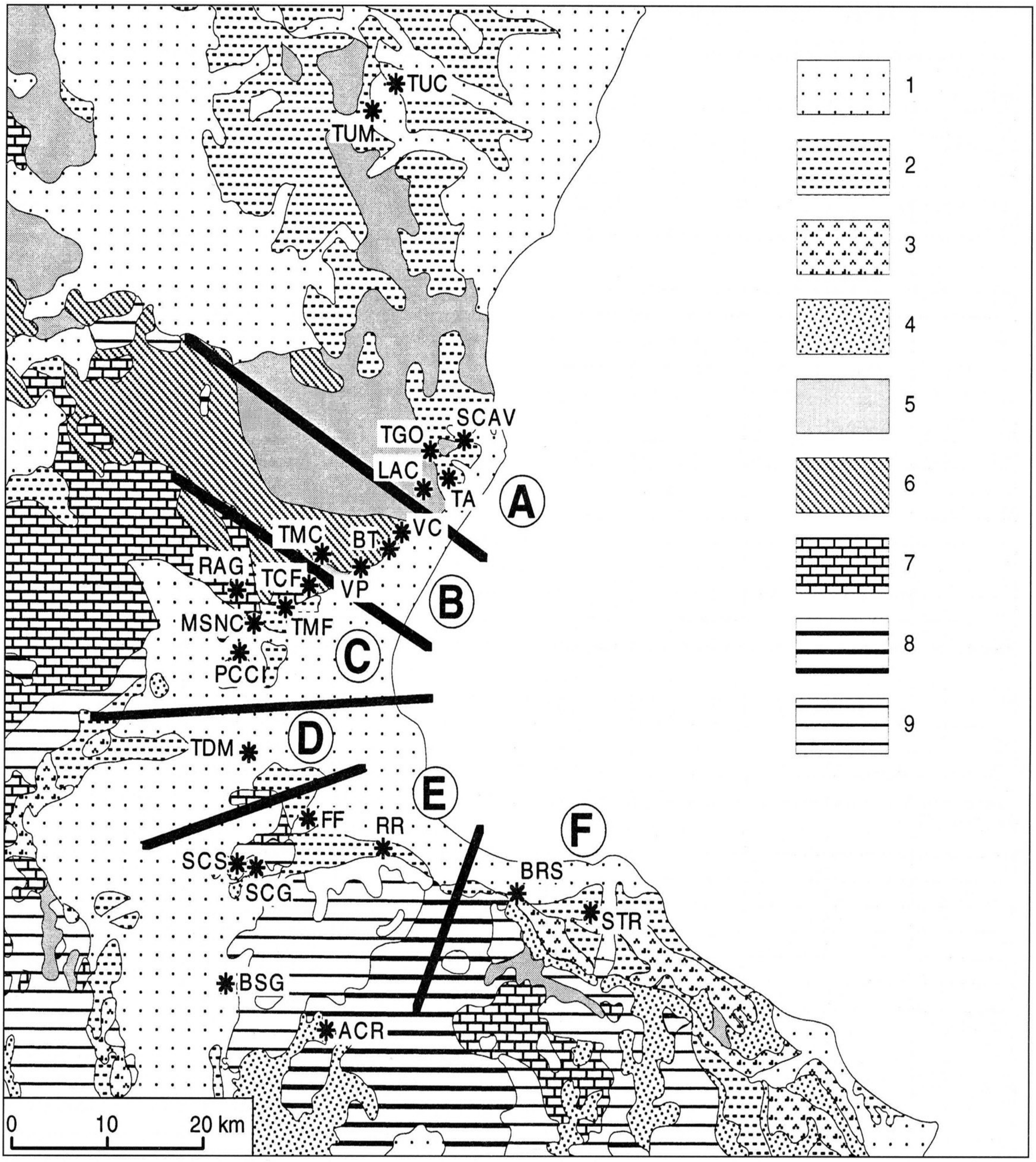


Fig. 4.12. Map of the Plain of Sybaris showing Zones A-F and main geological features: 1. Sands and gravels, alluvial deposits; 2. Clays; 3. Chalks; 4. Sandstones and calcareous conglomerates; 5. Sandstone-pelitic units; 6. Pelitic sandstone units; 7. Limestones and marls; 8. Igneous rocks; 9. Metamorphic rocks. From Levi 1999, fig. 27.

1b. Plain of Sybaris Programme 3 (Tables 4.7c, e, h, j and k)

Levi (1999, Fig. 28) considered the fabric composition of 163 samples of *impasto* and *dolia* found from 23 excavations and survey sites across the Plain as a function of location of production, type and date. Comparative material consisted of clays and sands, listed in Table 4.7k.

The compositions comprised two main groups, one with sedimentary inclusions/rock fragments, and one with metamorphic inclusions/rock fragments, corresponding to probable production areas in the north and south of the Plain respectively. Within the sedimentary group, there are Zones A-C which are characterised by very frequent sandstone and siltstone and, in Zones B and C, by calcite as well. Frequent granite, pyroxene and high metamorphic grade rocks make up Zone D, and their concentration rises to very frequent in Zone E. Zone F has very frequent mica and low metamorphic grade rocks. Detail is given in Table 4.7k where the characteristic inclusions are listed.

The two-fold North-South classification was then examined with respect to a quantitative analysis by point counting (for method see Part 1) on 38 specimens. Modal count data were plotted in three triangular diagrams (Fig. 4.13), and compared with the mean values for the present-day fluvial and beach sands (from the Province of Alto Jonio and Crati in Critelli, Le Pera, 1997): -QFL (total quartz grains + total feldspars grains + total silicate and carbonatic lithics) -QKP (total quartz grains + total potassium feldspars grains + total sodium-calcium feldspar grains) -Rg Rs Rm (total granite/gneiss grains + total sedimentary grains + total metamorphic grains).

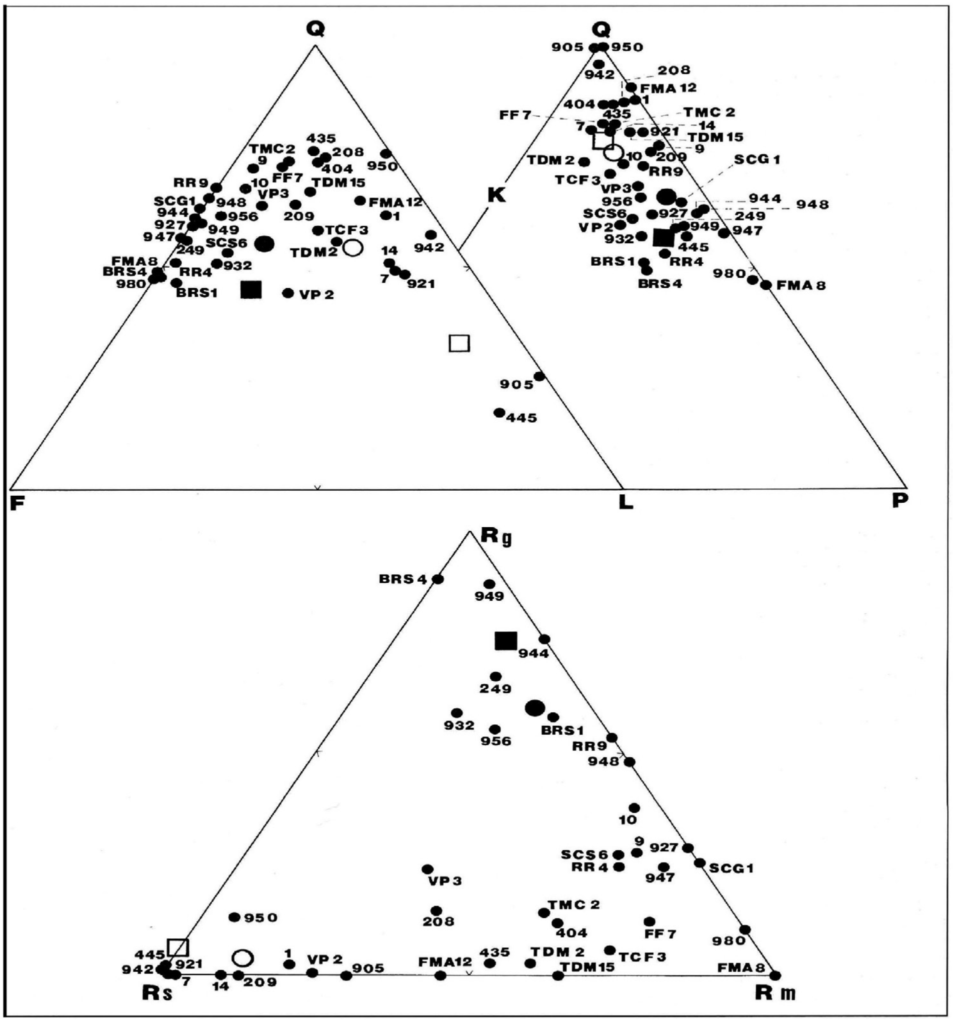


Fig. 4.13. Triangular diagram QFL (QuartzFeldsparLithics), QKP (QuartzKFeldpsarNaCaFeldspar) and RgRsRm (Granite Sedimentary/Metamorphic grains) showing the composition of the sand and clasts in the pottery from the Plain of Sybaris. Samples have their site codes except for those from Broglio. The average composition of fluvial and beach sands from the Crati (black squares and black circle respectively) and Alto Jonio (open square and circle respectively) provinces is also shown. From Levi 1999, Fig. 30. See Plates 4, 5.

In the QFL (Quartz Feldspar Lithics) plot, the pottery of northern production ranges along the QL axis, while southern production concentrates in the middle of the QF axis, but there is no clear-cut difference between them, nor do they differ from present-day sands except for a greater quantity of lithics in the North and feldspars in the South. In the QKP plot, all the specimens concentrate on the upper part of the QP axis. Again, the two provinces are not clearly distinguished, and the largest difference lies in the greater quantity of sodium-calcium feldspar in the southern pottery.

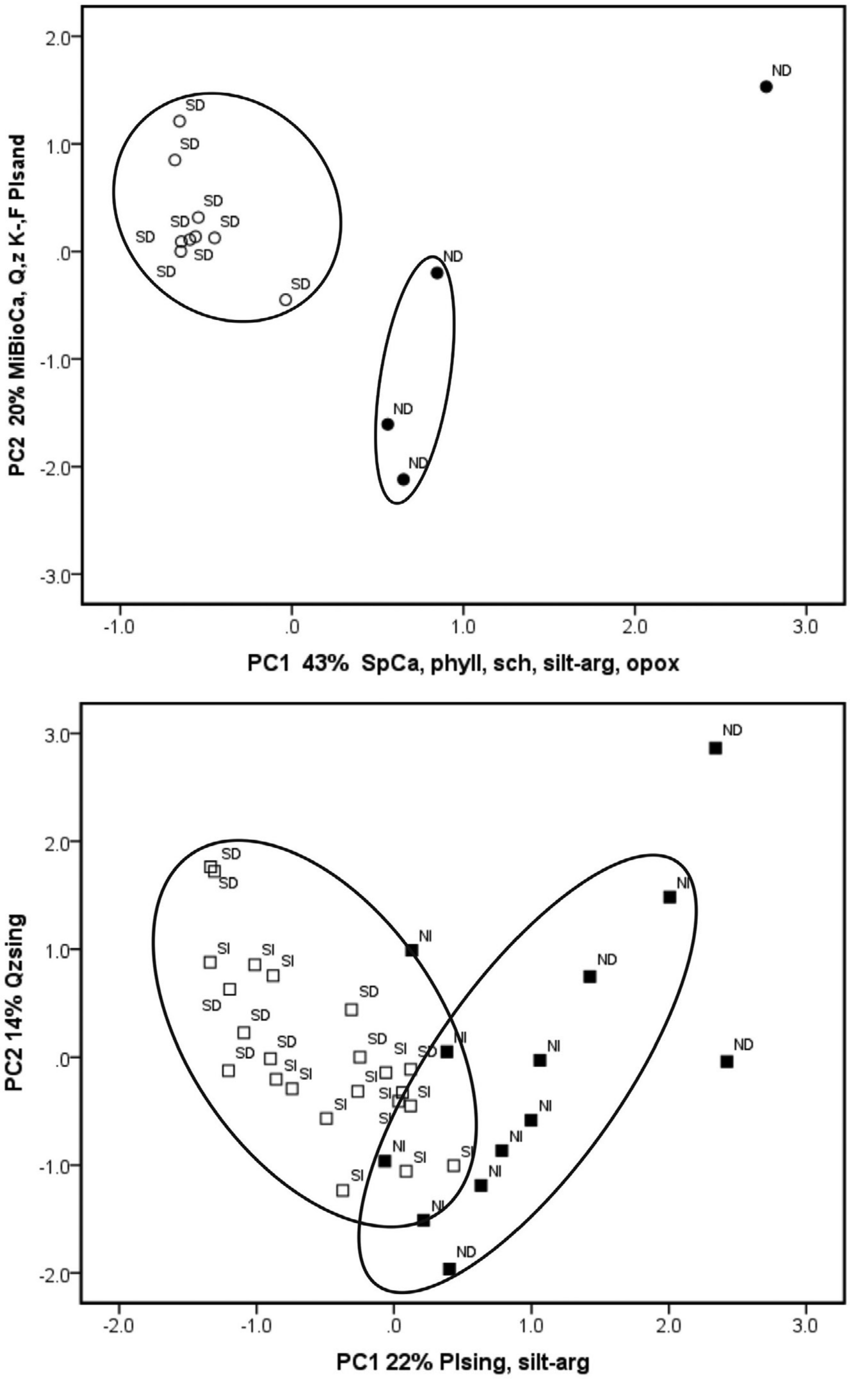


Fig. 4.14. PC plots of the petrographic data for *impasto* and *dolia*. ND (North *dolia*, solid square) and NI (North *impasto*, solid circle); SD (South *dolia*, open circle) and SI (South *impasto*, open circle). Top: all fifteen variables listed in the text above; bottom: same but less serpentinite, flint, granite and hornblende.

Larger differences are found in the RgRsRm (Granite Sedimentary/Metamorphic grains) plot. The specimens range along the RsRm and RmRg axes, reflecting the geology of the region. In the more northerly specimens, 50-100% of the lithic clasts are sedimentary, while in the central part of the region (from Torre Mordillo to Rosa Russa) at least 50% of them are of metamorphic rock; in the specimens from the south-eastern part of the region (Basili di Rossano) granitic-gneiss prevails.

The next step was to examine the distinction this time between the respective productions of *impasto* and *dolia* in the north and South of the Plain, by taking the point counts of the following petrographic constituents:

Quartz (Qz sing), Quartz plagioclase feldspar – metamorphic, Quartz plagioclase feldspar– plutonic, Quartz plagioclase feldspar– sandstone (Qz K-F Plsand), Phyllite (phyll), Schist (Sch), Serpentinite (serp), Silt and Argillite (silt-arg), Flint Granite (gran), Micritic-Biomicritic calcite (MiBioCa), Spathitic calcite (SpCa), hornblende (orn verd), opaque oxides (opox), Plagioclase feldspar (Pl sing) and potassium feldspar (K-F sing) and submitting them to multivariate treatment in the same way as the chemical data have been classified, that is, by PCA. Fig. 4.14 shows two plots which bear out the distinction: (a) the northern *dolia* include one outlier but they all separate from the southern *dolia*, and (b) the northern *impasto* and *dolia* overlap slightly with their counterparts in the South.

Anticipating the presentation of the chemical data below, we can look here at the relationship between the main inclusions and bulk chemical composition. It appears that the most typically enriched elements in the North, Cs, Rb and K, are due to both the clay and the tempers (siltstone and shale). Na, more abundant in the South, appears to depend above all on the tempers (plagioclase feldspar) (Levi 1999, Figs. 59-60).

Moving now to the situation at Broglio, the results show that there are a number of *dolia* and *impasto* which were produced in the southern part of the Plain of Sybaris, at a distance of at least 20 km owing to the presence of plutonic and metamorphic inclusions. Based on these petrographic analyses, it was possible to employ macroscopic observations to estimate the amount of regionally imported pottery:

- *Dolia* 30% imported during the RBA and 20% during the FBA (308 observations).
- *Impasto* about 1-2% (mainly closed vessels) imported in each archaeological phase (1139 observations).

1c. Torre Mordillo

Carrara *et al.* (1981) examined Early Iron Age pottery from the necropolis. They found the composition of the *impasto* pottery to be similar to that of the specimens of Quaternary sands and conglomerates, and thus local. The Figulina pottery was apparently not local, but was of too generic a composition to be able to determine its possible source.

Chemical data

2a. AAS Programme 1 (Tables 4.7b, f, i)

Treating the data set of 115 compositions at **Broglio di Trebisacce**, Jones *et al.* (1994) established that there was one main composition group to which belonged a majority of the (decorated) Italo-Mycenaean pottery, and all the Grey wares, *dolia* and *impasto*, representing local or regional production utilising a variety of clay materials in the Plain delimited by Corigliano to the south and Amendolara in the east (Fig. 4.12). On the one hand, there were the clays used especially for the finer-textured pottery such as the Italo-Mycenaean and Grey ware which were calcareous in nature and resembled in composition the modern ceramics and clays. The *impasto*, on the other hand, was made of a different clay, non-calcareous but no doubt local.

This assessment is visualised in Fig. 4.15. Most of the decorated Mycenaean belongs to the central cluster, as do the majority of the modern bricks and clays; the Grey ware encompasses the full range of that cluster, the *dolia* form a rather tight group at the lower Mg concentration end of the cluster and the *impasto* lies outside it. The likely imports stand out clearly (**A23, 24, 40, 48, 49, 51, 53, 54** and **56**), and there are a few samples (**A3, 22** and **74**) that are classified as atypically local owing to their high Mg contents, yet their Cr and Ni contents lie within the 'local' ranges.

The decorated Mycenaean lying within the central cluster corresponds to manufacture within the Plain and it cannot be differentiated chemically from the Grey ware and Figulina. There is no apparent distinction between the Grey painted and Grey wares, although one example, **G24**, resembles the *impasto*. The correspondence of compositions of samples that were either duplicates or taken from the same vase is generally good: **A11** and **34**; **A48** and **49**; **A23** and **24**.

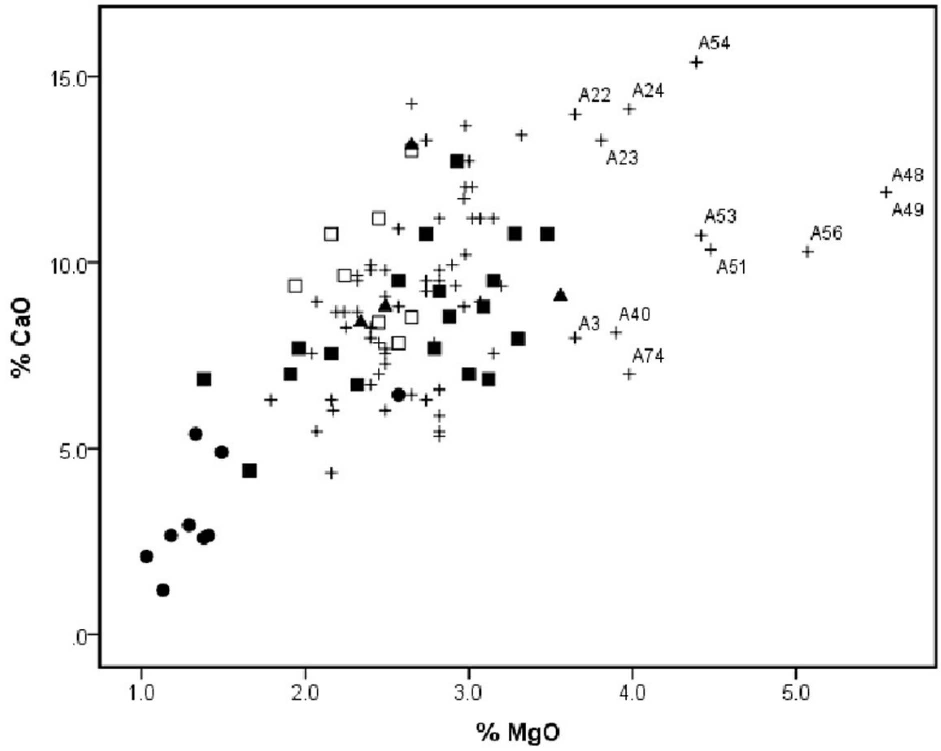


Fig.4.15. Mg-Cr oxide plot highlighting the Mycenaean (+), Grey ■, *impasto* ●, *dolia* □, figulina ▲ at Broglio di Trebisacce. AAS data.

2b. AAS Programme 2 (Table 4.7g)

Jones' (2001) programme of analysis at **Torre Mordillo** had similar aims to that at Broglio di Trebisacce with an emphasis again on establishing the status of the Mycenaean; chemical analysis alone was employed. Of the 95 samples selected by LV encompassing the main pottery classes, 53 were analysed (Table 4.7g), supplemented by two Aegean type which had been analysed in Programme 1 (Table 4.7f: **TDM1** and **2**).

The results are similar to those at Broglio: the non-calcareous *impasto* stands well apart from the broad main group containing the other classes including much of the Mycenaean. Several outliers with high Cr contents are apparent in the PC plot (Fig. 4.16) – **TM10, 45, 48** (Grey), **56**, 75 and 94 (Grey painted) with high scores on PC2, **TM83** and **88** with high scores on **PC1**, and **TM48** with negative score on PC1 – are all Mycenaean, except for **TM94** which is Grey painted. On the other hand, **TM73** and **86**, also Mycenaean, are border line cases, probably best regarded as atypical local/regional products, but different from two other border line cases, **TM22** and **43**. **TM83** and **88** having high Mg, Fe and K but low Cr contents are more likely to be atypical regional products than from the Aegean. **TM48** and **94** can also be classified as atypical regional products.

The *impasto* corresponds well with Carrara *et al.*'s (1981) data for their Group B vessels, as opposed to their Group A vessels which relate to the present broad group.

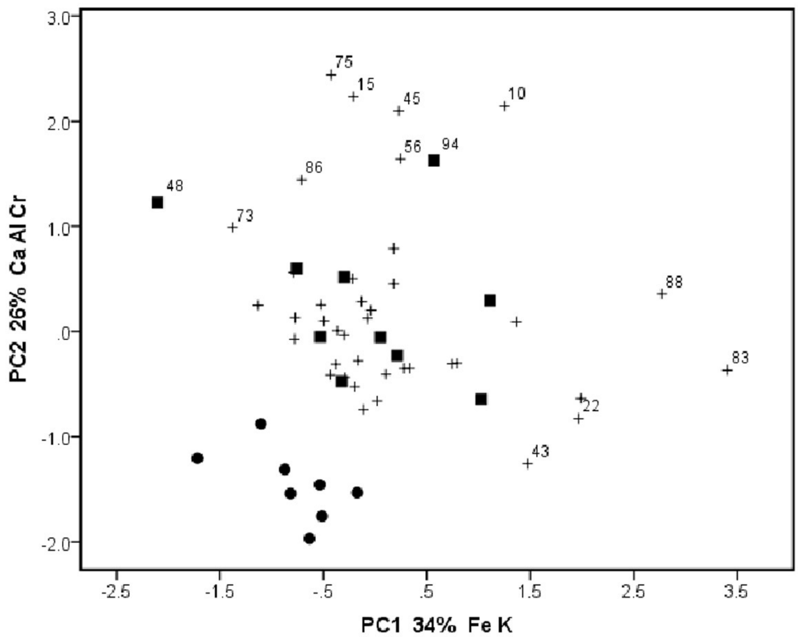


Fig. 4.16 PC plot of the AAS compositions of pottery from Torre Mordillo. Numbered samples of Mycenaean and Grey ware are discussed in the text; remaining Mycenaean +, Grey ■ and *impasto* ●.

3a. INAA (Pavia) Programme 1 (Tables 4.7b, i)

Like the corresponding AAS data set, the INAA compositions at **Broglio di Trebisacce** formed one main group, albeit with wide ranges in several elements, representing local/regional production. Many of the element distributions in the fine wares, Mycenaean and Grey, were significantly broader than those of corresponding fine-textured wares made in the Aegean. Moreover, the Grey and Grey painted wares, which were the best numerically represented among the INAA samples, seemed to form a less coherent group chemically than the other classes, certainly with respect to the Cs, La and Rb contents. Of the five Mycenaean analysed, all were likely local/regional products except for **A63** (*not* analysed by AAS), which had high Co, Cr and Cs contents and is discussed in Part 4. One *impasto* example, **I51**, stood apart both chemically (high Cs content) and petrographically (garnet content).

3b. INAA Programme 3, Broglio (Table 4.7c)

Treatment of this data set for Broglio di Trebisacce indicates that **BT704, 858** and **859** are surely imports, as is **BT703** (Fig. 4.17). Of interest is the small cluster of samples (highlighted in Fig. 4.17) with Cr > 200 ppm and Co > 20ppm comprising Mycenaean (**BT702**), Protogeometric and Geometric Figulina

(**BT708, 843, 851, 852**) and Grey (**BT606** and **639**); they seem to form a discrete group separating from the main cluster, and for the time being they are regarded as atypical products of the Plain. Detail within that main cluster is not discernible other than the *impasto* which has low Cr and Co contents.

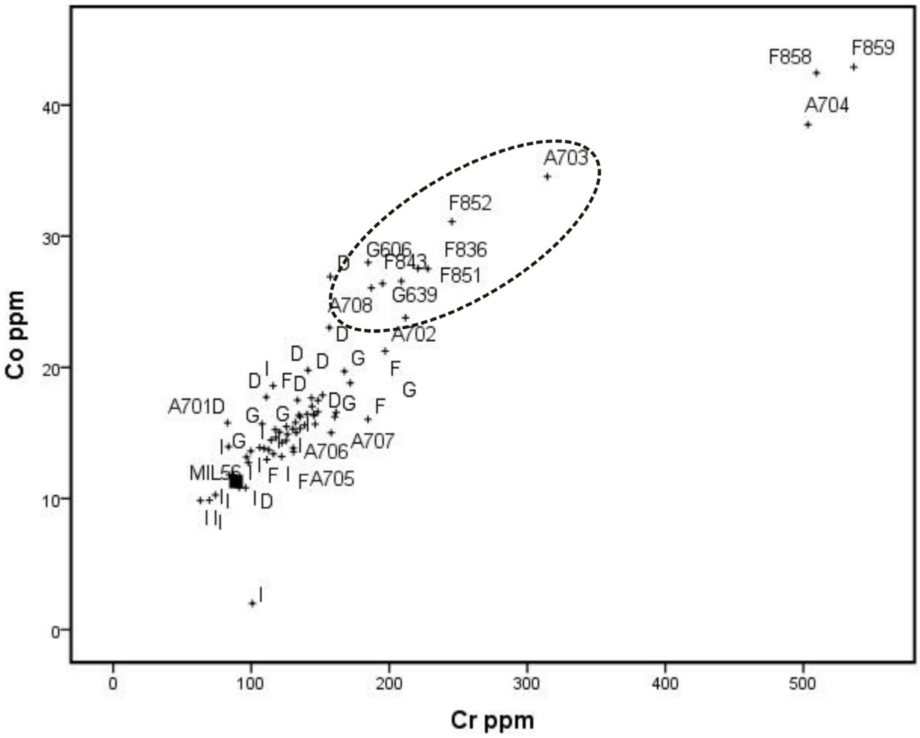


Fig. 4.17. Cr-Co plot for the samples from Broglio di Trebisacce, highlighting the Mycenaean (A), Grey (G) and PG Figulina (F), *impasto* I and MIL56 ■ (see Milena entry in Part 4). INAA data Programme 2.

3c. INAA Programme 3 Regional production of impasto and dolia (Tables 4.7c, e, h, j)

Investigation of *impasto* and *dolia* production in the Plain of Sybaris, which was remarkably amenable to minero-petrographic treatment as shown above, is here considered from the corresponding chemical evidence. The samples concerned, which are listed below, are classified according to their petrographic grouping to either the North or South of the Plain:

North of the Plain

Dolia: **BT905, 921, 940, 942, 943, 945, 946, 950** and **957**
Impasto: **BT1, 7, 11, 14, 206, 208, 209, 210, 409, 420, 436, 442, 445; SCAV3; TA2, 4; VP2; TMC2; TCF1, 7; TMF1, 2; FMA5, 9, 12; MSNC2, 3; TDM6.**

South of the Plain

Dolia: **BT927, 932, 944, 947, 948, 956; FMA8**
Impasto: **BT9, 10, 247, 404, 435; SCAV2; VP3; TCF3; TDM2, 3, 7, 8, 11, 14, 15, 19; SCS4, 6, 9, SCG1; FF1, 7; RR4, 7, 9; BRS3, 4; STR4, 5.**

Classification by PCA gave a partial picture as only 67% of the total variance was explained by the first three principal components. Nevertheless, a distinction between production in the North and South of the Plain was apparent, and, although crude because of the overlap between the two regional groups, it nevertheless provided encouraging support for the petrographic classification.

The North-South divide was further substantiated by discriminant analysis of four groups, representing *impasto* and *dolia* in the North and South. In Fig. 4.18 their respective productions *within* the North are reasonably well differentiated from those in the South, and small distinctions between their productions *within* the North or *within* the South are apparent. The division of the Plain of Sybaris into two regions is therefore substantially verified, based essentially on the higher concentrations of Cs, Rb and Ta in the North and of Na in the South. Other significant elements are Cr and K, and lastly Co, Sm, Fe, Eu (all higher in the North). While Cs and Rb appear mainly to depend on the characteristics of the clay, Na is related to a much greater extent on the tempers used. Levi (1999, 99-103; 327) discusses the distribution of element contents between clay and temper. For the Tursi area, it appears that a further zone of production of *dolia* may be identified: these specimens have higher values for almost all factors.

The elucidation of localised, rather than centralised production of *dolia* and *impasto* in the Plain of Sybaris has been an important step forward, achieved by petrographic analysis and supported by chemical analysis as reported above. For the present, Figs. 4.14 and 4.18 point to the presence of production in the north and south of the Plain, but a more refined picture may emerge from recent work which has involved *combining* the petrographic and chemical data sets.

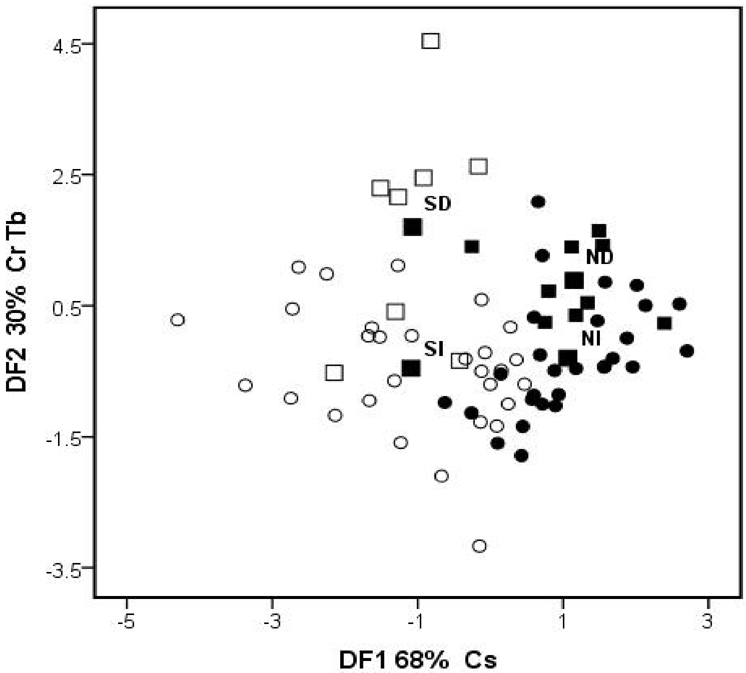


Fig. 4.18. DA of four composition groups: ND (North *dolia*, solid square) and NI (North *impasto*, solid circle); SD (South *dolia*, open circle) and SI (South *impasto*, open circle). Log transformed INAA data.

3d. INAA Programme 4 (Table 4.7d)

In the course of the technological investigation of Mycenaean and related wares and *impasto* at **Broglio di Trebisacce** (and one sample from Rosa Russa) discussed in Chapter 5, Buxeda i Garrigos *et al.* (2003) analysed thirty samples by INAA. Classification of the data by both cluster analysis and PCA revealed one broad group comprising most of the Mycenaean and related samples; some *impasto* samples and **BTD030** lay outside this group, and **BTA003** and **BTA068** with high Cr and Co contents were regarded as likely imports from the Aegean (see Part 4).

The data set is compared with the compositions obtained by INAA at Bonn in the Appendix (Table 10).

4. ICP Programme 5 (Table 4.7c)

Examination of the compositions of the Mycenaean analysed as part of this programme, still in progress (Database 3), strongly indicates local or regional production for **BT701, 705, 706, 710, 711, 713** and **714** and Coarse wares **707** and **712**. On the other hand, it is intriguing to find that both have volcanic temper, in which case their source must be located further afield.

The comparative INAA-ICP exercise reported in the Appendix (Table 10) includes analysis of samples from Broglio di Trebisacce.

Capo Piccolo (37)

AAS (Database 1): Mycenaean 1
INAA (Database 2): Mycenaean 2, *dolium* 1, PG? 1, *impasto* 7, daub 3, clay 1
Publications: Lattanzi *et al.* 1987; Jones, Vagnetti 1991; previously unpublished
Illustration: Fig. 4.77

Samples from the nearby sites of Torre Tonda Capo Rizzuto (TTCR) and Capo Rizzuto North-East (CRNE) are included here.

AAS						
Ware	**Sample**	**Description**	**Date**	**Suggested origin**	**Publication**	**Inv. N.**
M	CP	Closed vessel	I-II	N. Peloponnese	Lattanzi *et al.* 1987, fig. 6-7	
INAA						
M	CP501	Cup		Import; not Peloponnese	Bianco, Marino 1991-92, not ill.	
	CP502	Plain, wheel-made amphora		Import; not Peloponnese; different source from 501		
D	CP6			Local		42070
PG?	CP410			Local		
I	CP2	Bowl		Local		42109
	CP3	Jar		Local		42137
	CP14			Local		42068
	CP17	Base		Local		42173
	CP30	Carinated bowl		Local		42123
	TTCR2			Local		
	CRNE1			Local		
	CRNE1			Local		
V	CP203	Daub?		Local		
	CP204	Daub		Local		
	TTCR4	Daub		Local		
	CP407	Clay		Local		

The sample analysed by AAS is considered with the contemporary material from Vivara. Within the INAA data set, **CP501** and **502** are easily separable from the *impasto* and daub. These two imports are considered in Part 4.

Capo Cimiti

INAA (Database 2): Grey 1
Publication: Jones, Levi 2002

Ware	Sample	Suggested origin
G	CC1	Local

Taureana di Palmi (39)

ICP (Database 3): Mycenaean 1, *impasto* 6
PE: *Impasto* 6
Previously unpublished
Illustration: Fig. 4.77

The non-calcareous compositions of all the *impasto* samples are uniform. TAU19 is treated in Part 4.

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
M	TAU19	Cup	IIIA2	Peloponnese	Agostino *et al.* 2012, fig. 8:1	19
I	TAU2	Carinated cup	RBA?	Local	Bettelli *et al.* 2007, fig. 4:8	72
	TAU6	Rodì-Tindari handle	MBA1-2?	Local	Bettelli *et al.* 2007, fig. 5:2	80
	TAU9	Carinated cup	MBA1-2?	Local	Bettelli *et al.* 2007, fig. 3:1	12
	TAU11	Plate	MBA3	Local		124
	TAU14	Pedestal bowl	MBA3	Local	Bettelli *et al.* 2007, fig. 3:4	1
	TAU15	Apennine decoration	MBA3	Local	Bettelli *et al.* 2007, fig. 5:4	17

Punta Zambrone (40)

AAS (Database 1): Italo-Mycenaean 1, *impasto* 6
Previously unpublished
Illustration: Fig. 4.77

Ware	Sample	Description	Date	Suggested origin
IM	PZ1	Open vessel (?)	I-II (?)	Local/regional?
I	PZ2			Local
	PZ3			Local
	PZ4			Local
	PZ5			Local
	PZ6			Local
	PZ7			Local

The Italo-Mycenaean sherd, **PZ1**, decorated with oblique lines, which is clearly differentiated from the non-calcareous *impasto*, is treated in Part 4 (see also Chapter 6).

CAMPANIA

Grotta del Pino (42)

INAA (Database 2): Matt-painted 4, *impasto* 3
PE: *Impasto* 3
Publication: Jones, Levi 2000-01
Illustration: Fig. 4.78

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
MP	GSA1	Necked jar	I-II	Uncertain	Piperno, Pellegrini 2001, tav. M	132848
	GSA 2	Closed vessel	I-II	Import	Piperno, Pellegrini 2001, tav. N:1-2	132849
	GSA 3	Closed vessel	I-II	Regional?	Piperno, Pellegrini 2001, tav. N:5	132850
	GSA4	Necked jar	I-II	Regional?	Piperno, Pellegrini 2001, tav. N:3-4	132851
I	GSAI1			Local		
	GSAI2			Local		
	GSAI3			Local		

The only sherd that can be confidently defined as Matt-painted is **GSA1**, the other three being plain, at least in the preserved portion. The sample code in Jones, Levi (2000-01) was GSA.

Petrographic analysis

The composition of the *Impasto* is similar with high porosity and heterogeneous colour of the groundmass. **GSAI3** is coarser with sandstones, quartz, feldspars and grog (sometimes larger than 1 mm); the groundmass is reddish. **GSAI1** and **GSAI2** are characterised by quartz and grog with a brown groundmass. The composition is compatible with the local geology, characterised by sedimentary rocks (limestones, sandstones, marls, clays, conglomerates, dolomites) suggesting local production. **GSA 1-4** are treated in Part 4.

Pontecagnano (46)

ICP (Database 3): Italo-Mycenaean 1, *impasto* 4
Previously unpublished
Illustration: Fig. 4.78

Ware	Sample	Description	Date	Suggested origin	Publication
IM	PON1	Necked jar	IIIC	Local/regional	Bettelli, Vagnetti 2004-05, figs. 12:3; 14
I	PONI1			Local	
	PONI2			Local	
	PONI3			Local	
	PONI4			Local	

See Monteroduni.

Vivara (47)

There are a number of archaeometric studies on the pottery from the excavations on Vivara, mainly at the Punta d'Alaca site. Brief reference is made to an unpublished account by Riley (1980) mainly on the coarse wheel-made pottery which was later described and classified by Re (1994). Some of this material was later analysed chemically by Jones (1994a), although the focus of that study was directed more towards the decorated Early Mycenaean material, described by Re (1994). J.Ll. Williams reported (in Cazzella *et al.* 1997) the petrographic analyses of *impasto*, and Y. Goren (*et al.* 2001) has analysed petrographically a single supposed Canaanite jar (Part 4). The petrographic studies are presented first, followed by the chemical.

PE (Database 4): *Impasto* 14, daub 3, all from the Punta di Mezzogiorno and Punta Capitello sites
Publication: Cazzella *et al.* 1997
Illustration: Figs. 4.79-84

Williams' study, while focusing on decorated Capo Graziano pottery found on Vivara but made on Lipari, included wares probably local to the Bay of Naples. The petrographic characteristics of the five identified fabrics are summarised in Table 4.8 below.

Fabric	No. of samples	Ware	Matrix	Clasts	Suggested origin
1	8	Plain	Sandy clay	Angular clasts of volcanic rocks mostly >0.2mm: obsidian, pumice, glassy andesite and trachytoidal clasts	Bay of Naples
2	4	Capo Graziano	Compact sandy clay	Same as fabric 1	Lipari
3	1	Lid	Sandy clay?	Infrequent volcanic clasts, quartzite and grog	Made locally from imported materials?
4	1	Bowl with inturned rim and three vertical segments		Grog	Campania?
5	3	Daub	Fine residual	Pumice	Bay of Naples, but probably not Vivara

Table 4.8. Petrographic analysis of Lipari Capo Graziano pottery found on Vivara.

The fabrics correlated well with the typological assignments. While Fabric 2 was assigned with some confidence an origin on Lipari (see Table 4.12 in Aeolian Islands entry), the situation for Fabric 1, which displayed the largest variation in composition and texture, was less straightforward. The two fabrics shared a similar mineralogy, the clastic material from both deriving from unconsolidated volcanic ash which was added as filler to a clay; the detailed differences in the ash composition were not necessarily significant in terms of origin: in Fabric 1 it seemed to contain a wider range of more basic rock types, as opposed to glass shards being apparently more abundant in Fabric 2 ash. The ash in Fabric 1 was at least consistent with the geology of Vivara, if not decisively so. By contrast, the Fabric 1 clay whose composition pointed to a mature iron-rich clay could *not* be accommodated within the island's geology. As a result, Williams offered two interpretations: (1) the pots were made on Vivara from an imported clay but utilising a local filler; (2) the completed pots were brought in from a mainland source where volcanic ash had been introduced into the clay. The material used for the daub was different, having been formed from "a lapilli ash deposit and the products of a more alkaline basaltic volcanic terrain" giving a "very fine-textured clay matrix that contains minute and rare flecks of white mica". This material was probably not local. As for the grog-tempered pottery, the source of the clay matrix in Fabric 3, containing clasts indicative of sedimentary origin, cannot be local, although Williams suggested that the pot, having grog particles derived from crushed Fabric 1 pot, could have been made locally (that is, on the island) from an imported clay. The origin of Fabric 4 with a "total volcanic complement and grog in a residual clay" was uncertain but Campania was a possible candidate.

Here we note that four of the 23 sherds analysed by Riley (1980) (his fabrics 6-8), which were regarded as possibly local because they were consistent with the local geology, included examples of coarse wheel-turned wares.

AAS (Database 1): Matt-painted 15, Burnished 4, Mycenaean 58, Coarse ware 12
Publication: Jones 1994a

The first series of samples listed below – 1-71 – comprise the Fine Decorated (M) and Matt-painted (MP). There follow the examples of other wares originally defined by Re (1994): Mycenaean/Matt-painted (M/MP = Re's group 9; Matt-painted (MP = Re's groups 4, 7 and 8); Burnished Unburnished (BU = Re's group 3); Coarse ware (CW = Re's groups 1, 2, 5, 6, 10).

The majority of samples are from the Punta D'Alaca 'accumulo' and the Punta D'Alaca 'abitazione' contexts on Vivara; a few are from the Punta Mezzogiorno site.

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
MP	V39	Closed vessel, bichrome	I	Import, not Peloponnese	Panichelli, Re 1994, fig. 8:88	168
	V40	Closed vessel	I	Peloponnese	Panichelli, Re 1994, fig. 8:89	170
	V48	Closed vessel	I	Peloponnese	Panichelli, Re 1994, fig.8:90	248
	V54			Peloponnese		87/49
	V55			Peloponnese		87/53
	V56			Peloponnese		87/54
	V62			S. Peloponnese?		87/73
	V69			S. Peloponnese?		86/14
	V70			Peloponnese?		86/25
	V71			S. Peloponnese?		86/12
	VD2 =R1600	Closed vessel, wheel made		Uncertain	Panichelli, Re 1994, fig.14:224	6
	VD7	Closed vessel		Local?	Panichelli, Re 1994, n. 215	409
	VD8	Closed vessel, wheel made		Peloponnese?	Panichelli, Re 1994, n. 327	413
	VR3220=R8	Closed vessel		Uncertain	Panichelli, Re 1994, n. 329	222
	VR3224=R7	Closed vessel		Uncertain	Panichelli, Re 1994, n. 220	226
BU	V59			Uncertain		87/60

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
BU	V61			Local?		87/72
	VD6	Closed vessel		Local?	Panichelli, Re 1994, n. 206	411
	VR3212=R2	Closed vessel		Uncertain	Panichelli, Re 1994, n. 201	214
M	V1	Closed vessel	IIA	N.E. Peloponnese	Panichelli, Re 1994, fig. 11:120	295
	V2	Handle of alabastron?	I-II	Peloponnese	Panichelli, Re 1994, fig. 10:115	293
	V3	Closed vessel	II	Peloponnese	Panichelli, Re 1994, fig. 12:125	387
	V4	Closed vessel	II-III	Peloponnese	Panichelli, Re 1994, fig. 10:109	194
	V5	Closed vessel	II-III	N.E. Peloponnese	Panichelli, Re 1994, fig. 11:117	280/242
	V6	Alabastron?	II	N.E. Peloponnese	Panichelli, Re 1994, fig. 10:113	291
	V7	Closed vessel ?	II	Peloponnese	Panichelli, Re 1994, fig. 11:119	379
	V8	Closed vessel, handle		Uncertain	Panichelli, Re 1994, fig. 6:48	365
	V9	Handle of jar		N.E. Peloponnese	Panichelli, Re 1994, fig. 6:47	274
	V10	Alabastron?	IIA-B	N.E. Peloponnese	Panichelli, Re 1994, fig. 3:19-20	77
	V11	Closed vessel	I-IIA	Peloponnese	Panichelli, Re 1994, fig. 4:25	155bis
	V12	Closed vessel	IIA	Peloponnese	Panichelli, Re 1994, fig. 1:4	23
	V13	Handle of alabastron?	I-II	N.E. Peloponnese	Panichelli, Re 1994, fig. 5:37	209
	V14	Closed vessel	II	N.E. Peloponnese	Panichelli, Re 1994, fig. 6:46	364
	V15	Alabastron or jug		N.E. Peloponnese	Panichelli, Re 1994, fig. 4:28	161
	V16	Uncertain shape		N.E. Peloponnese	Panichelli, Re 1994, fig. 4:27	163
	V17	Alabastron		N.E. Peloponnese	Panichelli, Re 1994, fig. 5:43	246
	V18	Closed vessel	II	N.E. Peloponnese	Panichelli, Re 1994, fig. 2:10	50
	V19	Closed vessel	II	N.E. Peloponnese	Panichelli, Re 1994, fig. 5:42	239
	V20	Closed vessel, base		Peloponnese	Panichelli, Re 1994, fig. 7:51	12
	V21	Closed vessel		N.E. Peloponnese	Panichelli, Re 1994, fig. 7:59	56/260
	V22	Goblet ?	IIA	Peloponnese	Panichelli, Re 1994, fig. 7:75	198
	V23			Peloponnese		158/175
	V24	Closed vessel		N.E. Peloponnese	Panichelli, Re 1994, fig. 7:65	65

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
M	V25	Closed vessel		N.E. Peloponnese	Panichelli, Re 1994, fig. 8:77	164
	V26	Closed vessel		Peloponnese	Panichelli, Re 1994, n. 63	78
	V27	Alabastron	IIA	N.E. Peloponnese	Panichelli, Re 1994, fig. 3:16	94/369/ 177/72/14
	V28=V43	Jar	IIA	Peloponnese	Panichelli, Re 1994, fig. fig. 10:111	202
	V29	Closed vessel	II	Peloponnese	Panichelli, Re 1994, fig. 10:107	203
	V31=V45	Vaphio cup	I-IIA	N.E. Peloponnese	Panichelli, Re 1994, fig. 12:131	211
	V32	Cup	IIA	Peloponnese	Panichelli, Re 1994, fig. 13:136	1
	V33	Cup	IIA	Peloponnese	Panichelli, Re 1994, fig. 1:1	5
	V34	Piriform jar?	II-III	N.E. Peloponnese	Panichelli, Re 1994, fig. 2:14	70
	V35	Vaphio cup	I	N.E. Peloponnese	Panichelli, Re 1994, fig. 12:128	102
	V36	Cup	I	S. Peloponnese	Panichelli, Re 1994, fig. 12:129	103
	V37	Closed vessel	I-IIA	N.E. Peloponnese	Panichelli, Re 1994, fig. 8:91	138
	V38	Vaphio cup	I	S. Peloponnese	Panichelli, Re 1994, fig. 3:24	150
	V41	Vaphio cup	I-IIA	S. Peloponnese	Panichelli, Re 1994, fig. 4:30	180
	V42	Vaphio cup	IIA	S. Peloponnese	Panichelli, Re 1994, fig.12:130	201
	V44	Vaphio cup	I	S. Peloponnese	Panichelli, Re 1994, fig.5:40	204
	V46	Closed vessel	I	Peloponnese	Panichelli, Re 1994, fig.13:132	234
	V47	Jug	IIA-B	N.E.Peloponnese	Panichelli, Re 1994, fig.5:39	238
	V49	Vaphio cup	I	S. Peloponnese	Panichelli, Re 1994, fig.13:137	259
	V50			N.E. Peloponnese		262
	V51	Alabastron?	IIB	N.E. Peloponnese	Panichelli, Re 1994, fig.10:114	292
	V52			Peloponnese		294
	V53	Vaphio cup	I-IIA	Peloponnese	Panichelli, Re 1994, fig.11:124	389
	V57			S. Peloponnese		87/56
	V58			N.E. Peloponnese		87/57
	V60			N.E. Peloponnese		87/71
	V64			N.E. Peloponnese		87/153
	V65			S. Peloponnese		87/154
	V66			N.E. Peloponnese		87/164

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
M	V67			Peloponnese		87/165
	V68			Peloponnese		87/166
CW	VD1	Closed vessel		Local?	Panichelli, Re 1994, n. 154	137
	VD10	Closed vessel, painted, red-grey slip		Local?	Panichelli, Re 1994, tav. VIII, n. 153	105bis
	VD11=R1604	Closed vessel, yellow slip		Uncertain	Panichelli, Re 1994, n. 240	22
	VD12	Closed vessel, pink slip		Uncertain	Panichelli, Re 1994, n. 272	414
	VD3	Closed vessel, painted, light brown slip		Local?	Panichelli, Re 1994, fig.16:336	412
	VD4	Closed vessel, grey slip		Uncertain	Panichelli, Re 1994, fig.15:269	408
	VD9	Closed vessel, yellow slip		Uncertain	Panichelli, Re 1994, tav. X:325	218
	VR3219=R5	Closed vessel, orange slip		Uncertain	Panichelli, Re 1994, n. 161	221
	VR3222=R4	Closed vessel, orange slip		Uncertain	Panichelli, Re 1994, n. 144	224
	VR3223=R1	Closed vessel		Uncertain	Panichelli, Re 1994, n. 256	225
	VR3235=R6	Closed vessel, micaceous		Uncertain	Panichelli, Re 1994, n. 150	237
	VR3242=R3			Uncertain	Panichelli, Re 1994, n. 258	244
?	V63			Uncertain		87/76?
	VD5			Local?		410

Because of the lack of chemical data for 'local' fine-textured pottery on Vivara, recourse is made to the data available for 8th century BC local decorated pottery from Pithekoussai on Ischia and Cumae (Jones 1986a, Tables 8.10 (1-19) and 8.11 (7-19)). This situation, unsatisfactory though it is, can at least provide a crude guide to the ranges in certain elements in the clays of the Bay of Naples and its immediate environs. The clays in use at both sites are medium calcareous (7-8% CaO) with low Mg, Cr and Ni contents. A further point of comparison is with black gloss Campana A pottery attributed to the Naples region whose (ICP-ES) composition (Mirti *et al.* 1998, Table 3 Group A) is given in Database 3.

Decorated early Mycenaean

The samples were selected to provide a good cross section of the shapes among the decorated Mycenaean, mostly of early Mycenaean date. Their compositions are not uniform, and yet a large majority of them can, on the one hand, be securely distinguished from the Bay of Naples clays and, on the other, be related to reference data for the Peloponnese, as discussed in Part 4.

The *wheel-made domestic and coarse wares* also exhibit a range of compositions. Jones proposed that some of them could possibly be local products owing to their high K contents, a compositional feature of the region (Mirti *et al.* 1998, Table 3 Group A, and here Database 3). Those samples with K (oxide) contents >4% are **VD1, D3, D5, D6, D7, D10** and **61**. It is not yet possible to correlate these results with those of Riley mentioned above.

MOLISE

Monteroduni (50)

ICP (Database 3): Italo-Mycenaean 1
Previously unpublished
Illustration: Fig. 4.84

Ware	Sample	Description	Date	Suggested origin	Publication	Inv.N.
IM	ROD1	Closed vessel	IIIC	Regional?	Bettelli 2006, fig. 1	

Treating the results from these two sites together, it is apparent that **PON1** and **ROD1** differ from the *impasto*, their Na, K, Sr, Zr and lanthanide contents in particular being lower and Ca contents higher than in the *impasto*. They are considered in Part 4.

LATIUM

Casale Nuovo (51)

AAS (Database 1): Mycenaean 1, Italo-Mycenaean 5, *impasto* 6
Publications: Jones, Vagnetti 1991, 1992; Jones, Levi 2004
Illustration: Fig. 4.85

WARE	SAMPLE	DESCRIPTION	DATE	SUGGESTED ORIGIN	PUBLICATION
M	CNU3			Peloponnese	
IM	CNU1			Local/regional	
	CNU2	Stirrup jar	IIIB-C early	Local/regional	Bettelli *et al.* 2006, fig. 5:8
	CNU4			Local/regional	
	CNU5			Local/regional	
	CNU6			Local/regional	
I	CNU7			Local	
	CNU8			Local	
	CNU9			Local	
	CNU10			Local	
	CNU11			Local	
	CNU12			Local?	

Classifying the twelve compositions, five *impasto*, CNU7-11, are non-calcareous and can easily be separated from the Aegean type and the remaining *impasto*, CNU12, which is calcareous. The Aegean type examples are not uniform in composition, CNU3 in particular standing out in having a high calcium content. CNU1-6 are treated in Part 4.

Nijboer *et al.* (2006) have reported the petrographic analyses of LBA pottery from nearby Nettuno.

Monte Rovello (53)

INAA (Database 2): Italo-Mycenaean 1, *impasto* 2
Publication: Bettelli *et al.* 2006
Illustration: Fig. 4.85

WARE	SAMPLE	DESCRIPTION	DATE	SUGGESTED ORIGIN	PUBLICATION
IM	MRO1	Closed vessel	IIIB-C	Local/regional	Bettelli *et al.* 2006, fig. 5:6
I	MRO2			Local	
	MRO3			Local	

Luni sul Mignone (54)

INAA (Database 2): Mycenaean? 1, Italo-Mycenaean 4
Publication: Bettelli *et al.* 2006
Illustration: Figs. 4.85-86

Ware	Sample	Description	Date	Suggested origin	Publication
M?	LUN5	Stirrup jar/piriform jar ?	IIIA?	Uncertain	Bettelli *et al*. 2006, fig. 5:5
IM	LUN1	Alabastron ?	IIIB-C	Local/regional	Bettelli *et al*. 2006, fig. 5:1
	LUN2	Closed vessel	III	Local/regional	Bettelli *et al*. 2006, fig. 5:2
	LUN3	Jug/stirrup jar?	IIIC?	Local/regional	Bettelli *et al*. 2006, fig. 5:3
	LUN4	Bowl/cup	IIIB-C	Local/regional	Bettelli *et al*. 2006, fig. 5:4

S. Giovenale (55)

INAA (Database 2): Mycenaean? 1
Publication: Bettelli *et al.* 2006
Illustration: Fig. 4.86

Ware	Sample	Description	Date	Suggested origin	Publication
M?	SGI1	Closed vessel	IIIC	Uncertain	Bettelli *et al.* 2006, fig. 5:7

At Monte Rovello, Luni and S. Giovenale, the Mycenaean examples have compositions which are not unexpectedly significantly different from two examples of *impasto* from Monte Rovello; the latter's very high contents of Sb, Cs and Ce are notable. The Italo-Mycenaean examples are treated with those from the Po Valley in Part 4.

Chemical reference data for Latium appears to be limited, but note is made of the concentration ranges for certain elements, determined by INAA and reported by Pena, Blackman (1994) in modern (calcareous) clays in Latium and Umbria from locations including Civita Castellana, Orte Scalo, Mazzano Romano and Monterondo Scalo: Ca 13-22%, Cr 65-141, Co 8-16, La 28-127 ppm.

TUSCANY

Scarceta (56)

PE: *Impasto* 16
Publication: Martini *et al.* 1996

Examples of *impasto* of MBA (Apennine phase) and FBA date were included in this large study of prehistoric pottery from Tuscany. Two petrographic groups (Database 4) were isolated:

- Group SA (sanidine and augite) from quaternary volcanic outcrops (East of the River Fiora)
- Group SQ (sanidine and quartz) from a mixture of deposits in the River Fiora.

The second group is typical of the later phase. According to XRD data, the firing temperature range is *c*. 750°-900°C.

MARCHE

Treazzano di Monsampolo (57)

ICP (Database 3): Mycenaean 1
Publication: Vagnetti *et al.* 2006
Illustration: Fig. 4.86

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. n.
M	TRE1	Stirrup jar	IIIB	Peloponnese	Lollini 1982, tav. LXXIV	40645

The chemical analysis is discussed below.

Cisterna di Tolentino (58)

ICP (Database 3): Italo-Mycenaean 15, *impasto* 5
PE: *Impasto* 5
Publication: Vagnetti *et al.* 2006
Illustration: Figs. 4.86-88, Plate 6

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
IM	TOL1	Lekythos	IIIB-C	Local/regional	Percossi *et al.* 2005, fig. 4:8	r.s. 14
	TOL2	Amphoroid krater?	IIIB-C	Local/regional		
	TOL3	Basin	IIIB-C	Local/regional	Percossi *et al.* 2005, fig. 4:11	
	TOL4	Closed vessel	IIIB-C	Local/regional	Percossi *et al.* 2005, fig. 4:2	
	TOL5	Deep bowl	IIIC middle?	Local/regional	Percossi *et al.* 2005, fig. 4:1	r.s. 66
	TOL6	Bowl/cup	IIIB-C	Local/regional	Percossi *et al.* 2005, fig. 4:3	
	TOL7	Bowl/cup	IIIB-C	Local/regional	Percossi *et al.* 2005, fig. 4:5	
	TOL8	Bowl/cup	IIIC?	Local/regional	Percossi *et al.* 2005, fig. 4:4	r.s. 36
	TOL9	Amphoriskos (?)	IIIC middle?	Local/regional	Percossi *et al.* 2005, fig. 4:10	r.s. 42+36
	TOL10	Stirrup jar/ alabastron	IIIB-C	Local/regional	Percossi *et al.* 2005, fig. 4:13	r.s. 36
	TOL11		IIIB-C	Local/regional		r.s. 13
	TOL12	Uncertain shape	IIIC	Local/regional	Percossi *et al.* 2005, fig. 4:12	r.s. 26
	TOL13a	Jug/amphora	IIIC?	Local/regional	Percossi *et al.* 2005, fig. 4:9	r.s. 48
	TOL13b		IIIC?	Local/regional	Percossi *et al.* 2005, fig. 4:9	r.s. 60+104
	TOL14		IIIB-C	Local/regional		r.s. 21
I	TOL15	Handle		Local		71138
	TOL16			Local		71139
	TOL17			Local		71136
	TOL18	Bowl with handle		Local		71140
	TOL19			Local		71135

Petrographic analysis of *impasto*

The samples are fairly homogenous tempered with grog (and micritic calcite in **TOL18**). Other components are quartz, feldspars, mica, calcite (sparse in **TOL15** and **19** and abundant in **TOL16**). Groundmass is brown, darker in **TOL18** and yellowish in **TOL15**. Raw materials are all locally available. A similar composition has been identified in Bronze Age pottery from Moscosi di Cingoli (de Marinis *et al*. 2003, 19; 2005) where composition Group 1 is also characterised by the grog.

Jesi (59)

ICP (Database 3): Italo-Mycenaean 3, *impasto* 5
PE: *Impasto* 5
Publication: Vagnetti *et al.* 2006
Illustration: Fig. 4.88, Plate 6

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
IM	JES1	Jar	IIIC	Local/regional	Vagnetti *et al*. 2006, fig. 2:5	66496
	JES2	Closed vessel	III	Local/regional	Vagnetti *et al*. 2006, fig. 2:6	66487
	JES3			Local/regional		66488
I	JES4			Local		71196
	JES5			Local		71197
	JES6			Local		71194
	JES7			Local		71199
	JES8			Local		71201

Petrographic analysis of *impasto*

The samples are fairly homogeneous, tempered with grog, abundant and coarse in **JES5** and **7** (in this sample with micritic calcite). Other components are quartz, feldspars, micritic calcite, mica, polycrystalline quartz and chert. The groundmass is brown.

Ancona – Montagnolo (60)

ICP (Database 3): Italo-Mycenaean 2, *impasto* 4
PE: *Impasto* 4
Publication: Vagnetti *et al.* 2006
Illustration: Fig. 4.88, Plate 6

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
IM	ANC1	Closed vessel (alabastron?)	IIIB-C	Local/regional	Vagnetti *et al*. 2006, fig. 2:2	40646
	ANC2	Closed vessel (jug/ amphora?)	IIIB-C	Local/regional	Vagnetti *et al*. 2006, fig. 2:3	61030

Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
I	ANC3			Local		61032
	ANC4	Cup		Local		61033
	ANC5	Jar		Local		61038
	ANC6	Bowl		Local		61036

Petrographic analysis of *impasto*

The samples are fairly homogeneous, tempered with grog, with also quartz, feldspars, polycrystalline quartz, chert, micritic calcite and mica. Calcite is abundant in **ANC6**. The groundmass is brown (black in **ANC4**).

Chemical analyses of *impasto* and Italo-Mycenaean in Marche

Preliminary treatment of the data set reveals three potential groupings: the *impasto* with low Ca, a large group of the Italo-Mycenaean type with Ca contents in the 9-15% range, and a further, more calcareous group of Italo-Mycenaean type. In the Mg-Cr oxide plot **TRE1** stands well apart owing to its high Cr content. The multivariate classification by PCA indicates two main groupings (Fig. 4.19): B with high positive values on PC1 consisting entirely of *impasto*, and A consisting of Italo-Mycenaean samples together with one *impasto* (**TOL18**); there are two Italo-Mycenaean outliers from Tolentino. The members of A and the outliers have high, variable calcium contents reflecting the (micritic) calcite observed in thin section. The compositions of the Italo-Mycenaean samples at the three sites, which overlap with each other in Group A, are treated further in Part 4.

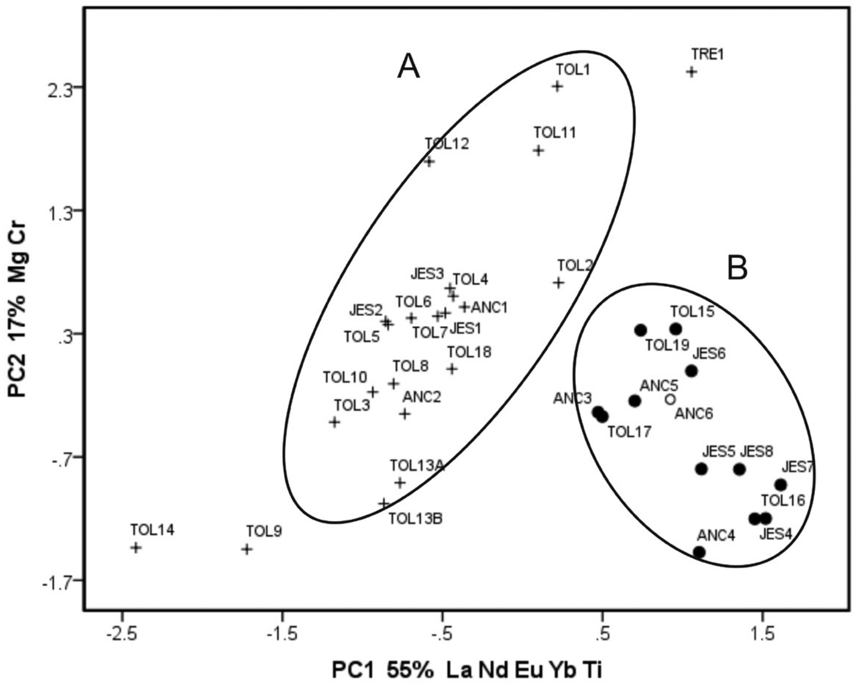


Fig. 4.19. PC plot of the ICP compositions of samples from sites in the Marche: TRE Treazzano, ANC Montagnolo di Ancona, TOL Cisterna di Tolentino, JES Jesi. Log transformed data. *Impasto* (●).

VENETO

Frattesina (61)

AAS (Database 1): Italo-Mycenaean 2
INAA (Database 2): Italo-Mycenaean 2, *impasto* 16, daub 4
ICP (Database 3): Italo-Mycenaean 2
PE: *Impasto* 18, daub 1, plaster 2
Publications: Jones, Vagnetti 1991, 1992; Jones *et al.* 2002; Jenkins *et al.* 1999
Illustration: Fig. 4.88

AAS and INAA						
Ware	Sample	Description	Date	Suggested origin	Publication	Inv. N.
IM	FRA1	Bowl/cup	IIIC	Local/Regional	Jones et *al.* 2002, fig. 3:1	149500
	FRA2	Open vessel	IIIC	Local/Regional	Jones *et al.* 2002, fig. 3:2	149501
INAA						
I	FR1			Local		
	FR2			Local		
	FR3			Local		
	FR4			Local		
	FR5			Local		
	FR6			Local		
	FR10			Local		
	FR11			Local		
	FR12			Local		
	FR13			Local		
	FR14			Local		
	FR15			Local		
	FR16			Local		
	FR17			Local		
	FR18			Local		
	FR20			Local		
V	FR7	Daub?		Local		
	FR8	Daub		Local		
	FR9	Daub		Local		
	FR19	Daub		Local		

Petrographic analysis of *impasto*, daub and plaster

This investigation by Jenkins *et al.* (1999), forming an essential background to the associated chemical study, considered Frattesina together with a number of LBA sites in the lower Po Valley (Table 4.9) with the aim of understanding the organisation of the domestic pottery industry.

Geographical group	Site	*Impasto*	Daub, plaster
East	Frattesina di Fratta Polesine	18	3
	Villamarzana	5	1
	San Martino loc. Saline	4	1
West	Fondo Paviani	5	
	Fabbrica dei Soci	4	1
	Castello del Tartaro	4	1
	Canova	5	
	Mariconda di Melara	2	1
North	Montagnana	4	1

Table 4.9. Pottery analysed petrographically from sites in different parts of the lower Po Valley.

Samples from Fabbrica dei Soci, Fondo Paviani, Castello del Tartaro and Canova (western group) are the same as those analysed chemically by INAA (see Fabbrica dei Soci).

There were three matrix types among the sherds, whose texture ranged from fine to coarse:

(a) a moderately micaceous, clay-rich body
(b) a porous, silt-rich body found in the eastern and northern group of sites.
(c) dense matrix containing abundant angular silt/fine-sand predominantly associated with the western sites.

Of the four clast types, the most common was grog which itself could be divided into a main group with fine texture and a smaller group with metamorphic clasts. The next type contained either metamorphic, igneous or sedimentary fragments. Bioclasts in the form of fragmented, carbonate shell and foraminiferal debris were encountered in only three sherds (**CTA4, FDS9** and **CA3**). Glass particles formed the fourth type. The clay matrix in all samples could be associated with the well-sorted fluviatile sediments of the Po Valley, containing fine granular calcite, bioclasts, small concretions of calcareous ooze or fragments of micrite. The most common rock fragments were metaquartzite/schist which also occurs in (modern) stream sediments of the Po and Adige. The presence of two distinctive igneous rock types was significant in the sense that it was found to be common in modern sediments from the Po but sparse in that from the Adige. The trachytic rock was observed in eleven sherds from five sites including, in particular, Montagnana, but not in the two river sediments; its source should lie in the volcanic outcrops of the Colli Euganei that lie immediately east of Este. Of particular interest were the coloured glass particles present only in some of the pottery at Frattesina, a site where glass making is securely attested (Angelini *et al.* 2004). Overall, the study demonstrated that the potters operating at the different sites were all exploiting the locally available fine-textured clays and furthermore were operating in the grog tradition. They were operating in a well organised, versatile and successful industry using local raw materials. The importance of this study however is more methodological in that it was possible, despite the relative uniformity of the geological environment of the Po Valley, to discriminate to some extent between the different production zones. PCA of 22 physical and petrographic attributes in the pottery revealed most of the eastern group separating from the remainder along PC2. The western bioclast group was also well defined, the other less groups less so. The first two PCs in Fig. 4.20 were dominated by the grog and grain percentages.

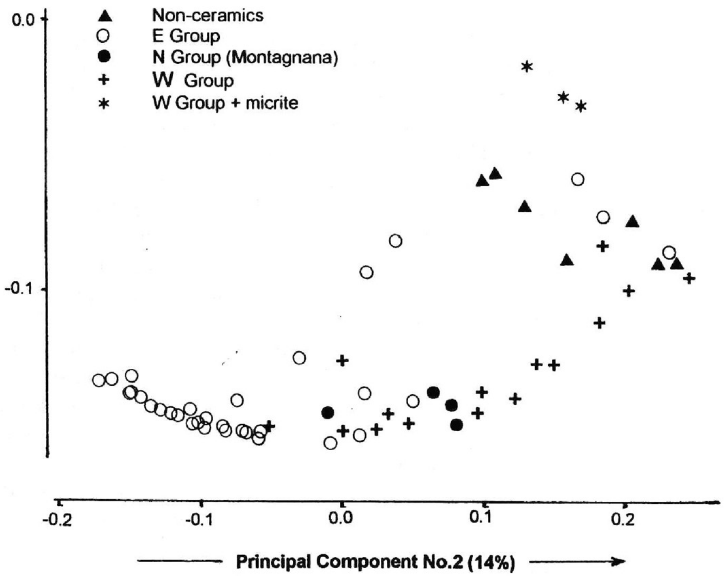


Fig.4.20. PC plot resulting from PCA of 22 physical and petrographic attributes (excluding matrix) of *impasto* from sites in different locations in the lower Po Valley (Jones *et al.* 2002, Fig. 11).

Chemical analysis

See Fabbrica dei Soci and Part 4.

XRD: Mycenaean? 1, *impasto* 46, daub 1
PE: Mycenaean? 1, *impasto* 46, daub 1
Publication: Saracino *et al.* 2006

Minero-petrographic analysis of *impasto* and daub

The samples are classified in five groups, one coarser (with metamorphic sand with polycrystalline quartz and amphibole; quartz, K-feldspars, plagioclase, mica, pyroxenes, calcite, amphibole) and the others fine or medium with grog, quartz, mica, K-feldpars, plagioclase and amphibole. One group is characterised by hematite.

The wheel-made sample **FrX38** is extremely fine; its mineralogical composition is given in Database 4.

Lovara (62)

ICP (Database 3): Italo-Mycenaean 2, *impasto* 6
PE: *Impasto* 6
Publication: Salzani *et al.* 2006
Illustration: Fig. 4.89

Ware	Sample	Description	Date	Suggested origin	Publication
IM	LOV1+3	Necked jar?	IIIC middle?	Regional	Salzani *et al.* 2006, fig. 2:2
	LOV2	Jug	IIIB-C	Regional	Salzani *et al.* 2006, fig. 2:1
	LOV4			Local	
	LOV5			Local	

Ware	Sample	Description	Date	Suggested origin	Publication
IM	LOV6			Local	
	LOV7			Local	
	LOV8			Local	
	LOV9			Local	

Petrographic analysis of *impasto* at Lovara, Bovolone (BOV) and Terranegra (TNE)

The majority of samples are characterised by variable quantities of crystalline components (**LOV4, 5, 6**: quartz, feldspars, polycrystalline quartz, mica, pyroxenes, metamorphic rock fragments) and clasts (**LOV7, 9**). **LOV8**, is rich in calcareous rocks. The following groupings are apparent:

Sample	Petrography
LOV 4, 5, 6	Siliceous and metamorphic
TNE5, 8, 9	
BOV5, 6, 7, 8, 9	
LOV8	Calcareous rocks
LOV7, 9	Grog
TNE4, 6	Fossiliferous
TNE7	Volcanic

Chemical analysis: Lovara, Bovolone and Terranegra

Treating the data for Lovara, Bovolone and Terranegra together, a wide range of compositions is apparent: **BOV4** has a Ca content in excess of 30% (also encountered in the Montagnana samples) but very low Cr; there are several calcareous samples which surprisingly include *impasto* **TNE4** and **6**, and the remaining *impasto* make up the non-calcareous group. Mg contents are also variable, and Cr is in low concentration but its ranges are wide.

The Mycenaean samples are further considered in Part 4.

Fabbrica dei Soci (63)

INAA (Database 2): Mycenaean 2, Italo-Mycenaean 2, *impasto* 4, daub 1
PE: *Impasto* 4, daub 1, clays 2
Publications: Jenkins *et al.* 1999; Jones *et al.* 2002
Illustration: Fig. 4.89, Plate 7

Ware	Sample	Description	Date	Suggested origin	Publication
M	FDS3	Necked jar?	IIIC?	Peloponnese/ W. Greece?	Jones *et al.* 2002, fig. 2:6
	FDS4	Closed vessel	IIIC?	Peloponnese/ W. Greece?	Jones *et al.* 2002, fig. 2:7
IM	FDS1	Necked jar	IIIC middle	Local/Regional	Jones *et al.* 2002, fig. 2:3
	FDS2	Closed vessel	IIIC?	Local/Regional but different from FDS1	Jones *et al*. 2002, fig. 2:4
I	FDS6	Cup with handle		Local	
	FDS7	Ovoid jar		Local	

Ware	Sample	Description	Date	Suggested origin	Publication
I	FDS8	Bowl		Local	
	FDS9	Large everted rim decorated		Local	
V	FDS5	Daub		Local	
	LAG2	Clay, Stanghelle, 1 km NW of site			
	LAG3	Clay, Stanghelle, 1 km NW of site			

Petrographic analysis

See Frattesina

Chemical analysis: Frattesina, Fabbrica dei Soci, Fondo Paviani, Castello del Tartaro and Montagnana

Taking the suite of the elements determined by AAS first (Jones, Vagnetti 1991, 1992), **FRA1** and **MON1** are similar in composition, bearing the distinctive features of very high calcium and low iron contents which together are likely to be responsible for the very pale fabric colour. **FRA2**, on the other hand, has lower Ca and higher Fe and Al contents. The Cr and Ni contents of all three samples are low.

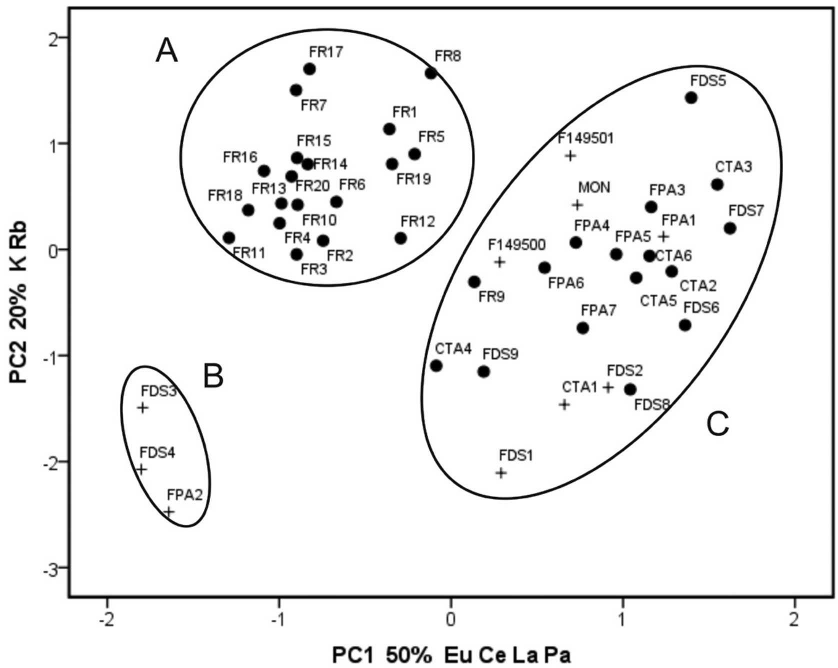


Fig. 4.21. PC plot of the INAA compositions of the pottery from Fondo Paviani (FPA), Fabbricia dei Soci (FDS), Castello del Tartaro (CTA), Frattesina (FR, F149500, F149501), Montagnana (MON) and Canova (CA). *Impasto* (●). Sc normalised data.

Turning to the INAA compositions of all the test and reference (*impasto*) samples, their classification by Ward's method cluster analysis and PCA, following Sc normalisation, reveals a group made up entirely of material from Frattesina (Group A in Fig. 4.21), Mycenaean samples, two from Fabbrica dei Soci (**FDS3** and **4**) and one from Fondo Paviani (**FPA2**) (Group B), and a rather ill-defined Group C comprising the remaining samples (Fig. 4.21). Part 4 treats **FDS3-4** and **FPA2** as imports, and Part 5 investigates the status of **FRA1-2**, **MON1, FPA1, FDS1** and **CTA1**. For now it is noted that the distinctions made above in terms of major element contents of **FRA1-2** and **MON1** do not seem to extend to the trace elements. The relative variability in chemical composition of the *impasto* harmonises with the petrographic compositions (see above) which are indicative of a number of hand-made pottery traditions operating in the region. It is gratifying to find that the different tempering recipes are reflected chemically as the examples of the grog-tempered and calcareous fabrics classify separately from each other and from the untempered fabric. There is as yet no explanation in petrographic terms of the chemical differentiation of Frattesina (Group A) due in particular to higher Cr from the other sites which are themselves only partially discriminated within Group C.

Fondo Paviani (64)

INAA (Database 2): Mycenaean 1, Italo-Mycenaean 1, *impasto* 5
ICP (Database 3): Italo-Mycenaean 2, *impasto* 3
PE: *Impasto* 5
Publications: Jenkins *et al.* 1999; Jones *et al.* 2002
Illustration: Fig. 4.90, Plate 7

			INAA			
Ware	**Sample**	**Description**	**Date**	**Suggested origin**	**Publication**	**N. Inv.**
M	FPA2	Closed vessel	IIIC?	Peloponnese/ W. Greece?	Jones *et al*. 2002, fig. 2:2	
IM	FPA1	Small juglet?	IIIC middle	Local/Regional	Jones *et al*. 2002, fig. 2:1	36171
I	FPA3	Decorated jar, everted rim		Local		
	FPA4	Cup with handle		Local		
	FPA5	Carinated cup		Local		
	FPA6	Deep bowl with cordon		Local		
	FPA7	Large everted rim decorated		Local		
			ICP			
IM	FPA8	Open vessel	IIIC?	Local/Regional		84314
	FPA9	Open vessel (krater?)	IIIC?	Local/Regional	Bettelli, Cupitò 2010, fig. 5	84313
I	FPAB1			Local		
	FPAB2			Local		
	FPAA3	Apennine		Local		

Petrographic analysis

See Frattesina

Chemical analysis

See Fabbrica dei Soci and Part 4.

Castello del Tartaro (65)

INAA (Database 2): Italo-Mycenaean 1, *impasto* 4, daub 1
PE: *Impasto* 4, Daub 1
Publications: Jenkins *et al.* 1999; Jones *et al.* 2002
Illustration: Fig. 4.90

Ware	Sample	Description	Date	Suggested origin	Publication
IM	CTA1	Closed vessel	IIIC?	Local/Regional	Jones *et al.* 2002, fig. 2:5
I	CTA3	Carinated cup		Local	
	CTA4	Bowl with cordons		Local	
	CTA5	Biconical vessel decorated		Local	
	CTA6	Cooking pot?		Local	
V	CTA2	Daub		Local	

Petrographic analysis

See Frattesina

Chemical analysis

See Fabbrica dei Soci and Part 4.

Terranegra (66)

INAA (Database 3): Italo-Mycenaean ? 2, *impasto* 6
PE: *Impasto* 6
Publication: Salzani *et al.* 2006
Illustration: Fig. 4.90, Plate 7

Ware	Sample	Description	Date	Suggested origin	Publication
IM?	TNE1	Closed vessel	IIIC? or Iron Age	Local/Regional	Salzani *et al*. 2006, fig. 3:5
	TNE2	Closed vessel	IIIC? or Iron Age	Local/Regional	Salzani *et al*. 2006, fig. 3:4
I	TNE4			Local	
	TNE5			Local	
	TNE6			Local	
	TNE7			Local	
	TNE8			Local	
	TNE9			Local	

Petrographic analysis of *impasto*

This pottery is not uniform and can be compared with some other samples from the same area (Jenkins *et al.* 1999; Jones *et al.* 2002) with abundant grog and metamorphic rocks frequent in the fluvial deposits of Po Valley:

- **TNE5, 8, 9**: siliceous and metamorphic (quartz, feldspars, mica, polycrystalline quartz, chert), with some grog and carbonate rocks;
- **TNE4, 6**: abundant fossils (Lepidocycline, Anphistegine, Rotalide) and bioclastic rocks, with quartz, feldspars, pyroxenes, polycrystalline quartz; reddish groundmass. A great variety of fossils is also attested in pottery from Castello del Tartaro, Fabbrica dei Soci, Fondo Paviani and Canova and these may derive from "Colli Euganei" oligocenic marls.
- **TNE7**: large and abundant rounded clasts of trachitic microcrystalline and carbonate rocks with feldspars and mica. Colli Euganei volcanic rocks are abundant in pottery from Montagnana.

For a comparison with Lovara and Bovolone see above.

Chemical analysis

See Lovara and Part 4.

Crosare di Bovolone (67)

ICP (Database 3): Italo-Mycenaean 4, *impasto* 5
PE: *Impasto* 5
Publication: Salzani *et al.* 2006
Illustration: Fig. 4.91, Plate 7

Ware	Sample	Description	Date	Suggested origin	Publication
IM	BOV1	Closed vessel	IIIA2-B1	Local/Regional?	Salzani *et al.* 2006, fig. 3:2
	BOV2	Closed vessel	IIIB-C	Local/Regional?	Salzani *et al.* 2006, fig. 3:3
	BOV3	Krater? High-swung handle	IIIB-C	Local/Regional?	Salzani *et al.* 2006, fig. 3:1
	BOV4	Open shape	III	Local/Regional but different from BOV1-3	
I	BOV5			Local	
	BOV6			Local	
	BOV7			Local	
	BOV8			Local	
	BOV9			Local	

Petrographic analysis of *impasto*

Quartz, feldspars, polycrystalline quartz, calcareous rock fragments, mica, granite, pyroxenes are very frequent in **BOV5, 7, 8,** abundant in **BOV6** and **9**.

For comparison with Lovara and Terranegra, see above.

Chemical analysis

See Lovara and Part 4.

Montagnana (68)

AAS (Database 1): Italo-Mycenaean 1
INAA (Database 2): Italo-Mycenaean 1
PE: *Impasto* 4, daub 1
Publications: Jones, Vagnetti 1991, 1992; Jenkins *et al.* 1999; Jones *et al.* 2002
Illustration: Fig. 4.91

Ware	Sample	Description	Date	Suggested origin	Publication
IM	MON1	Closed vessel?	IIIC	Local/Regional?	Jones *et al.* 2002, fig. 3:3

Petrographic analysis

See Frattesina and Other Analyses entry.

Chemical analysis

See Fabbrica dei Soci, Table 4.10 and Part 4.

Finally in this section and in view of the relative complexity of particularly the chemical data presented above, it is relevant to review briefly the results of other researchers' comparative chemical and minero-petrographic analyses carried out on pottery and clays in the Po Valley, as summarised in Table 4.10.

Site/area	Material/date	Analysis	Publication
Imola (Monte Castellaccio, S. Giuliano)	*Impasto* MBA-RBA	Chemical	Amadori *et al.*1996
Modena (Ca' de Monesi, Casinalbo, Castiglione di Marano, Gorzano, Montale, Montebarello, Pontenuovo)	*Impasto* and clays MBA-RBA	Chemical and PE	Levi, Loschi Ghittoni 1997; Cardarelli *et al*. 2007; Brodà *et al.* 2009; Cannavò, Levi 2009
Este, Padova, Montagnana, Adria and Altino	Iron Age *dolia* and other coarse wares; fine wares including grey and Etrusco-Padana wares	PE, XRF and XRD	Maritan 2002, 2004
Rovigo: Corte Cavanella	Roman	INAA	Calogero 1986
(a) Area between Ferrara and Badia Polesine close to Fondo Paviani, Fabbrica dei Soci and Castello del Tartaro, and (b) to the west of (a) in the area delimited by the towns of Bobbio, Piacenza, Cremona and Parma along the tributaries of the Po: Taro, Arda, Niure and Trebbia	Modern clays	XRF (see Database 5)	Picon 2000

Table 4.10. Other analytical studies of pottery in the Po Valley.

The results obtained by Maritan usefully overlap with those of Jenkins *et al.* (1999) above. The prevalence of trachyte in the coarser fabrics as well as incidence of the grog tradition is noteworthy.

Of the four fabrics at Este, three were trachyte-based and one calcareous, while at Montagnana the fabrics were with and without trachyte and grog temper. An indication of the variability of two origin-sensitive trace elements and calcium contents in the clay fractions of sediments occurring along or close to the Po can be gauged from the entry in Database 5. Picon (2000) associated the higher Cr and Ni contents to the ophiolitic zone south of Piacenza. The corresponding Cr ranges in the Roman pottery, admittedly in only four specimens, are wide (101-302 ppm). A somewhat similar situation is apparent in the material analysed by Maritan, but at least for the productions of fine ware there was a good level of inter-site discrimination: Adria and Altino could each be differentiated from Padova and Este which themselves partly overlapped.

SICILY

Mulinello di Augusta (69)

ICP (Database 3): Mycenaean 1
Publication: Jones, Levi 2004a
Illustration: Fig. 4.91

Ware	Sample	Description	Date	Suggested origin	Publication	N. Inv.
M	MOL1	Piriform jar	IIIA2	Peloponnese	Orsi 1902, 416, fig. 6 (tb. E)	21821

This sample is treated in Fig. 4.22.

Thapsos (71)

ICP (Database 3): Mycenaean 8, *impasto* 24, daub 1
PE: 24 *impasto*, 1 daub
Publication: Jones, Levi 2004a
Illustration: Fig. 4.92

The compositions of the Mycenaean vases are readily distinguishable from those of the *impasto*. The latter forms a broad group with positive PC 1 scores in Fig. 4.22, while the Mycenaean vases appear to divide into two groups which separate on PC2: **THA26-27, MOL1** and **MAI1** form one group, and **THA27-33** make up the other. The breadth of the *impasto* group is largely due to the wide variability in Ca content (1.6-18.5% oxide); a majority of samples display a positive correlation between Mg and Ca contents, the exceptions to that being **THA20-22** and **THA4** and **7**, calcareous and non-calcareous respectively.

Ware	Sample	Description	Date	Suggested origin	Publication or location	N. Inv.
M	THA26	Alabastron	IIIA2	Peloponnese but different from THA28-33	Orsi 1895, fig. 52 (tb. 64)	
	THA27	Alabastron	IIIA2?	Peloponnese, but different from THA28-33	Orsi 1895, col. 103 (tb. 7)	
	THA28	Handle	III	Peloponnese	Orsi 1895, col. 103 (tb. 7)	
	THA29	Stirrup jar	IIIA2	Peloponnese	Orsi 1895, col. 128-9, fig. 42 (tb. 56)	
	THA30	Base	III	Peloponnese	Orsi 1895, col. 98-99 (tb. 2)	
	THA31	Alabastron	IIIA1?	Peloponnese	Taylour 1958, 58, n. 11 (tb. C)	63750
	THA32	Piriform jar	IIIA2-B	Peloponnese	Voza 1973, 35, tav. VI, 78 (tb. D)	69345
	THA33	Base (closed vessel?)	III	Peloponnese	Orsi 1895, col. 98-99 (tb. 2)	
I	THA1	Body sherd		Local	tr. 55/58, XXVI	
	THA2	Body sherd		Local	“	

Ware	Sample	Description	Date	Suggested origin	Publication or location	N. Inv.
I	THA3	Body sherd		Local	"	
	THA4	Body sherd		Local	"	
	THA5	Body sherd		Local	"	
	THA6	Body sherd		Local	dromos tb. 51	
	THA7	Body sherd		Local	"	
	THA8	Body sherd		Local	"	
	THA9	Body sherd		Local	"	
	THA10	Body sherd		Local	dromos tb. 43	
	THA11	Body sherd		Local	"	
	THA12	Body sherd		Local	"	
	THA13	Body sherd		Local	tb. 2	
	THA14	Body sherd		Local	"	
	THA16	Body sherd		Local	"	
	THA17	Body sherd		Local	DI1, IV tg.	
	THA18	Body sherd		Local	"	
	THA19	Body sherd		Local	"	
	THA20	Body sherd		Local	XLIX, 31	
	THA21	Body sherd		Local	"	
	THA22	Body sherd		Local	"	
	THA23	Body sherd		Local	tr. 5/XX, tg. I	
	THA24	Body sherd		Local	"	
	THA25	Body sherd		Local	"	
V	THA15	Daub		Local	tr. IX surface	

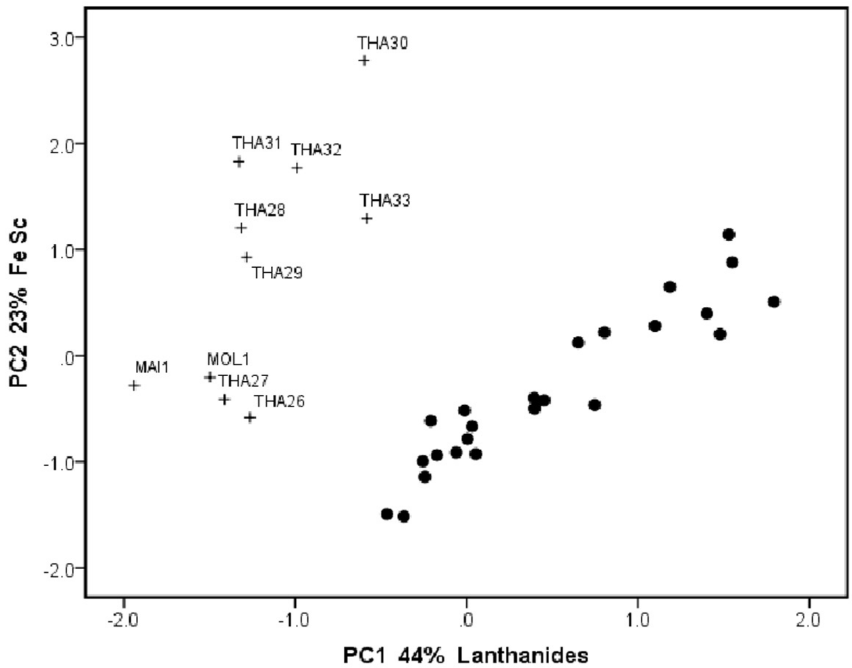


Fig. 4.22. PC plot of the ICP compositions for Mycenaean (+) and *impasto* (●) pottery at Thapsos (THA), Mulinello (MOL) and Buscemi (MAI1).

Petrographically, the *impasto* displays considerable homogeneity, all the samples being characterised by the presence of grog, which was deliberately added to the clay. As regards the other components which were probably naturally present in the clay, there are small subangular or subrounded quartz clasts and feldspar, mica and, in one case, pyroxene, small fragments of volcanic rock and calcite. The matrix is brown or yellowish, with abundant fractures and sometimes with fossils. The same composition appears in the daub (**THA15**).

The Mycenaean imports at Thapsos with other likely imports found elsewhere on Sicily and the Aeolian Islands are treated collectively in Part 4.

Buscemi (73)

ICP (Database 3): Mycenaean 1
Publication: Jones, Levi 2004a
Illustration: Fig. 4.92

Ware	Sample	Description	Date	Suggested origin	Publication	N. Inv.
M	MAI1	Stirrup jar	IIIB	Peloponnese	Tinè, Vagnetti 1967, tav. 17:73	72357

This sample is treated in Fig. 4.22.

Madre Chiesa (78)

INAA (Database 2): Mycenaean 1
Previously unpublished
Illustration: Fig. 4.92

Ware	Sample	Description	Date	Suggested origin	Publication	N. Inv.
M	MC3	Piriform jar	IIIA	Peloponnese	Castellana 2000, fig. 48d	MC93/15

This sample is treated with other imports in Part 4.

Monte Grande (79)

INAA (Database 2): Matt-painted 3, Burnished? 3, Mycenaean? 1, *impasto* 27
SEM-EDAX (Database 5): *Impasto* 8
PE: *Impasto* 38
Previously unpublished
Illustration: Fig. 4.93

Reported here are the previously unpublished results of petrographic and chemical analysis of pottery from the excavations at Monte Grande (Castellana 1998). Two main factors led to this study, first, the presence at Monte Grande of pottery with possible Aegean parallels, or at least manufactured in the Aegean tradition, apparently resembling the situation at Vivara in the Bay of Naples. Second, since the physico-chemical characterisation of the *local* prehistoric (and indeed later) pottery on Sicily is still limited in extent, Monte Grande presented suitable material with which to extend this database. The local wares were analysed both petrographically and chemically, while only some of the suspected imports were amenable to thin sectioning. Among the suspected imports that were sampled (in 1994) are a number whose analyses are not presented here owing to significant ambiguity in their dating. No clay or raw materials prospection was carried out other than to note, following a site visit, the remarkable outcrop of fine quality Neogene Tertiary clay on the beach some 2 km S.W. of the site, clay moreover which on initial inspection seemed *not* to have been exploited for pottery-making during the life time of the Monte Grande 'sanctuary'.

Ware	Sample	Description	Date	Suggested origin	Publication (Castellana 1998)	N. Inv.
MP	MG1	Closed vessel	I-II	Attica	fig. 125, II:15	93/84
	MG2	Open vessel	I-II	Attica	fig.125, II:18	93/89
	MG3	Closed vessel	I-II	Attica	fig.125, II:21	93/118
BU?	MG7	Open vessel	I-II	Attica	fig. 125, III:28	93/67
	MG8	Open vessel	I-II	Attica	fig.125, III:27	93/101
	MG9	Open vessel	I-II	Attica	fig.125, III:26	93/90
M?	MG6	Open vessel	I-II?	Attica	fig. 124, 1	93/66
I	MG12	Coarse pithoi		Local	fig.156, XIII:348	91/29
	MG13	Open vessel		Local	fig.159:372	93/55
	MG14	Uncertain shape		Local	fig.159:366	91/98 (91/18)
	MG15	Uncertain shape		Local	fig.160:383	93/186
	MG24	Jug, Lustrous Decorated		Local	fig. 124,14	91/94
	MG25	Closed vessel, M-P Burnished coarse		Local	fig. 127, V:43	91/1
	MG26	Open vessel, M-P Burnished coarse		Local	fig. 127, V:44	93/65
	MG27	Amphora? M-P Burnished coarse		Local	fig. 127, V:42	91/16
	MG28	Closed vessel? M-P Burnished coarse		Local	fig. 127, V:53	91/6 (91/9)
	MG29	Closed vessel, MH coarse M-P		Local	fig. 161:389	93/112
	MG30	Open vessel? M-P Burnished coarse		Local	fig. 127, V:47	91/5
	MG31	Closed vessel, M-P Burnished coarse		Local	fig. 127, V:46	91/11
	MG32	Uncertain shape, M-P Burnished coarse		Local	fig. 127, V:48	91/17
	MG33	?		Local		93/130
	MG34	Uncertain shape, M-P Burnished coarse		Local	fig. 127, V:50	91/87
	MG35	Pithos		Local	357, fig. 157	91/44
	MG36	Pithos		Local	353, fig. 157	91/33
	MG37	Pithos		Local	349, fig.156	91/26
	MG39	Matt painted burnished coarse		Local	52, fig. 127	91/35
	MG40	Pithos		Local	350, fig. 156	91/23

Ware	Sample	Description	Date	Suggested origin	Publication (Castellana 1998)	N. Inv.
I	MG41	Coarse pithos		Local	fig.157, XIII:354	91/10
	MG42	Uncertain shape, Matt porous		Local	fig. 159:364	93/81
	MG44			Local	387, fig. 161	
	MG45	Matt painted burnished coarse		Local	51, fig. 127	93/128 or 179
	MG1001	Painted pottery		Local		93/68
	MG1002	Painted pottery		Local		93/56
	MG1003	Painted pottery		Local		93/64
	MG1004	Painted pottery		Local		91/15
	MGL1	Castelluccio		Local		
	MGL3	S. Cono		Local		
	MGL4	Castelluccio		Local		
	MGL6	Castelluccio		Local		
	MGL8	S. Cono		Local		
	MGL10	Castelluccio		Local		
	MGL13	Castelluccio		Local		
	MGL14	Castelluccio		Local		
	MGL16	Castelluccio		Local		
	MGL19	Castelluccio		Local		

Petrographic analysis

27 *impasto* samples from Monte Grande were analysed to identify first the raw materials used in local production. Supplementary information was obtained with the analytical SEM.

The geological environment of central and western Sicily is characterised by heterogeneous sedimentary outcrops. In the area of the site there are mainly clays, limestones and evaporites (Gessoso-Solfifera Formation), and Globigerinae microfossils occur. The area is well-known for its sulphur deposits (Giardino 1998).

All the samples are homogeneous, and characterised by abundant grog and few diagnostic minerals. The variability is mainly in the amount and colour of grog, and in the presence of microfossils, quartz (and feldspars) or micritic calcite. All the minerals are very small and probably were present in the original clay. The grog is red, grey or green, the colours often appearing in combinations in the same sample. The green grog is very calcareous, with abundant microfossils, and may be a marl. The groundmass is mostly reddish/brown or yellowish/brown and always anisotropic. The colour is often not homogeneous and some areas are more green. Pores and fractures are abundant and elongated, often filled with secondary calcite. The samples can be divided into three groups according to the presence of fossils and/or the groundmass colour: (a) abundant, (b) yellow calcareous groundmass and (c) rare or absent microfossils.

Group A: **MGL8, 4** and **MG1004**. A microfossil-rich clay was used for the manufacture of three samples of different wares. **MGL8** displays a great variety of microfossils. The groundmass is brown or yellowish brown, and quartz is rare (more abundant in **MGL8** where there is also micritic calcite). Red grog is always present, sometimes associated with the grey or green coloured grog.

Group B: MG29 and **36** The two samples are characterised by a bright yellow groundmass, with calcite and quartz. Microfossils are rare in comparison to Group A. Red grog is associated with the grey or green coloured grog. **MG36** is finer and more fossiliferous than **MG29**.

Group C: **MGL1, 3, 6, 10, 13, 14, 16, 19, MG12, 14, 27, 28, 30, 33, 35, 37, 38, 39, 40, 41, 44, 1001**. This group, consisting of 22 samples, is heterogeneous. Microfossils are rare, and the groundmass is more frequently red or reddish brown, although in five samples (**MGL3, 6, 16, MG12, 30**) it is brown or yellowish brown. Often the groundmass colour is variable in the same sample; in particular differences occur between the surfaces and the core which effectively precludes a classification based on colour alone. **MGL1** and **6** are very fine, and **MG12** has abundant quartz and micritic calcite.

These results relate well to those obtained by Moore (1995) on contemporary pottery at La Muculufa.

SEM-EDAX examination

Polished sections of **MGL 5, 6, 7, 8, 9** and **19** and **MG12, 14, 16, 17, 19, 21, 23** and **41** were examined with the analytical SEM to examine the fossiliferous and grog inclusions and to obtain quantitative data for the major and minor elements not determined by INAA (Database 5).

The identity of grog is made plain both by its appearance – the angular fragments of grog are very evident in **MGL9** – and, very encouragingly, by its composition which is so similar to that of the fabric itself in the cases of **MGL8, 9** and **19**.

In summary, the majority of the analysed pottery is homogeneous and locally produced. The three local groups indicate that different clays were used: (a) fossiliferous, (b) with calcareous clasts, and (c) non-fossiliferous. The quartz is very fine and was naturally present in the original clay. The artificially added temper is red, grey and green grog. Local production therefore at Monte Grande involved various local clays, and grog was only added during the paste preparation.

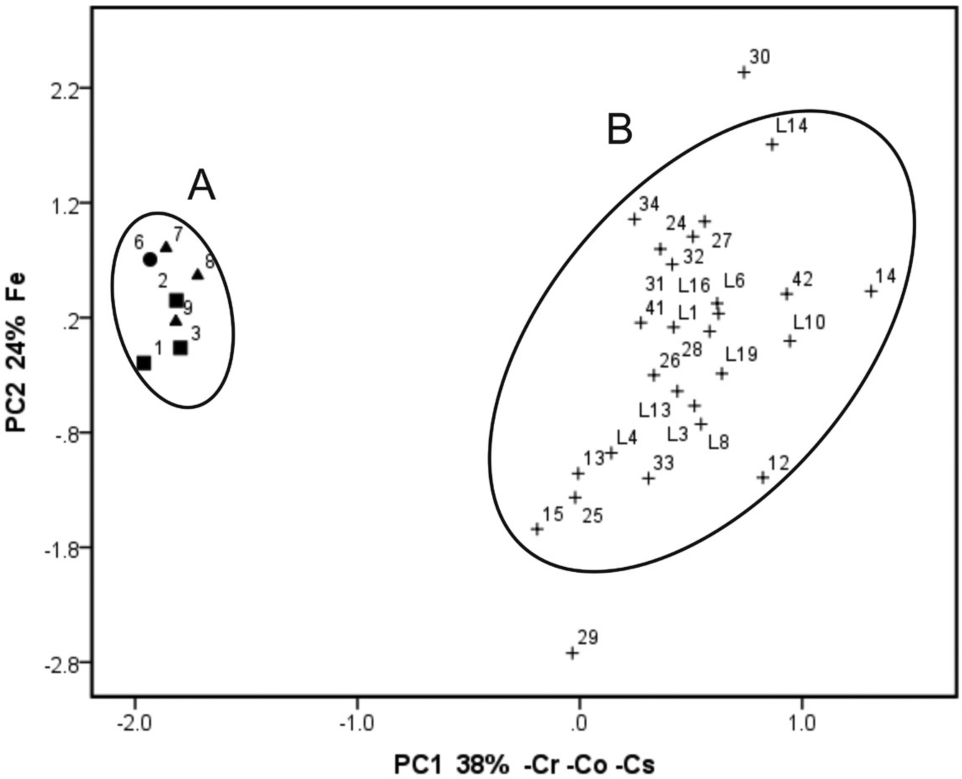


Fig. 4.23. PC plot of the INAA compositions of pottery from Monte Grande. All elements except Sb, Tb and Yb. Matt Painted ▪; Burnished? ▲; Lustrous Decorated? ●; remainder +. Clusters A and B enclose the imports and the local products respectively.

Chemical Analysis

The PC plot (Fig. 4.23) shows one large grouping, B, a few outliers, and a small separate group, A. Group B in Fig. 4.23 represents local production because of the presence of the petrographically-defined local fabrics including the Castelluccio fabric (which on the basis of the SEM-EDAX data is calcareous). That it is a broad group can cause little surprise in view of the presence of pottery of varying textures and fabrics. The members of Group A are discussed in Part 4 where the case is made for an Attic source.

Milena, Monte Campanella (80)

AAS (Database 1): Mycenaean 1, Italo-Mycenaean ? 1, *impasto* 12
Publication: Jones, Vagnetti 1991, 1992
Illustration: Fig. 4.93

INAA (Database 2)
XRF (Database 4)
PE, XRD (Database 5): Mycenaean 1, Italo-Mycenaean 1
Publication: Troja *et al.* 1996

AAS

Ware	Sample	Description	Date	Suggested origin	Publication
M	MIL57	Amphoroid Krater	IIIB2-C early	C. Crete or Peloponnese?	La Rosa 1986, fig. 10 (Tomb A)
IM?	MIL56	Amphora	IIIB2-C early	Uncertain	La Rosa 1986, fig. 9 (Tomb B)
I	MIL1			Local	
	MIL2			Local	
	MIL3			Local	
	MIL4			Local	
	MIL5			Local	
	MIL6			Local	
	MIL7			Local	
	MIL8			Local	
	MIL9			Local	
	MIL10			Local	
	MIL11			Local	
	MIL12			Local	

The *impasto* forms a compact chemical group, calcareous in nature and similar to that determined by Troja *et al.* (1996) using XRF for the Middle and Late Bronze Age pottery and also the local group (as defined by SEM-EDAX) at Monte Grande (Database 5). The amphora **MIL56** resembles the local Milena group except in Fe and Cr, while all three chemical techniques concur in classifying the krater (**MIL57**) as an import; both are discussed in Part 4.

As observed at Monte Grande, grog temper was common; Troja *et al.* (1996) reported on its use in tempering a calcareous Miocene clay in almost all the pottery they examined (of Neolithic to Bronze

Age date). Mineralogically, the pottery could be classified into two main groups: with and without high temperature Ca-silicates (gehlenite, anorthite, wollastonite, and diopside).

Milena, Serra del Palco (81)

PE: *Impasto* (Bronze Age) 20?
XRD: *Impasto* (Bronze Age) 20
INAA, ICP: *Impasto* (Bronze Age) 13
XRF: *Impasto* (Bronze Age) 17
Micropalaeontology: *Impasto* 25 and clays 3
Publication: Troja *et al.* 1996 (La Rosa *et al.* 1995; Troja *et al.* 1995)

Troja *et al.* (1996) presented the results of a multi-disciplinary programme of analysis (and dating by TL) on a range of pottery of Middle Neolithic to Iron Age date from different sites in the Milena area and clays of Middle and Upper Miocene date. All samples presented homogeneous petrographic characteristics, the main differences lying in the structural organization of the groundmass: Neolithic and Copper Age pottery was yellow to red, Bronze Age pottery was dark brown or black. Quartz grains, K-feldspars, oligoclase plagioclase and mica were found in all samples; quartzo-arenite was observed rarely. Grog was used as temper in almost all the pottery.

Mineralogically, the pottery could be classified into two main groups: with and without high temperature Ca-silicates (gehlenite, anorthite, wollastonite, and diopside). There were twelve samples in the former group, fired at a temperature above 950°C, and only six in the second. The Miocene clays were similar, containing illite, quartz, calcite, feldspars and gypsum. The calcareous Miocene clay was probably used throughout the lifetime of the site. The chemical data are summarised in Databases 2 and 5.

Cannatello (82)

Sara Levi, Richard Jones and Peter M. Day

ICP (Database 3): Mycenaean 11, pithoi 2, *dolia* 4, *impasto* 18, daub 1
PE: Pithoi 2, *dolia* 4, *impasto* 18, daub 1
Previously unpublished
Illustration: Plate 9

Ware	Sample	Description	Suggested origin
M	CAN4570	Wall of closed vase, red band	Peloponnese?
	CAN4592	Foot of small amphora	Peloponnese?
	CAN4766	Stem of bowl	Peloponnese
	CAN4771	Wall of amphora or jug with brown band	Peloponnese
	CAN4774	Shoulder and wall of stirrup jar with band	Peloponnese?
	CAN4885	Small amphora with bands	Peloponnese
	CAN4896	Wall of small amphora with bands	Peloponnese
	CAN4913	Wall of small amphora	Peloponnese

Ware	Sample	Description	Suggested origin
M	CAN4916	Decorated amphora with brown glossy paint and bands	Peloponnese?
	CAN4601	Stirrup jar	C. Greece/C. Crete
	CAN4571	Shoulder of container vessel with brown paint	Chemical: not Mainland or C. Crete; could be Cyclades
P	CAN401	Pithos. Yellowish, with grooves	S.Cyprus
	CAN402	Pithos. Yellowish, with horizontal and wavy grooves, n. inv. AG/54644	S.Cyprus
D	CAN501	Wall with tall straight band	Local
	CAN502	Wall with tall straight band	Local
	CAN503	Large brown collar	Sardinia
	CAN504	Large brown collar with zig-zag incisions	Sardinia
I	CAN601	'Maltese' biconical vase, red slip	Malta
	CAN602	'Maltese' biconical vase, red slip	Malta
	CAN603	'Maltese' biconical vase red slip	Malta
	CAN701	'Nuragic' globular jar	Local
	CAN702	'Nuragic' globular jar	Sardinia
	CAN801	'Nuragic' brown almost hemispherical bowl	Local
	CAN802	'Nuragic' almost hemispherical bowl	Not local?
	CAN803	'Nuragic' black bowl	Local
	CAN804	'Nuragic' red almost hemispherical bowl	Local
	CAN805	'Nuragic' reddish hemispherical bowl	Local
	CAN901	Fine brown large carinated cup with incisions	Local
	CAN902	Fine dark brown rounded cup	Local
	CAN903	Fine brown amphora with two oblique strap handle	Local
	CAN904	Fine dark brown rounded cup	Local
	CAN1001	Coarse light brown ovoid jar	Local
	CAN1002*	Coarse black pedestalled cup with cordon	Local
	CANQ3D*	Wall fragment	Local
	CANSIV189*	Wall fragment	Local
V	CAN1301*	Daub	Local

* = ICP only

Petrographic analysis

The classification is based mainly on the clasts; five groups have been identified:

***Group 1*: grog (large size, dark brown or black without inclusions, sub-angular or angular)**

1a: grog predominant; other components, probably naturally present in the matrix are micritic calcite, fossils, quartz, feldspars, sometimes polycrystalline quartz, opaques, pyroxenes. The groundmass is calcareous, isotropic, brown or yellowish brown. This group include all the fine (**CAN901, 902, 903, 904**) and coarse (**CAN1001, 1002**) *impasto*, one closed vessel 'Nuragic' (**CAN701**) and two pithoi (**CAN501, 502**). The coarse *impasto* is more calcareous and the 'Nuragic' one **CAN701** shows more quartz and feldspars compared to the other samples.

1b: grog, quartz and feldspars (medium size, subrounded-subangular) predominant. Other components, probably naturally present in the matrix are micritic calcite, fossils, opaques, pyroxenes. The groundmass is calcareous, isotropic or anisotropic, brown or black. Abundant pores; sometimes spathic calcite. This group is tempered with grog, quartz, feldspars (and calcite). The majority of open 'Nuragic' vessels show this composition: **CAN801, 803, 804, 805**.

***Group 2*: quartz and feldspars**

2a: quartz, feldspars and sedimentary rocks. Anisotropic yellowish brown groundmass porous and rich in clasts: rounded quartz and feldspars, spathic calcite, chert. Fossils, micritic calcite, polycrystalline quartz, pyroxenes, marls. The sample (**CAN1301**) is a daub, locally produced.

2b: quartz, feldspars, sedimentary and metamorphic rocks. Anisotropic brown matrix rich in clasts, prevalent subrounded and subangular quartz and feldspars, polycrystalline quartz, chert, micritic calcite, metamorphic rocks, fossils. An open shape, typologically Nuragic (**CAN802**), may not be locally produced.

***Group 3*: grog and fossils**

Black (reddish brown close to the surfaces) matrix with abundant large pores (organic temper?) and post-depositional calcite. A red slip is clearly visible on the surfaces. The samples are tempered with subangular dark brown or black grog; other components are fossils, micritic calcite, opaques. The three samples of 'Maltese' wares belonging to this group (**CAN601, CAN602, CAN603**) are compositionally and typologically consistent with production on the island of Malta. This island's lithology is sedimentary, mainly carbonatic. An association with Malta is based first on comparative data obtained for some protohistoric samples from Malta (sanctuary of Tas-Silg), kindly provided by A. Ciasca and A. Cazzella, and second on Bruno, Capelli's (2000) results on 2nd-1st century BC amphorae from Malta; the presence of abundant microfossils in those amphorae were indicative of local production using the Blue Clays from Gozo or N.W. Malta.

***Group 4:* andesitic volcanic rocks**

Brown anisotropic matrix with abundant clasts of angular/subangular volcanic rocks, plagioclase, hornblende. A 'Nuragic' jar (**CAN702**) and two large pithoi (coarser) (**CAN503, 504**). A Sardinian production area is suggested, perhaps in the Antigori area (see Sardinia section). The group is linked to three closed vessels, possibly used for transport. One large container (**CAN504**) shows an incised decoration on the rim with parallels (a) in Nuragic pottery (Campus, Leonelli 2000, tav. 318/14, 565, from Villamar, protonuraghe Farruas), (b) on a jar from Lipari interpreted as an import (**NUR5**), *facies* Ausonio II and (c) on a pseudominyan pot from Tiryns probably imported from Sardinia (Belardelli 1999, fig. 1/7, 452).

***Group 5*: ultrabasic and gabbroic volcanic rocks, siltstone, opaques, metamorphic rocks, fossils, micritic calcite**

Brown anisotropic matrix, abundant clasts rounded (metamorphic rocks and siltstone) and angular/subangular (volcanic rocks). The two pithoi in this group are typologically Cypriot (**CAN401, 402**), and their composition suggests a production area in southern Cyprus (see Part 4).

Chemical analysis

Visual inspection of the data indicates that the daub, **CAN1301**, a calcium-rich but clay-poor material, is manifestly different from the remainder and so has been omitted from further examination. The dendrogram from cluster analysis (average link method) of the remaining samples suggested the following classification:

1a: CAN701, 801, 805, 1001, 804, Q3D, 501, 502, 602, 603, 601, 902, 904, 1002, 803, 189, 903, 901, 4571, 802, 702

1b: CAN702, 802, 4571

2: CAN4570 and **4916**

3a: CAN4592, 4913, 4766, 4885, 4896, 4774

3b: CAN4601 and **4771**

4: CAN503 and **504**

5: CAN401 and **402**

PCA of the same dataset produced a generally similar classification. On removing the members of clusters 4 and 5, **CAN401**, **402, 503** and **504**, the PC plot appears as in Fig. 4.24a. Here A stands well apart from **CAN4601** and **4771** (Cluster 3b), and B encompassing Clusters 1a-1b includes the local and probable imported *impasto*.

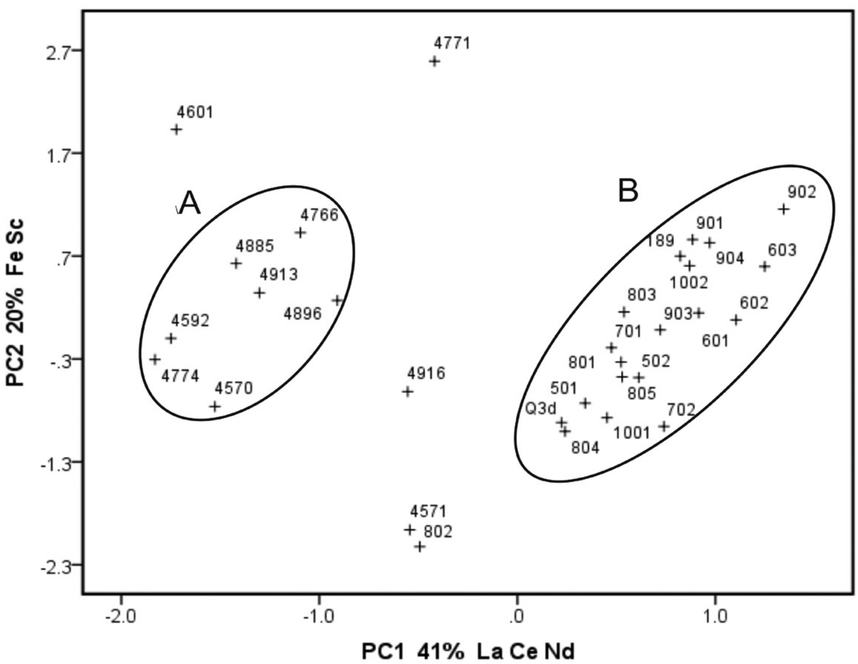


Fig. 4.24a. PC plot of the ICP compositions for pottery at Cannatello, except **CAN1301, 401, 402, 503** and **504**. Log transformed data.

Fig. 4.24b compares the chemical and petrographic classifications of all the *impasto* apart from **CAN503** and **504**: petrographic Groups 1a and 1b correlate well, but not perfectly with chemical Groups 1a, b. The identity of petrographic Group 3 is clear in chemical terms.

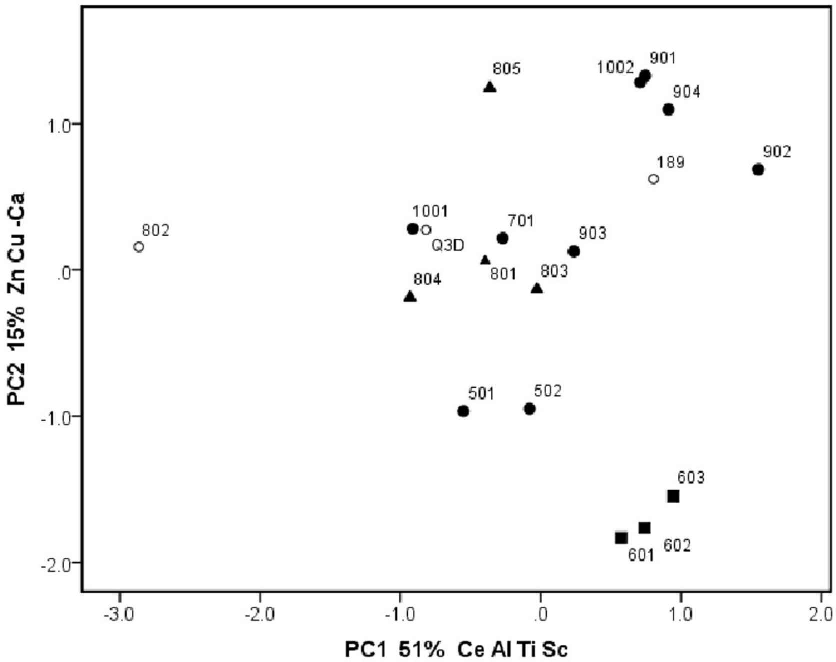


Fig. 4.24b. PC plot of the ICP compositions of *impasto* at Cannatello. Petrographic groups 1a (●), 1b (▲) and 3 (▪). Log transformed data.

Fig. 4.24c treats the *impasto* with the reference samples from Malta mentioned above. The *impasto* designated as 'Maltese' (**CAN601-3**) in petrographic Group 3 appears together with the reference material from Malta within a broad chemical cluster owing to variable Ca content.

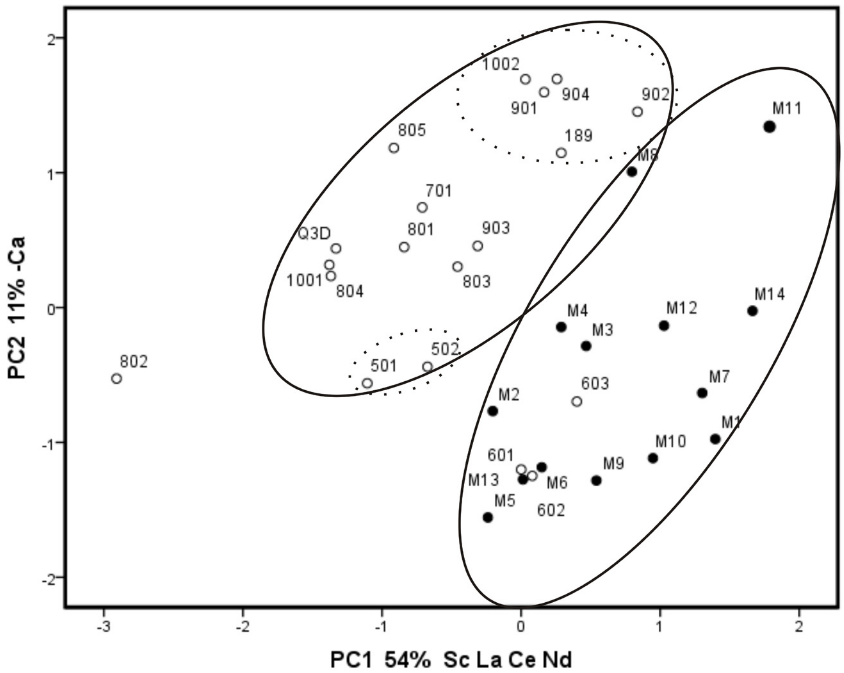


Fig. 4.24c. PC plot of the ICP compositions of *impasto* at Cannatello. The petrographic groups are superimposed (solid lines); the dashed lines highlight potential distinctions within petrographic Groups 1a, b. **CAN802** belongs to petrographic Group 2b, and Group 3 comprises the imports and reference (●) samples from Malta. Log transformed data.

Marina di Agrigento (83)

INAA (Database 2): Mycenaean 1
Previously unpublished
Illustration: Fig. 4.94

Ware	Sample	Description	Date	Suggested origin	Publication	N. Inv.
M	AG1	Piriform jar	IIIA2	(N.) Peloponnese	Orsi 1906; Tusa 1997a, 186, V.57	AG20448

This sample is discussed with other Aegean imports in Part 4.

Milazzo (85)

PE: Protogeometric 2, *dolia* in *impasto* 3, *impasto11*
XRD: Protogeometric 2, *impasto* 14
XRF (Database 5): Protogeometric 2, *impasto* 14
Publication: Levi *et al.* 1999

The petrographic compositions of sixteen samples from the Bronze Age village of Viale dei Cipressi (Tigano *et al.* 1994; Levi *et al.* 2003, 2009) were compared to those from the Aeolian Islands and Messina (Levi 1998-2000). In Capo Graziano phase two large *dolia* and a cooking pot appear to be imported from the Aeolian Islands and a painted Castelluccio amphora probably from Eastern Sicily. In the other phases all the pottery is local.

Phase (see Table 4.11)	Local	Aeolian	Sicilian
Capo Graziano	6	2 *dolia*, 1 cooking pot	1 Castelluccio amphora
Milazzese	3		
Ausonian	2 Protogeometric, 1 *dolium*		

Ustica (86)

ICP (Database 3): Italo-Mycenaean? 1
Previously unpublished

Ware	Sample	Description	Date	Suggested origin	Publication	N. Inv.
IM?	UST1			Uncertain		

In the absence of any comparative data, treatment of the composition of this singleton is left to Part 4.

AEOLIAN ISLANDS
(with a contribution by Peter M. Day for Lipari)

Period	Phase	Special wares and other notes
Neolithic	Castellaro Vecchio	Obsidian
	Capri	Painted pottery
	Serra d'Alto	Fine painted pottery
	Diana	Fine red '*impasto*' pottery
Eneolithic	Piano Conte	Only *impasto* pottery
	Piano Quartara	Only *impasto* pottery
Bronze Age	Capo Graziano (Early-Middle BA)	Aegean pottery
	Milazzese (Middle BA)	Aegean pottery
	Ausonian I (Recent BA)	Aegean pottery, some Protogeometric
	Ausonian II (Final BA)	Aegean, Piumata, Protogeometric, Nuragic pottery. Only Lipari was occupied

Table 4.11. Chronological sequence of phases in the prehistory of the Aeolian Islands.

The fabrics of pottery from the Aeolian Islands, dating to the periods outlined in Table 4.11, and more than 500 in number, were first identified and defined petrographically in a broad-based study that was undertaken over forty years ago (Williams 1967, 1980, 1991). Williams recognised three main petrographic groups, each of which had subgroups:

A: locally manufactured with lithic and mineral inclusions of andesitic and rhyolitic composition;
C: locally manufactured with imported clays; clasts derived from andesitic and rhyolitic volcanic rocks and detrital fraction of plutonic and metamorphic origin from outside the archipelago;
B: imported vessels with lithic and mineral inclusions derived from plutonic and metamorphic rocks.

A recent integrated microchemical-petrographic approach has been applied to recognise Temper Compositional Reference Units and discriminate the possible Aeolian production centres (Brunelli *et al.* 2013). This has involved investigation of the volcanic tempers through multivariate analyses of relative abundances of mineral and rock clasts along with petrographic characteristics and *in-situ* mineral chemistry microanalyses by EMPA and LA–ICP-MS to assess major and trace element composition of the most common mineral phases.

Filicudi (87)

PE, SEM, EMPA, ICP-MS: *Impasto* 61
Publication: Williams 1991; Martinelli *et al.* 2010; Brunelli *et al.* 2013

The integrated microchemical-petrographic approach (see Lipari entry) revealed the existence of two main Temper Compositional Reference Units: AIV (attested also at Stromboli) and AVIII showing distinct petrographic characteristics but overlapping geochemical fingerprints. The majority of samples are likely locally produced.

Salina (88)

PE: *Impasto* 2
Publication: Williams 1991; Williams, Levi 2008

The two Apennine undecorated sherds of the Milazzese *facies* are imported.

ICP (Database 3): Pithoi 2, *impasto* 24
PE: Pithoi 2, *impasto* 38, daub 2
Publication: Levi, Jones 2005; Williams, Levi 2008; Levi, Fragnoli 2010
Illustration: Fig. 4.94

The MBA3 samples (Milazzese phase) are from the new excavations at Portella village (Martinelli 2005), and the two from Rinicedda are part of the group of Neolithic sherds (Castellaro phase) already analysed petrographically (Williams, Levi 1995) and with XRD and XRF (Levi *et al.* 1999).

Ware	Sample	Site	Description	Phase	Suggested origin	Publication (Martinelli 2005)
P	POR1	Portella	Pithos	Milazzese	S. Cyprus	fig. 98
	POR3	Portella	Pithos	Milazzese	S. Cyprus	fig. 98
I	POR2	Portella	Undiagnostic sherd	Milazzese	Aeolian (imported clay?)	
	POR4	Portella	Apennine cup	Milazzese?	Not local	fig. 84:1
	POR5	Portella	Cup?	Milazzese	Aeolian	fig. 84:3
	POR6	Portella	Spindle whorl	Milazzese	Aeolian	fig. 90:9
	POR7	Portella	Bottle	Milazzese	Aeolian	fig. 90:10
	POR8	Portella	Apennine bowl	Milazzese	Aeolian	fig. 84:2
	POR9	Portella	Pithos with incised mark	Milazzese	Aeolian	fig. 73:1,Tav. VII:1
	POR10	Portella	Cooking pot	Milazzese	Aeolian	fig. 87:9-10
	POR11	Portella	Bottle/handle	Milazzese	Aeolian	fig. 87:8
	POR12	Portella	Globular jar	Milazzese	Aeolian	fig. 87:4
	POR13	Portella	Foot of cup	Milazzese	Aeolian (imported clay?)	fig. 75, Tav. VI:4
	POR14	Portella	handle of a coarse jar	Milazzese	Not local	figs. 68, 87:2
	POR15	Portella	Coarse cylindrical-ovoid jar	Milazzese	Aeolian	fig. 69:4
	POR16	Portella	Apennine bowl	Milazzese	Not local	fig. 81

Ware	Sample	Site	Description	Phase	Suggested origin	Publication (Martinelli 2005)
I	POR17	Portella		Milazzese		fig.69, Tav. VI:6
	POR18	Portella	Small pithos	Milazzese	Aeolian	
	POR19	Portella	Pithos with incised mark	Milazzese	Aeolian	fig. 74:1
	POR20	Portella	Apennine cup	Milazzese	Aeolian	fig. 82:1
	POR21	Portella	Apennine bowl	Milazzese	Not local	fig. 83:1
	POR22	Portella	Foot of cup	Milazzese	Aeolian (imported clay?)	
	POR23	Portella	Cup with incisions	Milazzese	Aeolian	fig. 101:26
	POR24	Portella	Pithos	Milazzese	Aeolian	fig. 100
	POR25	Portella	Globular jar with cordons	Milazzese	Aeolian	fig. 70
	RIN1	Rinicedda	Undiagnostic sherd	Castellaro Vecchio	Not Local	
	RIN2	Rinicedda	Undiagnostic sherd	Castellaro Vecchio	Aeolian	

Groups 1, 2 and 3 in Table 4.12 are petrographically consistent with Williams' classification (see Lipari). The microchemical-petrographic study is in progress in order to better define production centers.

Williams 1980 fabrics	Samples	Notes	Suggested origin
A	6, 5, 7, 8, 9, 10, 11, 12, 15, 17, 18, 19, 20, 23, 24, 31, 34, 36, 37, 38, 39, 42, 43, 44, 45	8, 20, 42 Apennine 44, 45 daub	Aeolian
C	2, 13, 22, 32, 40, 41		Aeolian with imported clay
B	4, 14, 16, 21, 25, 33, 35	4, 16, 21, 35 Apennine	Metamorphic area
	1, 3		Cypriot (ultrabasic and gabbroic volcanic rocks, see Part 4)

Table 4.12. Petrographic groups for Bronze Age pottery on Salina.

The chemical results are treated in the Lipari section.

Lipari (89)

PE: *Impasto* (168 Neolithic, 19 Eneolithic, 137 Bronze Age)
Publication: Williams 1980

The results are summarized in Fig. 4.25a.

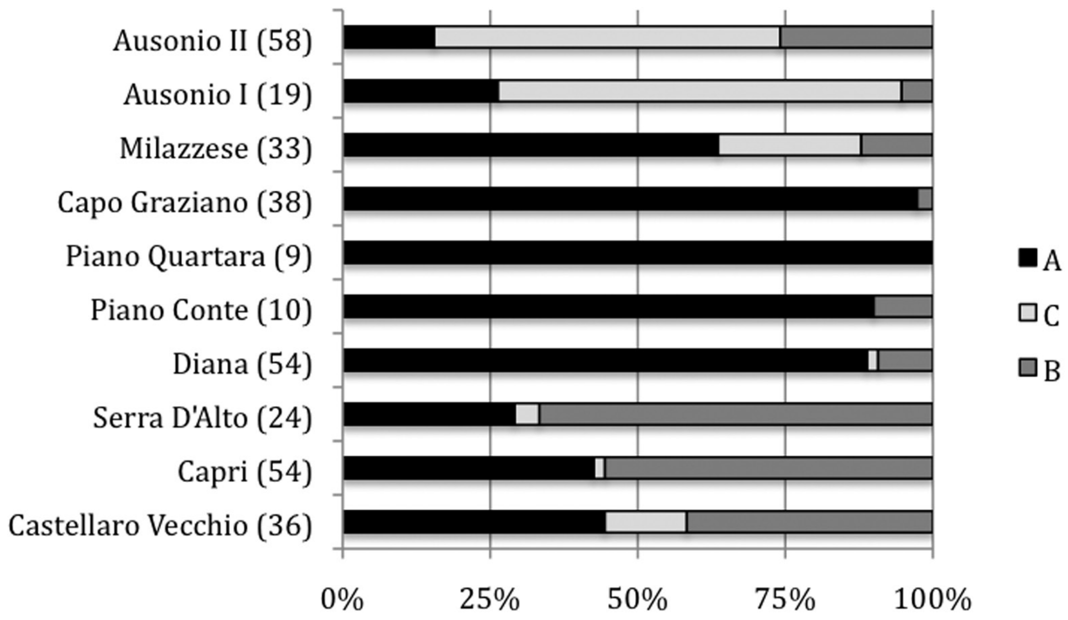


Fig. 4.25a. Lipari paste groups (classification of Williams 1980 and Williams, Levi 2008 for the Ausonian) in the different phases (see Table 4.11). A: locally manufactured; C: locally manufactured with imported clays; B: imported vessels. The number of samples analysed is indicated in brackets.

The three groups are represented in a diverse manner in relation to the chronological sequence on Lipari:

- From the Castellaro Vecchio to the Serra d'Alto phases about 50% of samples are imported (Group B). Imports are often painted figulina.
- From the Diana to Capo Graziano phases local production (Group A) dominates.
- Local production with imported clay (Group C) is relevant in the Ausonian phase.

The archaeological implications of the results are discussed by Williams, Levi (2001) and Levi, Williams (2003).

PE: Painted (Protogeometric and Piumata) 25, *impasto* 49 (Ausonian)
Publication: Williams, Levi 2008

Regarding the first petrographic study of Ausonian Protogeometric and Piumata wares (Williams, Levi 2008), the results in Fig. 4.25b indicate:

- Protogeometric was mainly locally manufactured with clay imported from Sicily (nearly 70% in group C) and was also imported as finished product from southern Italy (group B);
- Piumata, the typical Sicilian painted ware, was manufactured on Lipari with clay imported from Sicily (group C).

Work is in progress in relating the petrographic with the corresponding chemical (ICP) data.

PE, SEM, EMPA, ICP-MS: *Impasto* 54
Publication: Brunelli *et al.* 2013

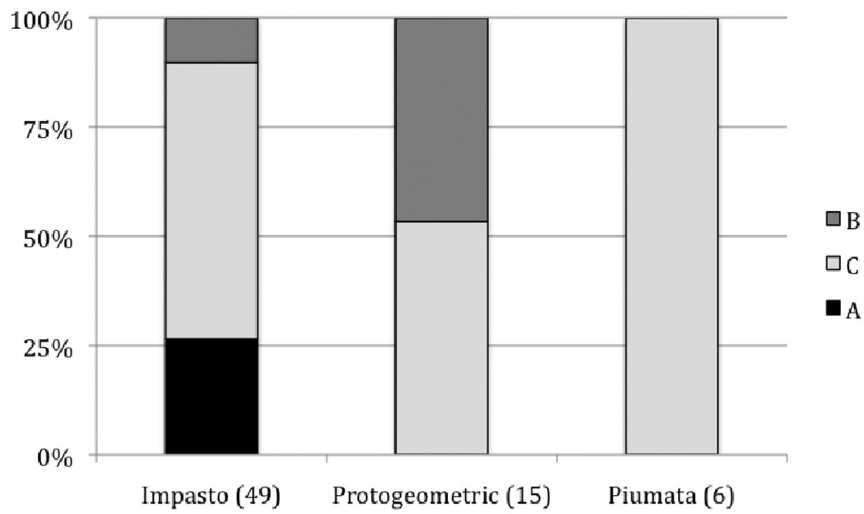


Fig. 4.25b. Distribution of Groups A, B and C (see Fig. 4.25a) in *impasto*, Protogeometric and Piumata on Lipari.

Lipari Temper Compositional Group defined by microchemistry (AI) is unequivocally distinct by unusual trace element enrichment and petrographic composition. All the samples of Capo Graziano facies from the Acropolis (village), Diana (village and cemetery) and Pignataro di Fuori (shipwreck) are all locally made.

XRF, XRD (Database 4, 5): clays 2
Publication: Levi *et al.* 1999

The mineralogical analysis of clays from Fuardo and Portinente shows minor differences. That from Fuardo is rich in smectite and a small component of dolomite, while the latter contains smectite and chalk/gypsum. Chemically, the clays are differentiated by their trace element contents due to a composition difference in the tufaceous material altered to smectite; at Fuardo dolomite is always found, probably deriving from carbonate deposits in the west part of the island. The high silica content in the Portinente clay and the presence of chalk/gypsum indicates proximity to a source of hot waters and fumaroles which occur in the area and could have caused precipitation of silica and sulphur.

ICP (Database 3): Mycenaean 10, 'Nuragic' *impasto* 5, *impasto* (Neolithic) 2, clay 1
PE: Mycenaean 2, 'Nuragic' *impasto* 4
Previously unpublished
Illustration: Figs. 4.95-96, Plate 8

Ware	Sample	Description	Date	Phase	Suggested origin	Publication	Inv. N.
M	MIC1	Base of uncertain shape	III	C.Graziano/ Milazzese	Uncertain	Taylour 1980, tav. CLII:25	7822
	MIC2	Amphora or jug	IIIB-C	Mil/Ausonian	Peloponnese	Taylour 1980, tav. CLX:19	6688
	MIC3	Necked jar	II	C.Graziano	Peloponnese	Taylour 1980, tav. CXLVIII:1	7991
	MIC4	Closed vessel	IIIC	Ausonian II	Peloponnese	Taylour 1980, tav. CCXLV:9	5746

Ware	Sample	Description	Date	Phase	Suggested origin	Publication	Inv. N.
	MIC5	Krater?	III	Ausonian II	Peloponnese	Taylour 1980, tav. CCXLIV:5	8996
	MIC7	Bridge-spouted jug	I-II	C.Graziano	Peloponnese	Taylour 1980, tav. XLIV:12; XLV:e	7971
M	MIC8	Krater	IIIB	Mil/Ausonian	Peloponnese	Taylour 1980, tav. CLX:14; CLXI:n	7898
	MIC9	Jug with cut-away neck	II-IIIA	C.Graziano	Aegean?	Taylour 1980, tav. CXLVIII:17	7988
	MIC10	Amphora or jug	IIIB?	Ausonian I	Aegean	Taylour 1980, tav. CXCIII:h	6670
P	MIC6	Base of uncertain shape	III	Milazzese	Uncertain	Taylour 1980, tav. CLXII:20	7478
	CVE8	Body sherd		Castellaro Vecchio	Local		
	CVE9	Body sherd		Neolithic	Local		
	NUR1	Nuragic, incised		Ausonian II	Not Aeolian		5392
I	NUR2	Nuragic, necked jar?		Ausonian II	?		5828
	NUR3	Nuragic		Ausonian II	Sardinia		5009
	NUR4	Nuragic		Ausonian II	Sardinia		5570
	NUR5	Jar with incised rim		Ausonian II	Sardinia	Bernabò Brea, Cavalier 1980, fig. 113A 604	
V	LIP1	Fuardo Clay			Local		

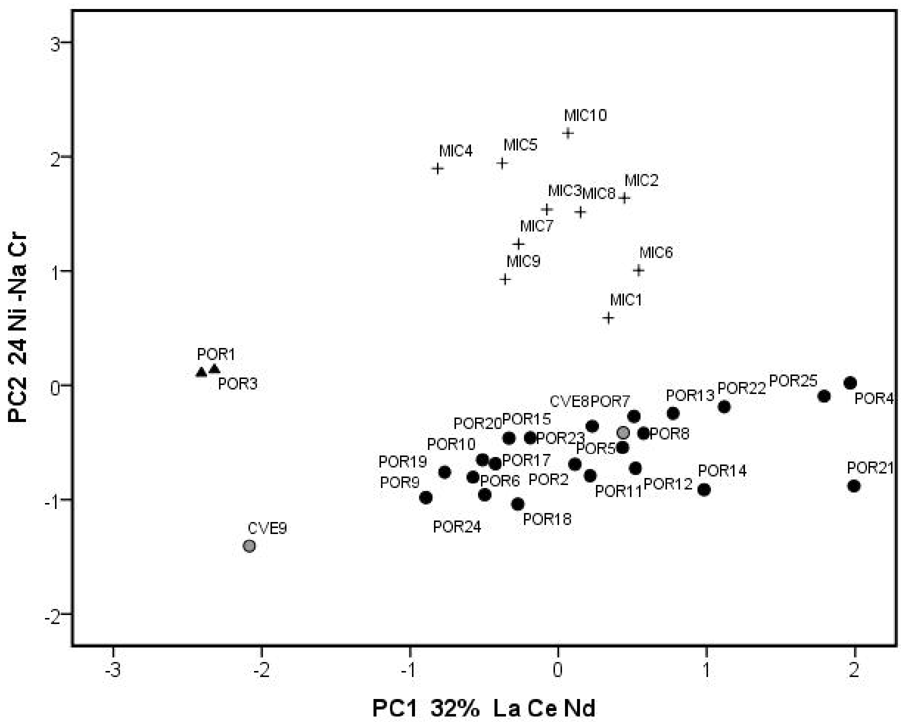


Fig. 4.26. PC plot of the ICP compositions for Salina and Lipari (except the clay LIP1). Salina (●) and Lipari (o shaded grey) *impasto*, Cypriot pithoi (▲) and Mycenaean (+). Log transformed data.

Williams' petrographic description of **MIC2** and **MIC6** appears in Part 4 (and Database 4).

Chemically, the modern clay, **LIP1**, stands well apart from the pottery by virtue of high iron and low sodium. Treating collectively the composition data for Salina and Lipari (**LIP1** omitted), Fig. 4.26 shows that with the exception of **POR21** the *impasto* from Salina forms a discernible group encompassing **CVE8** from Lipari but separating from the Neolithic *impasto*, **CVE9**. The Mycenaean examples form a broad group, and the pithoi, **POR1** and **POR3**, are clearly different (see Part 4).

Nuragic pottery

P.M. Day

'Nuragic' *impasto*, **NUR1**, is a very highly fired vessel with an optically inactive matrix, probably calcareous, with frequent microfossils visible in PPL. It is characterised by textural concentration features which resemble grog, but are compatible with the groundmass. No suggestion of origin can be proposed.

NUR3 is dominated by well-sorted quartz and feldspar but also with highly altered igneous rocks, including a porphyritic example which preserves flow structure. The latter inclusions point to a Sardinian provenance.

NUR4 is very similar to **CAN702** and Fabrics 2-3 in the *impasto* found at Kommos and attributed to Sardinia having porphyritic volcanic characteristics.

NUR5 is composed of a red clay; the dominant non-plastics are fragments of low-grade metamorphic rocks, primarily biotite schist with what may be fragments of an acid igneous rock and an altered porphyritic volcanic rock which resembles those in **CAN503** and **CAN504** which are attributed to Sardinia.

Panarea (90)

PE: *Impasto* 11
Publication: Williams 1991; Williams, Levi 2008

This set of material from Punta Milazzese (MBA3) was produced in the Archipelago except for 5 Apennine pots which were imported. The microchemical-petrographic study is in progress in order to better define production centers.

Stromboli (91)

PE, SEM, EMPA, ICP-MS: *Impasto* 137, geological 16
Publication: Brunelli *et al.* 2013

A large programme of analytical and macroscopic analyses of Bronze Age and later pottery is in progress from the ongoing excavation of the San Vincenzo site. The integrated microchemical-petrographic approach (see Lipari entry) shows the existence of a local Temper Compositional Reference Unit (AX) which is unequivocally distinct due to its unusual trace element enrichment and petrographic composition.

SARDINIA

Orosei Area (92)

PE: Mycenaean
Publication: Riley (unpublished)

All the samples are treated in Part 4 in keeping with the prognosis that they are Aegean imports.

AAS (Database 1): Mycenaean 12
Publication: Jones 1986
Illustration: Fig. 4.97

Ware	Sample number	Description	Date	Suggested origin	Publication	Inv.n.
M	O21	Handle (Krater)	IIIB	Peloponnese	Vagnetti 1982e, tav. LXIX:1b	38892
	O22	Decorated rim (Krater)	IIIB	Peloponnese	Vagnetti 1982e, tav. LXIX:1a	38893
	O23	Deep bowl?	IIIB-C	Peloponnese	Vagnetti 1982e, tav. LXIX:2	38894
	O24	Base	III	Peloponnese		38895
	O25	Open vessel	IIIB-C	Peloponnese	Vagnetti 1982e, tav. LXIX:3	38896
	O26	Open vessel	IIIB-C	Peloponnese	Vagnetti 1982e, tav. LXIX:4	38897
	O27	Vertical handle, closed shape?	IIIB-C	Peloponnese	Vagnetti 1982e, tav. LXIX:5	38898
	O28	Uncertain shape	IIIB-C	Peloponnese		38899
	O29	Bowl/cup	IIIB-C	Peloponnese		38900
	O30	Krater?	IIIB-C	Peloponnese		38901
	O31	Closed vessel	IIIB-C	Peloponnese		38902
	O32	Uncertain shape	IIIB-C	Peloponnese		38904
	O33	Uncertain shape	IIIB-C	Peloponnese		38905

The results are treated in the Antigori entry and Part 4.

Nuraghe Arrubiu (94)

AAS (Database 1): Mycenaean 1; *impasto* 4
Publication: Jones, Vagnetti 1991, 1992; Jones 1993
Illustration: Fig. 4.98

Ware	Sample	Description	Date	Suggested origin
M	ORL1	Alabastron	IIIA2	Peloponnese
I	ORL2			Local
	ORL3			Local?
	ORL4			Local
	ORL5			Local

The results are treated in the Antigori section.

Nuraghe Antigori (98)

PE: Mycenaean (see below)
Publication: Riley (unpublished)

The site is situated between the granites and schist of the Capoterra region to the east and the trachyte to the south east.

A range of decorated wares published by Ferrarese Ceruti (1979, 1982a) and Lo Schiavo, Vagnetti (1980) were examined in thin section. A range of fabrics is represented indicating much variety in recipe, which may relate to several sources. Many formed two main fabric groups. The first group is likely to be local to the region, containing abundant potash feldspar arkose, and other minerals compatible with a granitic origin. Included in this group is a decorated rim (Lo Schiavo, Vagnetti 1980, Tav. II no. 4=**AN4**). The second fabric is distinctive with much siliceous matter and abundant dark opaque ferruginous grains. This group included two published by Lo Schiavo and Vagnetti (1980, Tav. II no. 3 (=**AN17**) and 7 (=**AN7**)). This fabric is not granitic and a local origin is not certain, but a sample of clay collected from the vicinity of the Nuraghe Antigori has a similar suite of inclusions.

One rim (Lo Schiavo, Vagnetti 1980, Tav. II no. 1=**AN3**) has a very distinctive fabric with a dense matrix of fine quartz of average size 0.05mm, with regular larger quartz grains (to a size of 0.2mm across). The fabric is very similar to that of the white wares of Chania in western Crete. This similarity may be fortuitous, but three other samples share this fabric, and a Cretan origin cannot be ruled out. Other samples had finer textures, which are generally characteristic but not exactly paralleled with Aegean wares. One sample with a whorl decoration (Lo Schiavo, Vagnetti 1980, Tav. II no. 2=**AN5**) was compared with over fifty samples from Mycenae whose decoration included whorls. All contain fine quartz and silty sediments, but the quartz in the Sardinian sample is larger and the sediments more abundant than in the Mycenae samples. However, this does not rule out an Aegean origin or even one in the Argolid as a good variety has been noted in the Mycenae LH IIIB fabrics. In summary, there seems to be good evidence that decorated wares were made in southern Sardinia as well as imported from outside.

AAS (Database 1): Mycenaean 22, Base Ring 2, Pithoi 3, Italo-Mycenaean 30, *impasto* 7
PE: 18
Publication: Jones 1986; Jones, Day 1987; Jones, Vagnetti 1991, 1992
Illustration: Figs. 4.98-103

Ware	New no.	Jones, Day (1987) n.	Description	Date	Suggested origin (see text)	Publication	Inv. n.
M	AN1	1	Large container jar	III	Peloponnese	Ferrarese Ceruti 1982a, tav. LXV:8	97709
	AN5	5	Rhyton	IIIB	Peloponnese	Ferrarese Ceruti 1982a, tav. LXIII:5	97720
	AN6	6	Uncertain shape	IIIB-C	Peloponnese	Ferrarese Ceruti 1981, 608, m7	97721
	AN10	10	Stirrup jar	IIIB-C	Peloponnese	Ferrarese Ceruti 1982a, tav. LXIII:9	97739
	AN19	19	Foot (kylix?)	IIIB	Peloponnese	Ferrarese Ceruti *et al.*1987, fig. 2.4:1	
	AN22	36	Closed vessel	IIIB-C	Peloponnese	Ferrarese Ceruti 1986, fig. 4:1	

Ware	New no.	Jones, Day (1987) n.	Description	Date	Suggested origin (see text)	Publication	Inv. n.
M	AN32	46	Krater	IIIB-C	Peloponnese	Ferrarese Ceruti 1986, fig. 8:5	
	AN35	49	Stirrup jar?	IIIB-C	Peloponnese	Ferrarese Ceruti 1983, fig. 8:3	
	AN36*	50	Closed vessel	IIIB-C	Peloponnese	Ferrarese Ceruti 1983, fig. 8:9	
	AN41	55	Deep bowl	IIIC?	Peloponnese	Ferrarese Ceruti *et al.* 1987, fig. 2.4:2	
	AN43	57			Peloponnese		
	AN47	61	Piriform jar/amphora?	III	Peloponnese		
	AN58*	77			Peloponnese		
	AN61	80	Bowl?	IIIB?	Peloponnese	Ferrarese Ceruti 1982a, tav. LXIII:3a-b	
	AN3	3	Cup	IIIB2	W. Crete	Ferrarese Ceruti 1982a, tav. LXIII:1	97713
	AN9	9	Stirrup jar	IIIB-C	W. Crete	Ferrarese Ceruti 1982a, tav. LXIII:7	97738
	AN18	18	Bowl/krater	IIIB2	W. Crete		
	AN23*	37	Closed vessel	IIIB-C	C. Crete	Ferrarese Ceruti 1986, fig. 4:3	
	AN26	40	Bowl/cup	IIIB2-C	W. Crete	Ferrarese Ceruti 1986, fig. 7:3	
	AN27	41	Stirrup jar	IIIB-C	W. Crete	Ferrarese Ceruti 1986, fig. 7:1	
	AN57	76	Stirrup jar	IIIB	C. Crete/Boeotia	Ferrarese Ceruti 1982a, tav. LXIII, 10	
	AN62	81	Coarse ware stirrup jar		W. Crete		
BR	AN54	73	Base Ring? Base		?	Lo Schiavo *et al.* 1985, fig. 2,4	
	AN55	74	Base Ring? Wishbone handle		?	Lo Schiavo *et al.* 1985, fig. 2,5	
P	AN44*	58	Pithos		Local	Ferrarese Ceruti *et al.* 1987, fig. 2.4:4	
	AN48*	62	Cypriot-type pithos		S. Cyprus	Ferrarese Ceruti *et al.* 1987, fig. 2.5	
	AN49*	68	Minoan-type pithos		C. Crete	Ferrarese Ceruti 1981, 608, M9	
IM	AN2	2	Bowl/cup	IIIB2	Local		97711
	AN4	4	Krater	IIIB-C	Local	Ferrarese Ceruti 1982a, tav. LXV:1	97717
	AN7	7	Bowl/cup	IIIB2	Local	Ferrarese Ceruti 1982a, tav. LXIV:2	97723
	AN8	8	Krater?	IIIB2	Local	Ferrarese Ceruti *et al.* 1987, fig. 2.6:5	97724
	AN11	11	Closed vessel?	IIIB-C	Local		97740
	AN12	12	Bowl/krater	IIIB-C	Local	Ferrarese Ceruti 1979, fig. 2:5	97747
	AN13	13	Bowl/cup	IIIC	Local	Ferrarese Ceruti 1982a, tav. LXIV:9	97766

Ware	New no.	Jones, Day (1987) n.	Description	Date	Suggested origin (see text)	Publication	Inv. n.
IM	AN14	14	Deep bowl	IIIC	Local	Ferrarese Ceruti 1982a, tav. LXIV:1	97780
	AN15	15	Bowl	IIIC	Local	Ferrarese Ceruti 1982a, tav. LXIV:3	97783
	AN16*	16	Closed vessel	IIIB-C	Local		97800
	AN17	17	Krater	IIIC	Local	Ferrarese Ceruti 1982a, tav. LXV:3	97806
	AN20	20			Local		
	AN24*	38	Open vessel	IIIB-C	Local	Ferrarese Ceruti 1986, fig. 4:4	
	AN25	39	Open vessel	IIIB-C	Local	Ferrarese Ceruti 1986, fig. 4:2	
	AN28	42	Closed vessel	IIIB-C	Local	Ferrarese Ceruti 1986, fig. 7:2	
	AN29	43	Closed vessel	IIIB-C	Local	Ferrarese Ceruti 1986, fig. 7:6	
	AN30	44	Bowl	IIIB-C	Local	Ferrarese Ceruti 1986, fig. 7:4	
	AN31	45	Deep bowl?	IIIB-C	Local	Ferrarese Ceruti 1986, fig. 7:5	
	AN33	47	Krater	IIIB-C	Local	Ferrarese Ceruti 1986, fig. 8:1	
	AN34	48	Closed vessel	IIIB-C	Local	Ferrarese Ceruti 1986, fig. 8:3	
	AN37*	51	Krater?	IIIB-C	Local	Ferrarese Ceruti 1983, fig. 8:7	
	AN38	52	Open vessel	IIIB-C	Local	Ferrarese Ceruti 1983, fig. 8:4	
	AN39	53	Closed vessel	IIIB-C	Local	Ferrarese Ceruti 1983, fig. 8:8	
	AN40	54	Open vessel?	IIIB-C	Local	Ferrarese Ceruti 1983, fig. 8:2	
	AN42	56	Closed vessel?	IIIB-C	Local		
	AN45*	59			Local		
	AN46*	60	Closed vessel?		Local		
	AN56	75			Local		
	AN59	78			Local		
	AN60	79	Bowl/cup	IIIB-C	Local	Vagnetti, Jones 1988, fig. 3:4	
I	AN21	35			Local		
	AN50*	69			Local		
	AN51	70			Local		
	AN52*	71			Local		
	AN53*	72			Local		
	ANF4	-			Local		
	ANF7	-			Local		

Samples from Antigori analysed chemically and petrographically are indicated *.

Petrographic analysis

Day (Jones, Day 1987) identified the following fabrics within the material from Antigori and Domu s'Orku which were regarded as local to the island:

***Siliceous fabric:* AN24, AN37, AN44, DO3**

This red fabric is distinctive macroscopically, as it also is when examined under the microscope. It corresponds to Riley's Siliceous/Ferruginous fabric. The samples display an optically active, bright micromass which is orange/brown in XPL and may display parallel extinction. Dominant inclusions are subrounded to subangular quartz and chert fragments up to 0.8 mm. Some of the chert inclusions contain fibrous red/brown minerals which may be zeolitic. There are red coloured minerals which sometimes form hypocoating on these inclusions. There are frequent alkali feldspar sometimes altered to sericite and frequent black opaque minerals which may be iron oxides (up to 0.3mm). Also present are occasional microcline, biotite, clay pellets and very rare pyroxene. The raw materials of this fabric are found in abundance in the area around the site of Antigori. The opaque inclusions and chert probably derive from local iron-bearing siliceous deposits. Frequent opaque minerals are also recorded in some of the fabrics recorded at Ortu Comidu (*q.v.*).

***Sedimentary derived fabrics:* ANF4, ANF7, AN50, AN16, AN36 and AN45**

These samples are considered to have a broadly similar geological origin. Two Grey Burnished ware samples (**ANF4** and **ANF7**) and **AN50** have a micromass which is optically active and 'bright' in the case of **F7**. There is variation in the colour of the micromass according to position in the sherd cross section due to the degree of oxidation. In PPL the colours range from light yellowish brown to light reddish brown. A grounding of small quartz and calcite is present. The pottery appears to be low-fired. Frequent large inclusions, mostly subangular, comprise quartz, orthoclase, plagioclase feldspar, biotite and dark opaque minerals. The orthoclase is frequently altered. In addition, **F7** and **AN50** contain microfossils, including globigerina foraminifera. Rounded inclusions of calcite are present which derive from the rounded globigerina microfossils. Also present in varying quantities may be amphiboles, muscovite mica, clay pellets and red amorphous concentration features, fine grained rock fragments with zeolitic minerals which display parallel extinction and rock fragments comprising quantities of quartz, feldspar and mica. This group is distinctive and may relate to Riley's Granitic/Arkose fabric, their non-plastics being sedimentary material which may ultimately be derived from the granitic outcrops present in southern Sardinia. There are also other rock fragments which may derive from argillaceous schist deposits. The clay matrix appears to be derived from neogene deposits, indicated by the presence of foraminifera microfossils.

AN45 is closely related to the latter group, and petrographic differences may not be archaeologically meaningful in the case of this small sample. However, it does not contain microfossils and plagioclase but has frequent subangular inclusions of hornblende.

AN16 has a fine grounding of small quartz in a micromass which is light reddish brown in PPL. There is frequent, small muscovite mica, clay pellets, feldspar and amphibole. The sample contains moderately frequent microfossils which are of a different species from those dominant in the other samples. The petrographic composition of this sample which appears in the local chemical group IIc (of Jones, Day 1987) is compatible with local manufacture.

***Volcanic Grey Burnished wares:* AN52, AN53**

These samples display an optically active bright micromass which is light brown in PPL. Inclusions are sub-angular to angular, and include dominant plagioclase, often zoned, hornblende, volcanic rocks containing plagioclase set in a microcrystalline matrix, occasional opaque minerals, pyroxene and clay pellets. This fabric contains materials derived from volcanic rocks. The inclusions are likely to be derived from basaltic/andesitic rocks which occur near the site of Antigori.

Chemical analysis

The PC plot in Fig. 4.27 shows wide variations in several element contents, such as iron which dominates PC2, and these variations are in part responsible for the way that the first two PCs account for little more than half the overall variation in composition; as a result, Fig. 4.27 gives only a partial but nevertheless useful overview of the classification. There are two large groups, 1c and 2, and two small ones, 1a and 1b. On closer examination, Group 2 may comprise two subgroups, 2a and 2b with high and low iron contents respectively. Table 4.13 indicates the group memberships.

Group	Imports to Sardinia	Italo-Mycenaean	*Impasto*, other
1c	AN1, AN5, AN6, AN10, AN19, AN22, AN35, AN36, AN43, AN47, AN49, AN57, AN58, AN61 DO1, DO2 O1-O13 ORL1	AN28	DO5
2a	AN32, AN41	AN20, AN24, AN25, AN30, AN31, AN34, AN37, AN38, AN39, AN40, AN42, AN56, AN59, AN60	AN21, AN52-55 ORL3-4 DO4
2b	AN3, AN9, AN18, AN26, AN27, AN44, AN62 DO3	AN2, AN4, AN7, AN8, AN11, AN29, AN33, AN45, AN46	AN50, AN51 ORL2, 5
1a		AN13, AN14, AN15, AN17	
1b		AN12, AN16	
Outliers	AN23		AN48, ORL3

Table 4.13. Classification of samples from Sardinia, based on chemical composition.

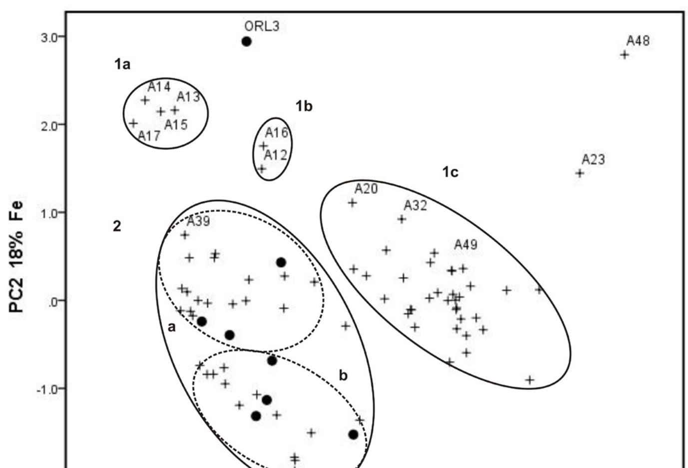


Fig. 4.27. PC plot of the AAS compositions for Antigori, Orosei, Domu s'Orku and Orroli. Clusters 1a, 1b, 2a, 2b and 2c from cluster analysis are superimposed. Some of the Antigori samples are marked (A). *Impasto* (●).

The task now is to identify the local material. This comprises first the members of Groups 1a and 1b with a rather coarse fabric whose distinctive feature is high aluminium and very high iron and nickel contents; indeed crumbs of the pottery are even affected by a magnet. The high nickel is shared by **AN20**. Either of Day's main petrographic fabrics – the Siliceous and the Sedimentary-derived – could accommodate this small group because of the presence in both groupings of black opaque minerals which could be iron oxide. The presence of iron ore and/or iron has been noted in *impasto* elsewhere, for example at Nuraghe Ortu Comidu fabrics (see below). Second, the majority of Clusters 2a and 2b can be regarded as local, sharing the features of low calcium and variable iron. There are no apparent inter-site differences.

In Group 1c are likely imports which, together with **AN3, AN9, AN18, AN26** and **AN27** of Group 2 whose fabric suggests they also are imports, are considered in Part 4.

Nuraghe Domu s'Orku (99)

AAS (Database 1): Mycenaean 2, Italo-Mycenaean 3
PE: Mycenaean 2
Publication: Jones, Day 1987
Illustration: Fig. 4.103

Ware	Sample	Jones, Day (1987) n.	Description	Date	Suggested origin	Publication
M	DO1*	63	Closed vessel (jar/amphora?)	IIIB-C	C. Crete	Ferrarese Ceruti 1982, tav. LXIV:11
	DO2	64	Closed vessel	IIIB-C	C. Crete	Ferrarese Ceruti 1982, tav. LXIV:12
IM	DO3*	65	Closed vessel	IIIB-C	Local	Ferrarese Ceruti 1982, tav. LXIV:10
	DO4	66	Wheel made		Local	
	DO5	67	Wheel made		Local	

* petrographic analysis.

The chemical and petrographic data are treated with Antigori above.

Nuragic impasto found at Kommos

AAS (Database 1): *Impasto* 23
PE: *Impasto* 24
Publication: Watrous *et al.* 1998

Kommos Number	Description	Date*	Watrous (1992)	Catalogue number
522	Dish?	LM IIIA1	Pl. 56; Fig 73	4936
814	Jug	LM IIIA1	Pl. 56	5731
1037	Open vessel	LM IIIB	Pl. 53; Fig. 75	1520
1293	Jar	LM IIIB	Pl. 56	1699

Kommos Number	Description	Date*	Watrous (1992)	Catalogue number
1296	Large bowl	LM IIIB	Pl. 56	1900
1307	Jar	LM IIIA2-B	Pl. 57	4625
1338	Pithos	LM IIIB	Pl. 51	2928
1377	Collared jar	LM IIIB	Pl. 57; Fig. 75	1147
1423	Collared jar	LM IIIB	Pl. 53; Fig. 75	847
1424	Bowl	LM IIIB	Pl. 57; Fig. 74	863
1426	Large collared jar	LM IIIB	Pl. 57; Fig. 76	5348
1427	Jar	LM IIIB	Pl. 57	5349
1428	Collared jar	LM IIIB	Pl. 57; Fig. 75	5464
1429	Collared jar	LM IIIB	Pl.57	5465
1542	Jar	LM IIIB	Fig. 74	3310
1543	Collared jar	LM IIIB	-	3311
1561	Bowl	LM IIIB	Pl. 58; Fig. 75	731
1696	Large jar	LM IIIB	Pl. 56	2137
1752	Amphora	LM IIIB-C	Pl .58	6673
1753	Bowl	LM IIIB-C	Pl. 58; Fig. 74	6694
1761	Bowl	LM IIIB-C	Pl. 58; Fig. 74	6710
1968	Bowl	LM IIIB2-C	Pl. 58; Fig. 73	469
1966	Dish?	LM IIIA1	Fig. 73	4470
	-	LM IIIB		8173

* J. Rutter (2006, 674-678) has revised the contexts of provenance of the Nuragic pottery from Kommos, proposing a Late Minoan IIIB chronology.

Petrographic analysis

In light of the review of the evidence of Sardinian imports at Kommos by Rutter and Van de Moortel (2006, 674-678), two of the four fabrics originally identified, and since reassessed by Day – Fabric 1 (containing **C4470, C4936**) and Fabric 4 (containing **C5731**) – together with **C6673** (originally a member of Fabric 3) can no longer be regarded as Sardinian. Rutter (in Rutter, Van de Moortel 2006, 658-663) has identified **C5731** as western Anatolian. That leaves Fabrics 2 and 3 which can be confidently assigned to Sardinia:

Fabric 2 **(C731, C848, C863, C1147, C1520, C3311, C5465)** which contains fragments derived from acid igneous rock such as granite, devitrified porphyritic volcanic rocks in combination with foraminifera microfossils and fossil shell. Although clearly separable from Fabric 3, this fabric was created by the mix of fossiliferous, calcareous deposits with plutonic and volcanic igneous rock fragments. The presence in some samples of this group of volcanic rock fragments show at least a broad relationship with Fabric 3 in terms of its probable provenance. The high calcite content – notably the shell and foraminifera – accounts for the high calcium content determined chemically for Fabric 2. The combination of granitic and such volcanic rocks with fossiliferous marls is compatible with an origin in Sardinia. Granite and the Miocene calc-alkaline volcanics are present in most of the east and especially the central parts of the island.

Fabric 3 **(C469, C1699, C1900, C2137, C2928, C3310, C4625, C5348, C5349, C5464, C6694, C6710, C8173)** is characterised by porphyritic volcanic rocks with zoned plagioclase varying from andesites to rhyolites displaying devitrification. This fabric is completely incompatible with a Cretan source, and originates in geologically recent volcanic deposits. The only related pottery examined in the Aegean has been from Aegina, but the present samples can be easily distinguished from that island. Aspects of the mineralogy of this group have been observed in pottery from Sardinia (see Antigori and Ortu Comidu entries above). The combination of non-plastics found in these samples is indicative of an origin in Sardinia.

Reference to Fabrics 3 and 4 is made in Part 4 in relation to 'Nuragic' *impasto* found at Cannatello.

Chemical analysis

The compositions are not uniform; despite low Cr and Ni contents in all samples, there is notable variation in Ca, Fe and Mn. Two main groups are apparent on classification by PCA (Fig. 4.28): Group A, which is well defined and corresponds exactly with Fabric 2, is calcareous; apart from its notably low Fe contents (2-5% oxide), it has no distinctive chemical features and indeed could be associated with *impasto* from many sites in mainland Italy. The broad Group B, which associates with Fabric 3, is less calcareous and relates to southern Sardinian *impasto*; there are two potential subgroups separating along PC2 but they are of uncertain significance: (B1) **C1900, C3310, C4625, C534**8 and possibly **C5348b** and **C5349**, and (B2) **C469, C1699, C2137, C6710** and **C6694**. **C8173** stands apart due to high alkalis and Mn, and **C2928** due to high Al, Ti and Na.

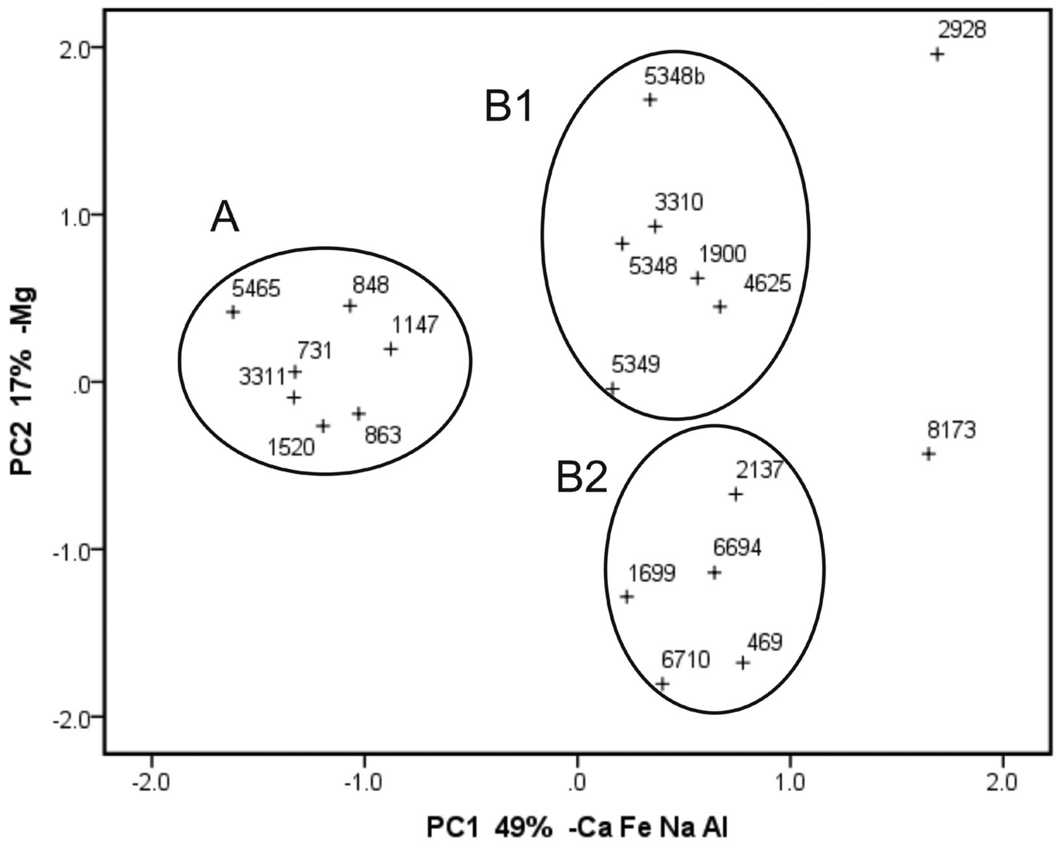


Fig. 4.28. PC plot of the AAS compositions of *impasto* found at Kommos.

Nuragic pottery found at Pyla-Kokkinokremos, Cyprus

PE: *Impasto* 2
Publication: Fragnoli, Levi 2011

The two likely Nuragic samples were compared with four examples of local pottery from Pyla. One of them, **PYLA1**, stood apart from the remainder being characterised by andesitic rocks, much plagioclase and oxides but very little clinopyroxene and biotites. Such a composition, which is consistent with a source on Sardinia, seems to relate best to Fabric 3 above from Kommos.

Other chemical, petrographic and related analyses

Alghero: Nuraghe S. Imbenia (Sassari province): **F131**, handle fragment with dark paint, and three *impasto* (Jones, Vagnetti 1992, 231); AAS Database 1. **F131** is unlikely to be an import.

Pozzomaggiore (Sassari province): potential Aegean import (Lo Schiavo, Vagnetti 1986, 199-204; Jones, Day 1987, 267; see alsco Chapter 2.3); AAS Database 1. The composition, although not treated with those from Antigori in Fig. 4.27, is considered in Part 4.

Nuraghe Ortu Comidu: three local *impasto* fabrics (Phillips *et al.* 1987). Fabric A with granitic and basalt rock fragments, Fabric B with mudstone and limestone fragments and iron inclusions, and Fabric C distinguished by the presence of zoned plagioclase feldspar.

As part of a broader investigation of Phoenician-Punic pottery in the Central Mediterranean, Amadori, Fabbri (1998) have reported petrographic (and chemical) analyses of Punic period pottery from Tharros, S. Antioco and Monte Sirai, and Botto *et al.* (2006) have characterised Phoenician and Punic period amphorae. Annis (1985) has studied the raw materials used in contemporary pottery making at Oristano and other centres (M. Annis pers. comm.).

4.4. Aegean and other Imports

This has two chronological sections: 1. Early Mycenaean (LH I-II) and 2. Later Mycenaean (LH IIIA-C).

Note that several samples treated here in Part 4 are classified finally as local or regional products, that is Italo-Mycenaean. As such, many of them feature in Part 5.

Many of the plots in this Part include the mean values for Aegean reference groups; their concentration ranges can be determined from the composition characteristics given in the relevant database (Database 1-3).

4.4.1. Early Mycenaean

This section considers the suspected imports of Mycenaean and other fabrics found at: Manaccora, Capo Piccolo, Grotta del Pino, Vivara and Monte Grande. Material of early date from Lipari is treated in section 4.4.2.

Apulia

Manaccora

In Fig. 4.29 **MAN3** and **4** are close to the Mycenae and Achaia reference groups, while **MAN1** and **2** have a source most likely elsewhere in the Peloponnese.

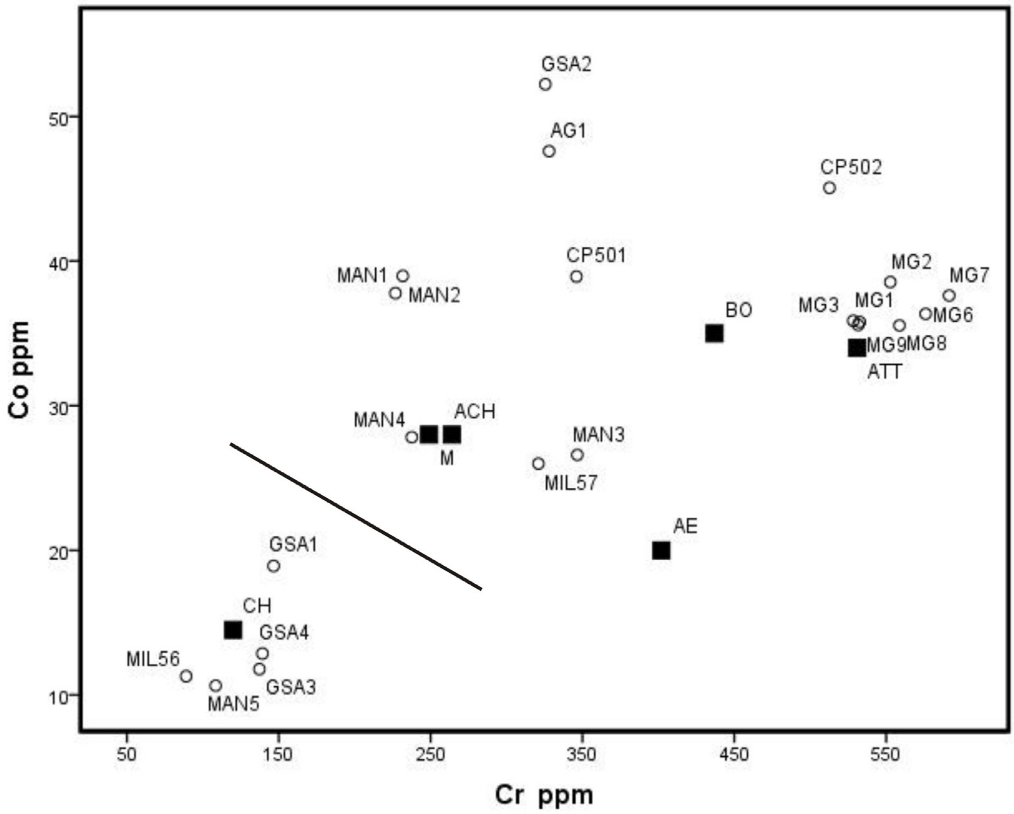


Fig. 4.29. Plot of Cr-Co for the imports at Monte Grande (MG), Manaccora (MAN), Capo Piccolo (CP), Grotta del Pino (GSA), Milena (**MIL56-57**), Madre Chiesa (MC) and Agrigento (AG). Aegean reference groups (■): Mycenae M, Achaia ACH, Boeotia BO, ATT Attica, AE Aegina and CH Chania. INAA data. The line separates the imports from the proposed local products: **MAN5, GSA1, 3** and **4**.

Calabria

Capo Piccolo

CP501 and **502** have different sources (Fig. 4.29), both of them apparently outside the North Peloponnese. **CP502** may have a connection with Central Greece. By contrast, **CP** (analysed by AAS) falls well within the (North) Peloponnese ranges (Fig. 4.30).

Punta Zambrone

PZ1 (analysed by AAS), which lies outside the cluster of imports in Fig. 4.34, is classed as a probable local or regional product. Apart from its Cr content, it resembles **CNU2**.

Campania

Grotta del Pino

GSA2 contrasts in almost all elements with **GSA1, 3** and **4**, and this is evident in the Cr-Co plot (Fig. 4.29). No satisfactory association within the Aegean can yet be found for **GSA2**. While **GSA3** and **4** are likely to have a common, regional origin (whose composition happens to be very similar to that of Chania in West Crete), the status of **GSA1** is uncertain.

It is striking the way that the Matt-painted from this site, Manaccora and Monte Grande have differing sources. Comment on their relationship with the Matt-painted at Vivara is given below.

Vivara

Chemistry
Decorated early Mycenaean

This material, introduced in the previous section, was not uniform in composition, and yet a majority of the samples appeared to relate to reference data for the Peloponnese. Furthermore that level of similarity seemed to extend further: it reflected the contrast between the relatively uniform OES-AAS derived compositions of LH I-II pottery in the N.E. Peloponnese (at Mycenae and Korakou) and those of LH I-III pottery from sites in Laconia and Messenia. The latter, which were more variable, were a reflection of the clays in the south whose colours ranged from pale calcareous to redder and more sandy. The writer's conviction that there were at least two populations represented among the Vivara compositions seemed to be borne out by classification of the data by cluster analysis which gave two clusters: *A* with lower Ca and Mg was linked to more than one centre in the southern Peloponnese, while *B* which was more calcareous could be placed in either the N.E. or southern Peloponnese. Of the eight Vaphio cups analysed, six belonged to *A*. To *B* was assigned the piece from Capo Piccolo (CP in Capo Piccolo entry above); a three-handled jar found at Ayia Irini on Kea, analysed previously by Jones (1986a, Table 6.2: 35 – K2538 in Cummer, Schofield 1984), has not only a stylistic counterpart at Vivara but a B-type composition.

This interpretation can now be reviewed. First, the variability in composition, especially in Ca, can be confirmed (Fig. 4.30b). Second, with limited structure being evident within the PC plot (utilising PC 1-3), in turn lending little direct support for the viability of Clusters *A* and *B* above, a return is made to bivariate plots. Figs. 4.30a-b together indicate a weak distinction between those samples including the Mycenae reference group with MgO >2.8% and those with <2.8% MgO that are closer to the Ayios Stephanos and Messenian (Routsi and Korifassion) groups. From a chronological viewpoint, there is an indication that the earlier (LH I) material is less calcareous, and is thus closer to Messenia, than the later (LH II).

The most reasonable interpretation, then, is to propose that several production centres are implicated and at least some of those are situated in the N.E. and South Peloponnese, possibly including Kythera. The following samples are more likely to be from the N.E. Peloponnese than from the south:

V1, 5, 6, 9, 10, 13/30, 14, 15, 16, 17, 18, 19, 21, 24, 25, 27, 31, 34, 35, 37, 47, 50, 51, 58, 60, 64, 66, Capo Piccolo (CP).

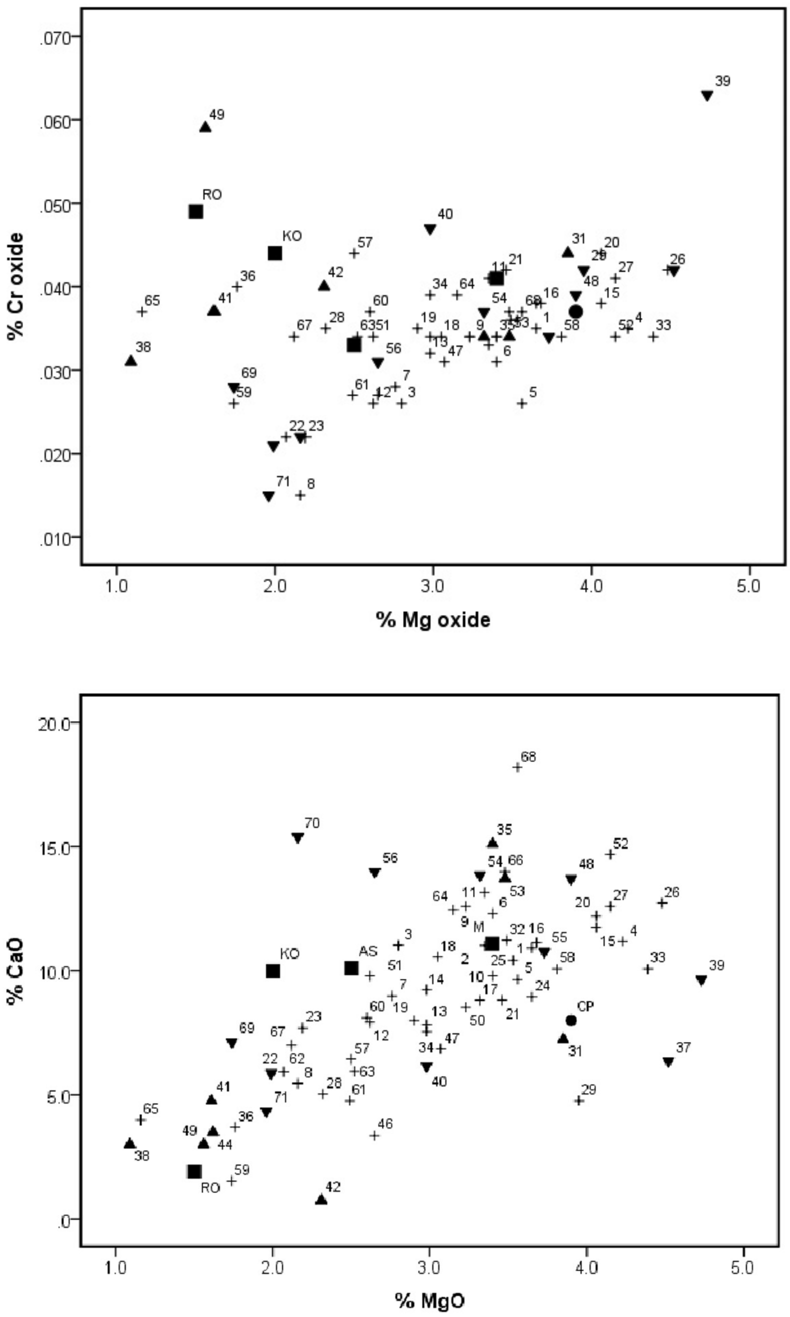


Fig. 4.30. (a) Mg-Cr oxide and (b) Mg-Ca oxide plots of the decorated Mycenaean samples at Vivara (and Capo Piccolo CP ●). Individual Vaphio cups (▲) and Matt-painted (▼) are indicated, as are the means (■) of the reference groups for Mycenae (M), Ayios Stephanos (AS), Korifassion (KO) and Routsi (RO). AAS data.

Equally, there are potential candidates for Messenian production among the pieces lying close to the Routsi and Korifassion groups in Fig. 4.30a-b: **V36, 38, 41, 42, 44, 49, 57, 59, 65**.

The remainder can be classed as from the Peloponnese. The two of the main areas of production may well apply to the Vaphio cups which form two apparent groups in Fig. 4.30a-b:

a. **V41, 42** and **44**. **V49** associates with them apart from its high Fe and Cr contents.
b. **V31, 35** and **53**

Here it is relevant to note a recent assessment by the present authors of the INAA compositions of Vaphio cups found in the Peloponnese in connection with their study of a Vaphio cup found at Pazhok in Albania (Bettelli *et al.*, in preparation). Treatment of the compositions of examples found at Nichoria, Mycenae, Asine and Berbati by Tomlinson (1997) and Mommsen *et al.* (2002) and from near Patras by Mommsen *et al.* (2001a) indicated that a clear majority of the cups were consistent with origins in the North Peloponnese, if not the Argolid itself. It is significant that the two examples from Nichoria that were different had the feature of Ca contents linking them to the AAS-defined Messenian production.

As for the Matt-painted examples, **V39** stands well outside the Peloponnese ranges in Fig. 4.30a, while most of the remainder align with the North Peloponnese and **V62, V69** and **V71** with the South Peloponnese. On the basis of Cr content, **V37, V40** and **V48** may relate to Grotta del Pino Matt-painted 2 (**GSA2**). The four Burnished ware examples divide into two pairs: non-calcareous **V59** and **VR3212** of uncertain association, and **V61** and **VD6** whose high K contents may link them to some of the wheel-made domestic and coarse wares of possible local manufacture (see Vivara in Part 3).

Petrography

Suspected Levantine import (**V82e/360+**)
(after Goren *et al.* 2001)

The matrix is dense, reddish-brown in plain polarised light and contains mica minerals, serpentine minerals and relict olivine. The inclusions consist of a badly sorted rounded to subangular fine to medium sand comprising a great variety of sedimentary, igneous and metamorphic rocks and their derived minerals. These include:

- Serpentine minerals often displaying mesh textures and relict olivine crystal shapes, rarely including olivine core.
- Highly altered trachytic to doleritic basalts including plagioclase laths (sometimes skeletal) ophitically enclosed by augite or brownish glass.
- Plagioclase feldspars with sharp boundaries and zoning.
- Quartz, sometimes with fluid inclusions.
- Red oxidised hornblende; clinopyroxenes; cherts, often brownish and radiolarian; large crystals of potassic feldspars; felsic to intermediate volcanics including trachytic feldspar microlites in glass with feldspar microphenocrysts; carbonatic rocks including micritic limestone; metamorphic rocks, primarily amphibolites and mica-quartz schists.

This lithological assemblage has been derived from a source area consisting of igneous rocks which range from ultrabasic, through basic and intermediate to acid types (peridotite, dolerite and basalt, and the quartz respectively), sedimentary rocks (limestone and chert) and metamorphic rocks. These compositional, textural and mineralogical characteristics clearly indicate that the source area comprises an ophiolite complex. On geological grounds, this area is likely to be the Baër-Bassit massif of north-west Syria, not far from Ras Shamra (Ugarit) and its port at Minet el Beidha, and there are petrographic *comparanda* as well assigned to the same region in the form of Fabric 7 with Serpentine and Micrite in two Canaanite jars found in a LM IIIA2 context at Kommos (Day *et al.* 2011, Fig. 11b), Group 4 jars from Memphis and Amarna (Smith *et al.* 2004, Fig. 4.18) and a few late phase 13th to 15th Dynasty jars at Tel el-Dab'a comprising Group A Ophiolitic rock fragments (Cohen-Weinberger, Goren 2004, 71-72).

Organic residue analysis of this jar reported by Tzedakis *et al.* (2008, 160-1, 276-7) gave some indications of a possible flavoured (olive?) oil content.

Monte Grande

Chemistry

The members of Cluster A in Fig. 4.23, comprising Mountjoy's (1981) Fine Orange Burnished ware (**MG7, 8, 9**), Matt-painted (**MG1-3**) and Lustrous Decorated (**MG6**), are likely to have a common origin. Considering the reference data in Fig. 4.29, they have a closer comparison with the Attica composition group (Mommsen 2003) than with Aegina (Mommsen *et al.* 2001).

4.4.2. Later Mycenaean

This section considers the suspected imports of Mycenaean and other fabrics found at:

- **Apulia**: Scoglio del Tonno, Rocavecchia, Porto Perone, Torre Castelluccia, Otranto, Punta Terrare, Coppa Nevigata and Torre Santa Sabina
- **Basilicata**: Termitito
- **Calabria**: Broglio di Trebisacce, Torre Mordillo and Taureana
- **Campania**: Pontecagnano
- **Molise**: Monteroduni
- **Latium**: Casale Nuovo, Monte Rovello, Luni and San Giovenale
- **Marche**: Treazzano di Monsampolo
- **Veneto**: Frattesina, Fabbrica dei Soci, Fondo Paviani, Castello del Tartaro, Montagnana, Lovara, Bovolone and Terranegra
- **Sicily**: Thapsos, Mulinello, Buscemi, Cannatello, Madre Chiesa, Milena, Agrigento and Ustica
- **Aeolian Islands**: Salina and Lipari
- **Sardinia**: Antigori, Orosei area, Orroli and Domu s'Orku

Apulia and Basilicata

AAS

The compositions of Scoglio del Tonno **ST5, 6, 8, 9, 10, 32, 34, 36** and **92** compare well with those of reference material from Rhodes (Database 1).

Comparing the members of Group B (Fig. 4.7c, d) with the reference material from the Aegean (see Fig. 4.1) indicates in Fig. 4.31 a fairly clear association with the Mycenae group representing the (North) Peloponnese for the following: **ST1-4, 21, 23, 26, 30, 31, 33** and **35**; **PP16** (Matt-painted). However, **PP30, ST7, 11, 12, 13, 22, 27**, although not so different in respect of Mg and Cr in Fig. 4.7b, are in other elements indicative of less confident classification. **ST25**, mistakenly classed typologically by Biancofiore as a Cypriot milk bowl, is a Mycenaean-type cup with a wish-bone comparable with Cypriot shapes. Indeed its composition finds no *comparanda* with Cypriot White Slip data obtained by Hatcher (2007); White Slip ware, irrespective of its findspots in Cyprus, seems consistently to be made from clays with low calcium and potassium contents, in contrast to **ST25** whose contents in these and other elements are much closer to those in the Peloponnese. Torre Castelluccia **TCA1**, clearly an import, is closer to Central Crete or Central Greece than to the Peloponnese. Termitito **T37** associates well the Mycenae reference group (Fig. 4.31: T).

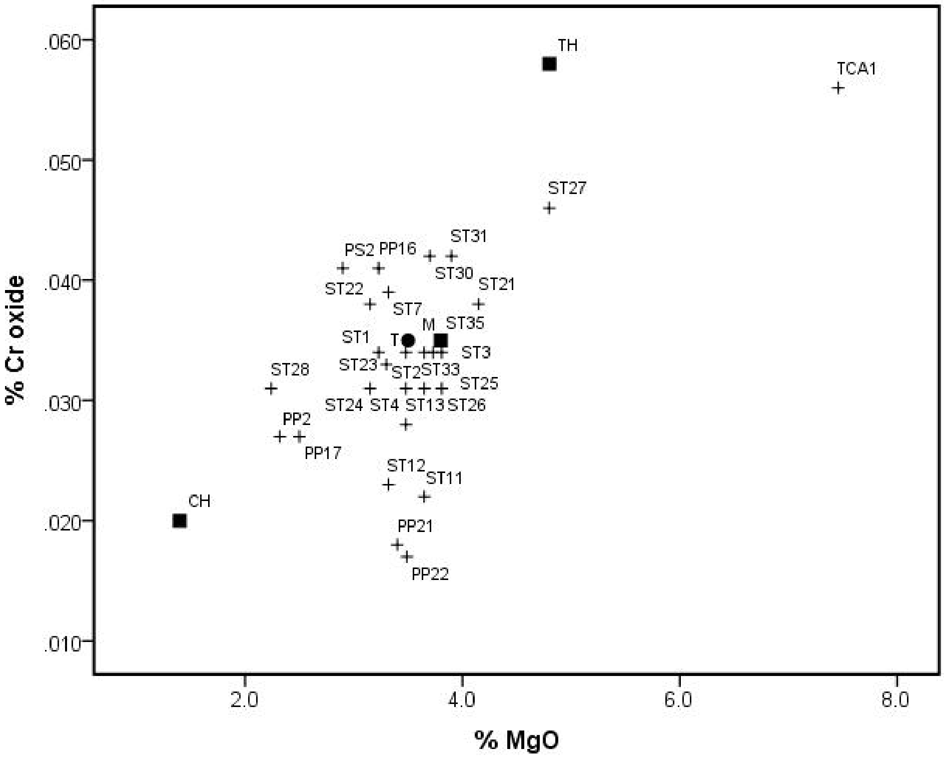


Fig. 4.31. Mg-Cr oxide plots of the proposed imports (apart from the Rhodian imports) in the Taranto area and Termitito (T ●) compared with the Aegean reference groups: Mycenae (M), Thebes (TH) and Chania (CH). The point for Knossos lies off scale. AAS data.

INAA

Fig. 4.8a (Apulia section) indicated the way **ST48, 50, 52** and **57** and probably **ST40** as well, having very high but variable Cr (and Co), separate from the remainder: they are Rhodian, apart from **ST46** and **ST49** whose anomalously high Cr and low K contents would suggest a connection with the Troodos ophiolite on Cyprus, for example in the south central part of the island.

From the bivariate and multivariate plots a consensus is reached that, leaving aside the Rhodian (cf. reference data in Database 2 (Marketou *et al.* 2006, Table 1 RHa1) and possible Cypriot products, the following should be regarded as likely imports: **ST41, 42, 43, 44, 47, 54 PP16; PT1, OTR 2**. Referring now to Fig. 4.32, **ST42, 43, 44, 47** are sufficiently close to the Mycenae-Berbati and Achaia ranges for them to be regarded as probable imports from the North Peloponnese. **ST41** is close to the Boeotian and Attic ranges. **OTR2** is an import, more likely to be from the Peloponnese or Akarnania than from elsewhere, and the same may apply to **PP16** (cf. its assignment to the N. Peloponnese by ICP analysis; see below) and probably **PT1**. **PP23**, which was re-analysed by ICP because of its apparently anomalous

Cr content is discussed below. Fig. 4.32 exposes the problematic overlap of the proposed large cluster with low Cr and Co in Fig. 4.8a (Apulia section), representing local/regional production, with West Crete; this overlap occurs in most elements. **ST55** is classified as Uncertain as it lies just outside cluster B in Fig. 4.8b.

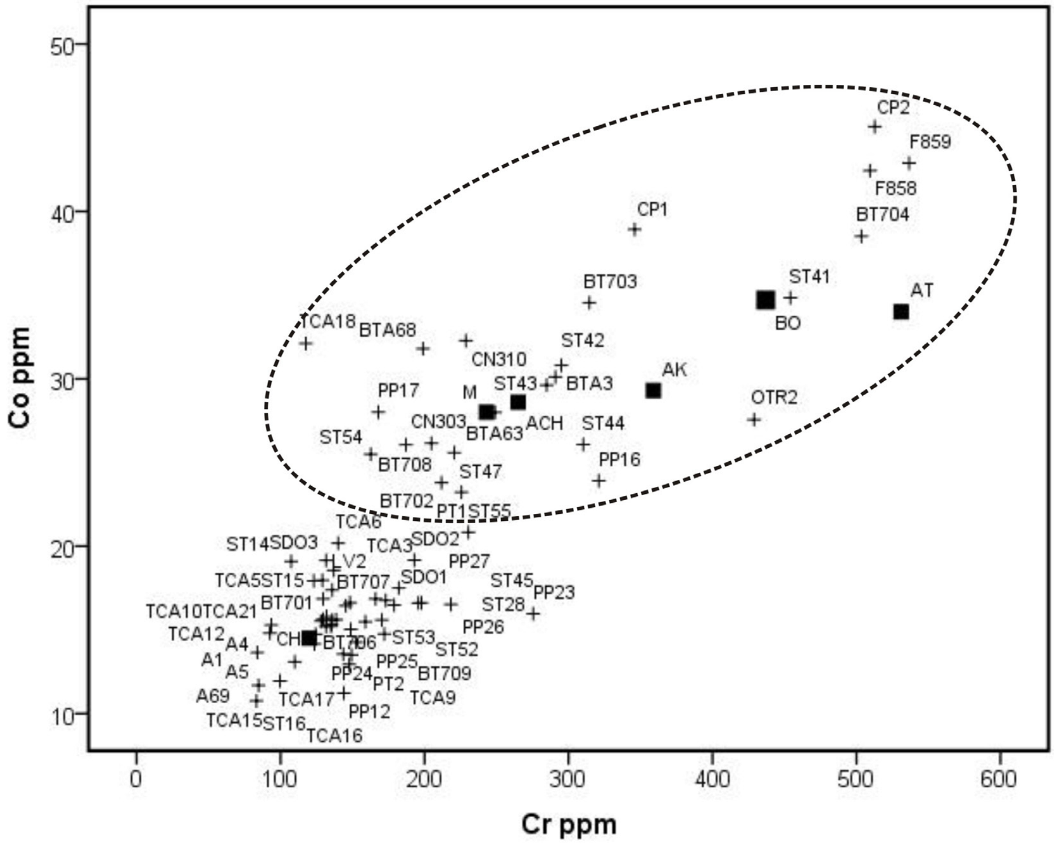


Fig. 4.32. Cr-Co plot of Mycenaean pottery found at Scoglio del Tonno (ST), Otranto (OTR), Coppa Nevigata (CN), Porto Perone (PP), Punta le Terrare (PT), Torre Casteluccia (TCA), Lugovivo (LV, *impasto*) and San Domenico (SDO) in Apulia, and Broglio di Trebisacce (BT) and Capo Piccolo (CP) in Calabria showing within the cluster those that are regarded as Aegean imports. The mean values of the Mycenae (M), Boeotia (BO), Achaia (ACH), Akarnania (AK) and Chania (CH) reference groups (■) are given. INAA data.

ICP

The Rhodian imports are **ST63, 64, 65** and **40** (Fig. 4.9) and to them can be added **ST84**, a coarse ware tripod which has anomalously high Fe, Cr and Ni contents. Closely relating to these Rhodian imports is **ST61**, a result which raises a problem in that this sample, previously analysed by INAA as **ST46** and undiagnostic typologically, was assigned to Cyprus. This unfortunate discrepancy has not been resolved.

Drawing together all the likely Aegean imports found in Apulia (Fig. 4.33a-b and Fig. 4.9), the following distribute themselves within or sufficiently close to the Mycenae-Berbati group for them to be considered from the North Peloponnese, if not from the same production centres: **ST59, TSS5, 6, 7, 8, 11** and **13** and **PP16**; the inclusion of the last of these samples is surprising since it is Matt-painted and therefore of earlier date than the others. A different source in the Peloponnese probably accounts for **TSS2** and **3**. **CH1** is likely to be from the Peloponnese despite its low Mg. For **ST60** there is some resemblance with INAA and AAS-derived reference data for Thebes and more generally Boeotia. **PP23** is problematic because, while its trace element content favours an atypical local origin,

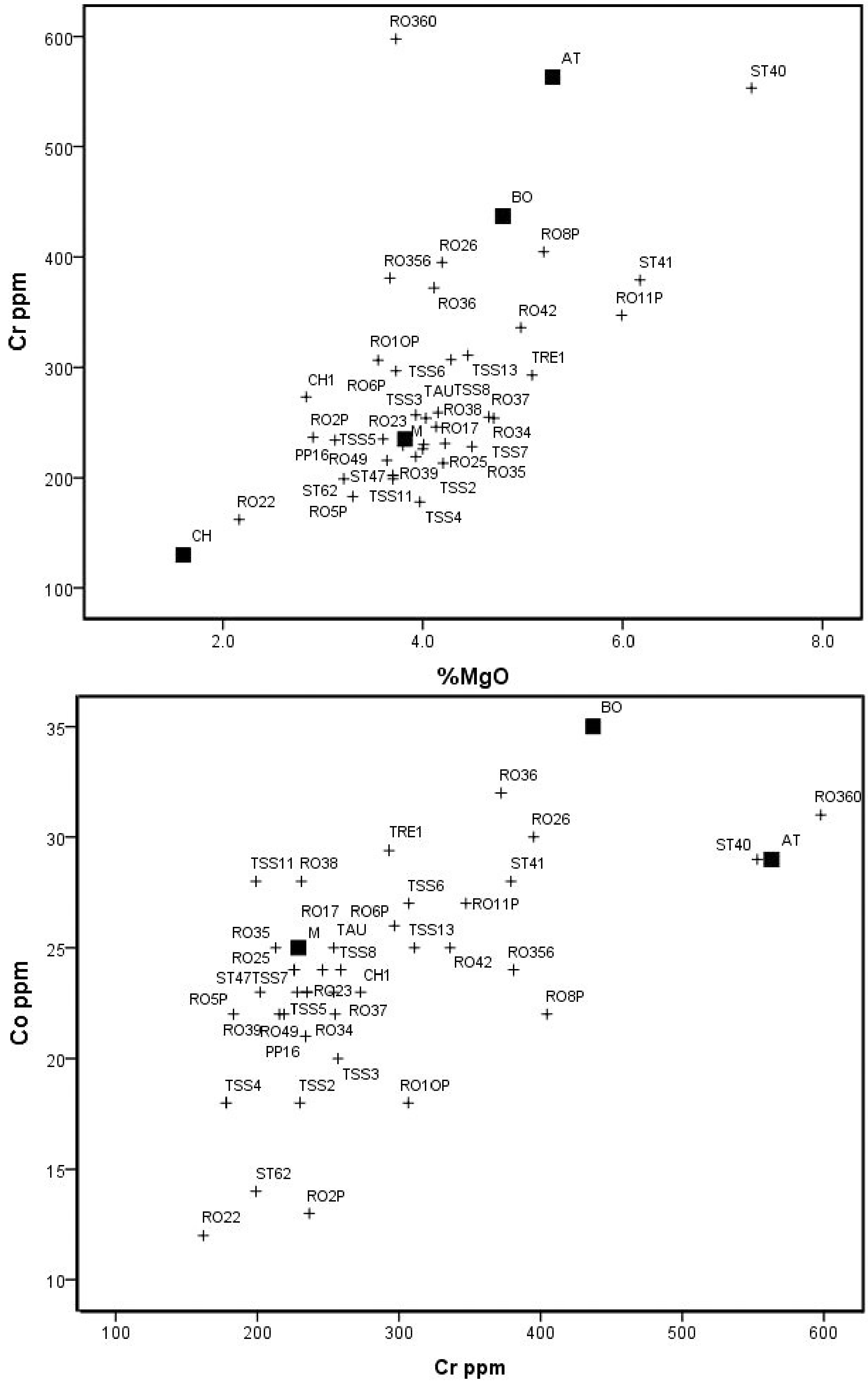


Fig. 4.33. (a) Cr-MgO and (b) Cr-Co plots of the imports found in the Taranto region (Scoglio del Tonno ST, Porto Perone PP, Rocavecchia RO (excl. **RO364, 430, 461, 531**), Torre Santa Sabina TSS, Chiancudda CH1, Treazzano (TRE1), Taureana 19 (TAU). Mean values for the Mycenae (M), Boeotia (BO) and Attica (AT) ICP reference groups (■); mean AAS MgO values for BO and CH (Chania) used in (a). ICP data.

it bears some resemblance (except in Sr) with the coarse ware stirrup jars analysed from Rocavecchia (**RO364, 430** and **531**) and assigned to West Crete (see next section); on the other hand, there is a poor match (in Sm, La, Cr, Cs, Ce and Eu), notwithstanding the discrepancies occurring between INAA and ICP-ES determinations (Appendix Table 13), between the INAA compositions of **PP23** and the West Cretan stirrup jars found at Thebes analysed by Mommsen *et al.* (2002a). A petrographic analysis is certainly called for. That leaves **TSS4** and **ST62** which are probably local.

Bartek Lis (pers. comm.) has recently drawn our attention to cooking pot **ST83** which could be Aeginetan. This view is borne out by analysis; petrographically, this cooking pot resembles Fabric **FG1** from Kolonna on Aegina as defined by Gauss, Kiriatzi (2011, 93-98), and there is also similarity with the ICP-determined **FG1** chemical group (Gauss, Kiriatzi, Table 48).

Regarding Rocavecchia, more detailed remarks can be offered. **RO23, 25, 34, 35, 39, 49** and **6P** relate to the (North) Peloponnese, although they are unlikely to be all from the same centre. It is notable the way many of these samples lie apart from the well-defined Mycenae-Berbati group due to their lower Ca contents. **RO5P**, although close to this Peloponnese group, is a border-line case. **RO36** should be classified elsewhere owing to its low calcium and relatively high chromium; in Fig. 4.33b it is close to Boeotia. **RO37** and **38** are less typical of the North Peloponnese. **RO8P, 11P, 26** and **42** bear similarities with Central Greece, such as Boeotia, but not consistently so for Co (Fig. 4.33b). Coarse ware stirrup jars **RO364, 430** and **531** (not shown in Figs. 4.33a, b) should be West Cretan, although it is noted that in many major and minor elements their compositions are similar to those of *impasto* in Apulia. However, these stirrup jars have lanthanide element contents that, first, overlap with the ranges in West Cretan stirrup jars found at Thebes analysed by INAA by Mommsen *et al.* (2002a) and second are lower than in the *impasto*. Furthermore, the compositions of these three jars resemble acceptably those of the large corpus of jars from many findspots attributed to West Crete on the basis of chemical analysis by atomic absorption spectrometry (Haskell *et al.* 2011). Coarse ware stirrup jar **RO461** with a finer fabric is neither West Cretan nor from the Knossos area, and it does not match the North Peloponnese well. Minyan **RO356** and **360**, both with a fine fabric, have many composition features in common with those in Attica-Boeotia, and yet they share the unexpected feature of being non-calcareous.

Calabria

AAS: Broglio di Trebisacce

Nine likely Aegean imports were identified in Fig. 4.15 (in Calabria section). When these are compared with imports from other sites (Fig. 4.34) and with reference data, the following observations can be made:

a. A23 and **A24** (**BT23** and **24** in Fig. 4.34) lie close to the Mycenae reference group.

b. A40, A51, A53 and **A54** (**BT40, 51, 53, 54** in Fig. 4.15 and 4.34) are somewhat different, but probably from the same region, the N. Peloponnese.

c. A48, A49 and maybe **A56** (**BT48, 49** and **56** in Fig. 4.34) associate with compositions encountered in Central Greece (and Central Crete) but not (so far) in the Peloponnese.

AAS: Torre Mordillo (1b above)

With reference to Fig. 4.16 (in Calabria section), **TM10** and **75** on the one hand and **TM15, 45** and **56** on the other can be regarded as potential Aegean imports. But scrutiny in the light of Fig. 4.34, where they are compared with Mycenaean from Broglio and the suspected import at Termitito (**T37**), makes plain that **TM15, 45** and **56** are border-line cases; certainly the high quality of these three sherds

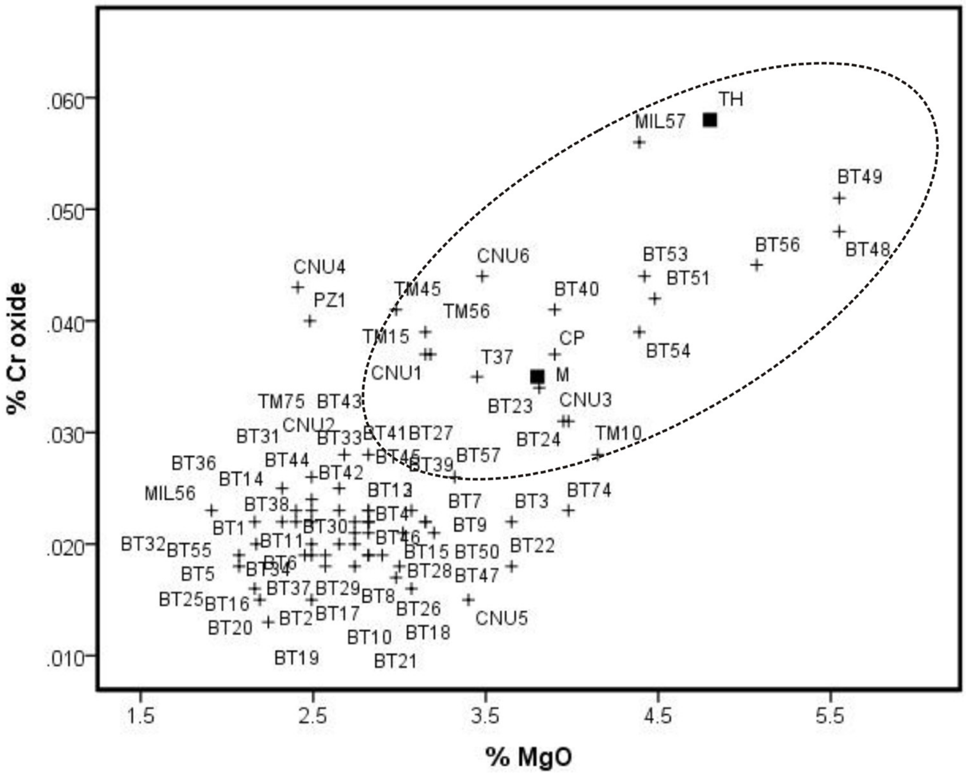


Fig. 4.34. Mg-Cr oxide plot for the Mycenaean material at Broglio di Trebisacce (BT) and Casale Nuovo (CNU), Termitito (T), Torre Mordillo (TM), Punta Zambrone (PZ), Capo Piccolo (CP) and Milena (MIL). Proposed imports lie within the dotted line. Mean values for the Mycenae (M) and Thebes (TH) groups ■; Knossos and Chania lie off scale. AAS data.

from Torre Mordillo marks them out macroscopically as atypical Italo-Mycenaean. If they are indeed imports from the Peloponnese, they are probably from a source in that region different from that of **TM10**. That leaves **TM75** with a highly calcareous composition which should more likely be classed as atypically local. In Part 3, **TM83, 88, 48** (Grey?), and **94** (Grey painted?) were identified as atypical regional products.

INAA: Broglio di Trebisacce

A63 (Programme 1), **BT704**, the two Greek Geometric sherds, **BT858** and **859**, are surely imports, as is **BT703** from Programme 3 (Fig. 4.17); from Programme 4 **BTA003** and **BTA068** have been isolated as imports. With reference to the Cr and Co ranges in Fig. 4.32, **A63, BT703, BTA003** and **BTA068** may be regarded as imports from the Peloponnese, whereas **BT704, BT858** and **BT859** resemble the compositions of Central Greece. There is an unfortunate discrepancy between the respective assignments for **BT704** and **BTA003**.

Problematic are those samples at Broglio comprising Italo-Mycenaean (**BT702**), PG (**BT708, 843, 851, 852**) and Grey (**BT606** and **639**) whose compositions (Fig. 4.17) are not dissimilar to these imports but on balance were regarded in the previous section as atypical of the Plain.

ICP: Taureana

TAU19 from Taureana is compared in Fig. 4.33 with likely Aegean imports in Apulia and Marche. The case is good for classifying this sherd as an import from the Peloponnese.

Campania and Molise

Pontecagnano and Monteroduni

Two points may be made about **PON1** and **MON1**: first, their compositions belong to the broad range encompassing local or regional production in central and southern Italy (cf. Fig. 4.36), and second the discrepancies in their respective Mg, Sr and Rb contents hint that they do not share the same origin.

Latium

Casale Nuovo

Jones, Vagnetti (1991, 134) classified **CNU3** as an import and **CNU1** and **6** as possible imports from the Peloponnese. Re-examination of their compositions in the light of Fig. 4.34 confirms that **CNU3** falls within the proposed import group for Mg and Cr. Lying on the limits of that cluster are **CNU1** and **6**, but their Ca contents are too low (6.4% CaO in both cases) to be regarded as typical of the North Peloponnese.

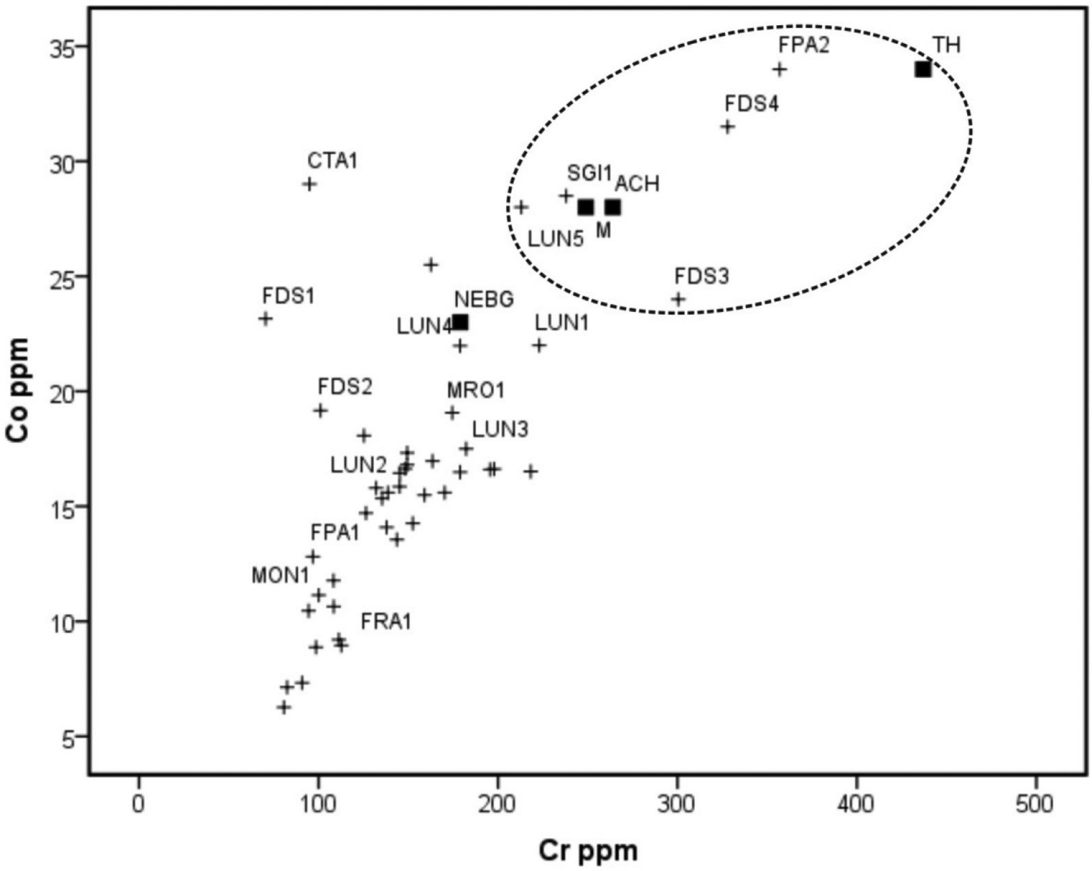


Fig. 4.35. Cr-Co plot of Italo-Mycenaean samples analysed by INAA, highlighting those from central and northern Italy and including imports. The mean values for the Aegean reference groups (Mycenae M, Achaia ACH, Boeotia BO, Attica AT) and Black Gloss from North Etruria (NEBG) (Gliozzo, Turbanti 2004; Cr 179 ppm (s.d 16.7) and Co 23 ppm (s.d. 2.2)) are marked with black square. The likely Aegean imports lie within the cluster.

Monte Rovello, Luni and San Giovenale

The Monte Rovello and Luni compositions are first assessed in Fig. 4.35 with all the other Aegean-type samples in Italy analysed by INAA, together with Aegean reference groups and, for interest, a reference group for Black Gloss pottery produced at Volterra and analysed by ICP-ES (Gliozzo, Turbanti 2004). The chronological and typological discrepancies notwithstanding, the Black Gloss group acts as a compositional indicator for this region of Italy, and its presence in Fig. 4.35 makes the point once again that the distinction between regional production and Aegean production is far from absolute.

LUN1 and **4** lying just outside the import group are probably Italo-Mycenaean and **MRO1** and **LUN2-3** are confidently Italo-Mycenaean. The case for local or regional production of **LUN1-4** and **MRO1** is supported if only indirectly by visual similarity with BG pottery produced at Volterra mentioned above (Gliozzo, Turbanti 2004); apart from Rb for which there are known to be major discrepancies between determinations by INAA and ICP (see Appendix Table 13), there is resemblance especially in the respective Cr and Co contents between the two data sets. As for the remaining samples, **LUN5** and **SGI1** lie just within the cluster in Fig. 4.35 and so in principle should be regarded as Aegean imports. But, although they stand apart from the other examples from Latium (**LUN1**-**4**, **MRO1**) in several elements other than Cr and Co, the distinction is small; in this situation it is unfortunately necessary to classify them as Uncertain.

Marche

Of the Aegean-type examples from the Marche – Treazzano di Monsampolo, Tolentino, Ancona and Jesi – only **TRE1** is classed as an Aegean import (Fig. 4.19), probably from the Peloponnese to judge from Fig. 4.33 and from a source similar to that of **THA31** and **THA32** (Fig. 4.37). The remainder are Italo-Mycenaean, those from Tolentino having wide ranges in Cr and Co.

Po Valley

Frattesina, Fabbrica dei Soci, Fondo Paviani, Castello del Tartaro and Montagnana

Fig. 4.21 showed that **FDS3-4** and **FPA2** stand apart from the other Aegean-type samples. Although these three samples may be regarded as imports because they fall within the proposed Aegean import cluster in Fig. 4.35, none of them matches closely the North Peloponnese groups, nor indeed the Boeotian or Attic groups. On the other hand, in terms of elements other than Cr and Co there is some resemblance between **FDS3-4** and both the Peloponnese and Akarnania groups; examination of AAS-derived reference data for Kephallonia, although of limited value since few of the elements were measured in common with INAA, has suggested a poor match with this island (Database 1). Overall, the case for classifying them as imports is equivocal; if the original interpretation stands, at least one source in the Peloponnese or western Greece (but not Kephallonia) is implicated, but not Boeotia or Attica. **FRA1-2**, **MON1**, **FPA1**, **FDS1** and **CTA1** are treated further in Part 5.

Crosare di Bovolone, Lovara, Terranegra and Fondo Paviani

The compositions are not uniform. **LOV1**-**3** separate from **BOV1**-**3** on the one hand and **TNE1-2** on the other; **BOV4** stands apart owing to its very high CaO, a feature which has been encountered at Montagnana and Frattesina. Before considering the status of these samples in the next section, they can be viewed in relation to the Italo-Mycenaean in Marche and Apulia in Fig. 4.36.

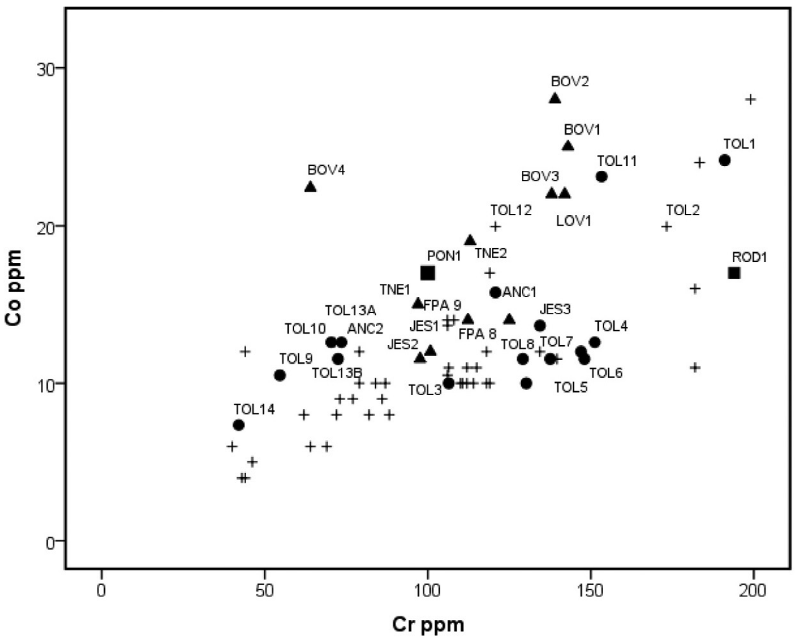


Fig. 4.36. Cr-Co plot of the Italo-Mycenaean from sites in the Po Valley (▲), Marche (●), Apulia (+) and Campania (Pontecagnano PON1 and Monteroduni ROD1 ■). LOV 2-3 and TRE1 are off the Co and Cr scales respectively. ICP data.

Sicily

Thapsos, Mulinello and Buscemi

Chemistry

THA26 and **27** (both alabastra) have significantly higher K and lower Mg, Fe, Sc and Zr than **THA28-33**. Drawing on the reference data in Database 3, the compositions relate to those of the Peloponnese, albeit with significant discrepancies in K, Rb and Zr, better than to other areas of the Aegean. In any case, **THA26** and **THA27** have a different source in the Peloponnese from that (or those) of **THA28-33**. **THA30** has an anomalous phosphate content (3.1%).

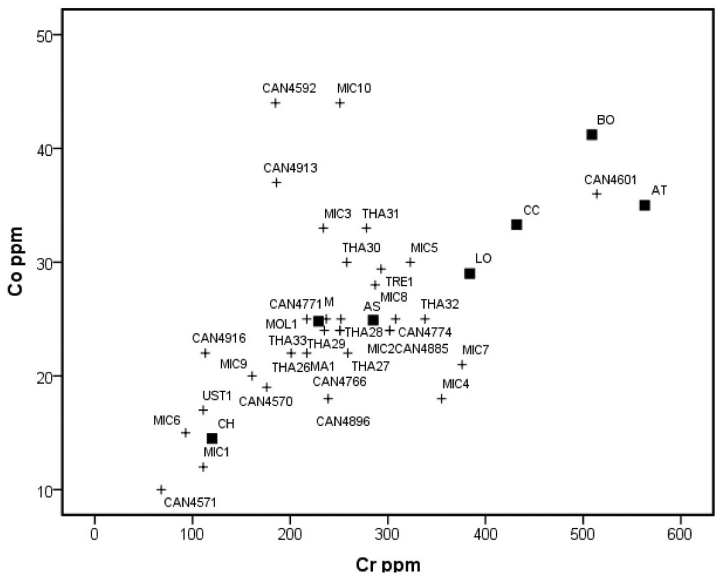


Fig. 4.37. Cr-Co plot of the ICP compositions of the likely Aegean imports on Sicily (Thapsos (THA), Mulinello (MOL1), Buscemi (MA1), Cannatello (CAN), Lipari (MIC)), Ustica (UST) and at Treazzano (TRE), and mean values for Aegean reference groups (black square): M Mycenae and AT Attica (ICP); TH Thebes, CC Central Crete, LO Locris, AS Ayios Stephanos, CH Chania (INAA).

MOL1 (Mulinello) and **MAI1** (Buscemi) may be classified as Peloponnesian imports (Fig. 4.37); in many respects their compositions are close to those of **THA26** and **27**.

Cannatello

Petrography

Peter M. Day

a. Pithoi

CAN401 and **CN402** in **Group 5** (Cannatello entry) have a production area in South Cyprus, and this is in agreement with the typological characteristics of the samples. Cypriot pithoi of similar composition has been already proposed for Antigori (**AN48**) and Salina (**POR1** and **POR3**) with the typical composition of the ophiolitic Troodos area north of Maroni and Kalavassos-Ayios Demetrios. The presence in these pithoi of a sand-sized fraction dominated by material derived from basic igneous rocks, primarily pyroxene, amphibole and some rounded basalt associates them with other Cypriot jars, one from Kommos (see Antigori section below), three from the Point Iria wreck (A4, A5 and A7) (Day 1999, 61-62) and possibly one from the Uluburun wreck (KW251).

b. Coarse ware stirrup jars **CAN4774** and **CAN4927** (Day, Joyner 2005)

A number of Aegean-style transport stirrup jar fragments have been excavated at Cannatello, some of which display incised Cypro-Minoan signs (De Miro 1996; Vagnetti 1999, 191, 208). Transport stirrup jars with signs incised after firing occur in a number of areas including the Uluburun shipwreck. At least some of the incised jars analysed from Uluburun were manufactured in Crete, some having West Cretan fabrics and others Central Cretan, suggesting that they were incised upon re-use in Cyprus and were then sent back travelling west (Day 1999, 68-9). In this context, as so many such jars appear to have an origin in Crete, the source of the jars found at Cannatello is of importance.

The two body sherds analysed both have dark-on-light painted decoration, ostensibly of deep wavy lines, related to the octopus motif on stirrup jars. They belong to Day's Fabric Group 9 which together with Fabric Group 11 (Haskell *et al.* 2011, 54, 58) encompass coarse ware stirrup jars from the Iria shipwreck, Mycenae, and Kommos; and in part to other vessels from the Uluburun shipwreck and Cyprus. These contain siltstones, sometimes tuffaceous in appearance, biotite schist, altered igneous rocks and chert in a high fired, calcareous clay matrix and resemble fabrics observed in Late Bronze Age contexts from Central Crete, and notably several examples in South Central Crete (Day and Joyner 2005, Fig. 1). The fabric seems to have its origin in Central Crete, more particularly the south of this region since some of the samples in the group are remarkably similar to the Kommos Kiln Group 3 in terms of aplastic inclusion composition, size and shape, and fabric texture (Shaw *et al.* 2001, 117-120, 145-147). The clay used in **AG4774** appears to have been mixed, perhaps being composed of a calcareous clay and a red firing clay.

Chemistry

Re-examining the likely Aegean imports, which were first treated above in Fig. 4.24a, there are several which associate with the Peloponnese reference material, some, such as **CAN4766**, **4771**, **4885**, **4896** and **4913**, more confidently than others: **CAN4570**, **4592**, and **4916**. The position of the transport stirrup jar **CAN4774** is ambiguous; its composition as a whole favours a link with the Peloponnese, but such an association does not accord with the Central Cretan assignment made more confidently on petrographic grounds (see below). **CAN4601** lies close to the Central Greece and Central Crete reference groups (Fig. 4.37), while the low Cr, Co and Mg and high Sr contents of **CAN4571** make it unlikely it is from either the Mainland, Peloponnese or Central Crete. The hypothesis of a Cycladic connection for this sample appears untenable as its composition is too calcareous, nor, if it relates to Middle Helladic Red Slipped & Burnished ware, is it from Aegina (Whitbread *et al.* forthcoming). Its petrographic composition needs to be determined.

Of the two pithoi, shown petrographically to be compatible with South Central Cyprus, **CAN401** has the distinctive chemical composition features of that region, notably low Al and high Ca and Cr, which are shared first by the typologically similar examples found at Salina (**POR1** and **POR3**) and second but to a lesser extent by **CAN402**.

Madre Chiesa, Milena and Agrigento

Chemistry and petrography

Madre Chiesa: **MC3**, relates acceptably to the Peloponnese reference groups (Fig. 4.29).
Milena: **MIL56** could be a local product because it bears some similarity in composition with the local Castelluccio style material at Monte Grande, although its trace element content is generally lower. The same remark seems to apply to Calabria; comparing **MIL56** with material from Broglio di Trebisacce in Fig. 4.17 indicates that it lies at the lower end of the Plain of Sybaris ranges such that an association with that part of Calabria is possible but not strong. An alternative view would see **MIL56** linked to West Crete since in Fig. 4.29 it falls well within the broad cluster characterised by low Mg and Cr contents which are shared by that region of Crete. The overlap between that cluster and West Crete has already been established (Fig. 4.1a, b), but on the basis of other elements a West Cretan assignment of origin seems less likely; for example **MIL56**'s fabric is more calcareous than is typical for West Crete.

On the basis of its XRF and INAA compositions, the krater, **MIL57**, would seem to be a good candidate for production in the Peloponnese, despite significant discrepancies in Rb and Th, yet its AAS-defined composition would place it closer to Boeotia rather than Knossos (Fig. 4.34, cf. Fig. 4.1a, b). On the other hand, the krater's petrographic composition is revealing and more in keeping with its decorative pattern (Fig. 4.93): the abundance of rock fragments containing plagioclase volcanites, metamorphic schists and sandstones (*pace* Jones, Vagnetti 1991, 135: siltstone tempered) in **MIL57** have been recorded in the coarse ware stirrup jars associated with South Central Crete - Day's Fabrics 9, 10 and 11 (Haskell *et al.* 2011, 54-58) (see above on coarse ware stirrup jars at Cannatello).
Agrigento: for a majority of elements the composition of **AG1** associates with the Peloponnese better than with other regions of Greece, but if its source indeed lies in the Peloponnese its Co content is anomalous (Fig. 4.29).

Ustica

With reference to Fig. 4.37, the composition of **UST1** appears analogous to that of **MIL56**: low Cr and Co contents, some association with the Plain of Sybaris, and some similarity with West Crete. Its source is uncertain.

Salina

Peter M. Day and Richard Jones

In Salina petrographic Group 4, **POR1** and **POR3** have tempers of ultrabasic volcanic rocks and fossiliferous clay, suggesting an association with the Troodos ophiolite in South Central Cyprus.

Chemically they are very similar, so much so they may be from the same jar, and they are also clearly different from the members of Salina petrographic Groups 1-3 having higher concentrations of Cr, Ni, Ca, Mg and lower concentrations of Ce, Rb, La. It is the feature of high Cr and Mg and low Ni, also encountered in jars found at Antigori (see Sardinia section below; Jones, Day 1987, 258-62; Jones, Vagnetti 1991, 131-34), Cannatello (see above) and Kommos which is diagnostic of South Central Cyprus.

Lipari

Chemistry

A feature of the suspected imports, which may be associated with the burial conditions, is that all but **MIC6** and **9** contain in excess of 1% phosphate, **MIC4** having 10.6% phosphate. The compositions are not uniform (Fig. 4.37); although **MIC2**, **3**, **5** and **8** seem to associate with the Peloponnese, they are most unlikely to be from the same source in that region. **MIC4**, anomalous in P and Sr, and **MIC7** form a loose pair, separate from **MIC9** which lies at the lower end of the concentration ranges of the Asine and Tiryns reference samples (not shown in Fig. 4.37). Despite its anomalous Co content, **MIC10**, like **CAN4592** is probably from the Peloponnese. As for **MIC1** and **6**, their positions in the Co-Cr plot in Fig. 4.37 suggests a West Cretan connection but that is not supported by other elements; they are probably not Aegean imports.

Petrography

John Ll. Williams
See Plate 8

MIC 2
Matrix – clay rich; poor aggregate birefringence; ultra fine grained silt sized detrital suite consisting of quartz, biotite; iron oxide and unidentified feldspar?; brown oxidized colour to matrix; some minor banding in clay; note iron? concretion rim to some foraminifera cells and grog particles; very well compacted matrix but see below under construction voids.
Voids – no linear construction voids since matrix is well compacted; note large holes most associated with grog fragments and probably result of slide making rather than an inherent feature of matrix; clay matrix is bio-clastic rich with small (0.1mm) foraminifera cells.
Grains – very difficult to identify, but very fine silt fraction is abundant; angular grains >0.1mm very rare.
Grog – abundant; several different types of grog included – e.g. type similar to host body; type with very fine grained banded matrix; one fragment has three generations of different grog combined in the same particle; particles vary in size from 0.2>2.0mm; note majority of particles are rounded/sub-rounded.
Clasts – not present.
Comment – fabric generally on border of microscopic examination, particularly of matrix, but presence of more than one type of grog is most interesting.

MIC 6
Matrix – silt rich; weak aggregate birefringence; fine grained detrital suite of quartz, biotite, orthoclase?; plagioclase; matrix is impregnated with very fine grained granular calcite grains; brown oxidized matrix colour; biotite laths not common.

Voids – very well compacted fabric with small number of short void structures infilled with grey coloured granular calcite; bio-clastic matter (foraminifera) infilled with same calcite cement.
Grains – angular to rounded quartz grains and other unidentified fragments (orthoclase?).

Clasts – large sub-rounded fragment of fresh (3.5mm) calcite mud; smaller fragments of granular calcite; one large clast of sub-rounded quartz.
Comment – fine grained matrix with abundant calcite in form of single granular grains or as cement in larger colourless concretions or as calcite mud.

MIC2 is very fine-grained and has the distinguishing feature of containing more than one type of grog (see Database 4), while **MYC6** has a fine-grained matrix with abundant calcite**.** This is also borne out chemically. The former is chemically classified as an import from the Peloponnese and yet it is surprising to find it has abundant grog.

Sardinia

Orosei area

Petrography

(after Riley 1982)

Several sherds considered to have an Aegean origin may have come from the Orosei region of eastern Sardinia (Lo Schiavo, Vagnetti 1980, 393). These were thin sectioned and several fabrics were identified. There were no examples of the two common Antigori fabrics, and most have a fine texture, with varying proportions of mica, quartz and altered ferromagnesian minerals. There was no evidence of rocks or minerals necessarily of a basaltic or granitic origin, which might be expected as the Orosei region is surrounded by these rocks.

A decorated rim, **O22**, compares well in thin section with two kylix sherds of LH IIIA2 date from Mycenae (French 1965, pl. 59 and 74 respectively), having scattered fine quartz particles, argillaceous sediments and altered ferromagnesian minerals. In comparison, another published sherd, **O21**, is very different, with a fine texture comprising minute shreds of mica with very rare quartz present, while another, **O26**, has abundant minute grains of calcite and quartz.

There is a very close match between a plain sherd (Southampton Aegean Project (SAP) 3756, inv. n. 38903) and a krater from a late LH IIIC context at Mycenae (SAP 1185). There is a fine matrix into which are set distinctive greenish tuff particles. This ware has not been noted elsewhere. These examples illustrate the variety of clay recipes represented in these wares as well as the persistent indication of Aegean parallels.

Nuraghe Antigori

Petrography

(after Riley 1982)

Riley's study (Sardinia section in Part 2) identified two imports whose origin assignments are in agreement with those from the corresponding chemical data (see below): **AN3** (West Crete) and **AN5** (North Peloponnese).

Nuraghe Antigori, Orosei area, Nuraghe Arrubiu and Nuraghe Domu s'Orku

Petrography

Peter M. Day

Antigori AN36 is of fine ceramic fabric. Its micromass is optically slightly active, dark yellowish brown in PPL and XPL. The frequent inclusions are small (<0.2 mm) and comprise a grounding of quartz and frequent biotite mica, occasional plagioclase feldspar, orthoclase and very rare amorphous concentration features which are red and brown. This sample is unlike the local fabrics both in its fineness and micaceous matrix. It is petrographically indistinctive in terms of provenance ascription, but is compatible with the chemical suggestion of an origin in the Peloponnese.

Antigori AN49, the pithos fragment of Minoan type, has an optically active slightly active calcareous micromass which is reddish brown and yellowish green around voids in PPL; yellowish red and greenish yellow around voids in XPL. The dominant non-plastics are frequent large angular to sub-angular argillaceous inclusions which contain poorly sorted grains of quartz. Also present are polycrystalline quartz and poorly sorted sandstone fragments. Technologically, this is a well-documented method of mixing raw materials in the manufacture of Minoan pithoi and is both technologically and geologically compatible with an origin in Crete, possibly North Central Crete where similar examples have been observed (Day 1988).

Antigori AN23 has a fine yellow micromass which is optically slightly active and greenish yellow in XPL, light greenish yellow in PPL. It contains sparse small quartz, a sub-rounded siltstone fragment, mudstone and small polycrystalline quartz inclusions. It is undiagnostic petrographically but is similar to fine wares examined from Crete.

Antigori AN46 has an optically inactive micromass which is dark greenish yellow in XPL and brownish green in PPL. It contains frequent poorly sorted inclusions of mono- and polycrystalline quartz, alkali and plagioclase feldspar. Also present are calcareous concentrations and red amorphous concentration features. The micromass of this sample is unlike any sampled from Sardinia and has affinities to ceramic matrices examined from the Aegean. However, it is petrographically compatible with both Sardinia and the Aegean.

Domu s'Orku DO1 has an optically active micromass which is greenish brown in PPL and brown in XPL. It has very frequent small quartz and biotite mica with occasional muscovite mica. Also present are red opaque minerals and orthoclase. This fine fabric is likely to have been manufactured in the Aegean.

Antigori AN48, the pithos fragment of Cypriot type, has a fine, optically active micromass, coloured red in XPL and dark red brown in PPL. There are frequent small quartz and foraminifera microfossils present. The poorly sorted range of inclusions comprises frequent large pyroxene, many altered to hornblende and biotite, plagioclase feldspar, sub-rounded fragments of volcanic material including pillow lava, olivine, amphiboles, biotite, feldspar/pyroxene rock fragments, epidote, red amorphous concentration features and microcrystalline lime. These inclusions are not compatible with the local geology of Sardinia.

The comparative pithos samples from Maroni and Ayios Demetrios-Kalavassos in Cyprus resemble **AN48** as well as a Cypriot-type pithos from Kommos (**846** C3171; Watrous 1992, 158) very closely in thin section. Two samples from Maroni with very frequent foraminifera and other microfossils have an optically active micromass which contains small fragments of calcareous material; their clay matrix derives from the Neogene deposits in the area. One of the Ayios Demetrios samples has a fabric which is extremely close to that of **AN48** whose main inclusions are derived from the ultrabasic and gabbroic plutonic igneous rocks and the pillow lavas present in the southern part of the Troodos range to the north of these sites. We may therefore be confident that **AN48** was manufactured in Cyprus, most probably in the south central part of the island.

Chemical analysis

The suspected imports were first examined by comparing their Mg and Cr contents (Fig. 4.38) with those of reference groups for the N.E. Peloponnese (Mycenae), Central and West Crete (Knossos and Chania respectively) and Mainland Greece (Thebes). Having subsequently compared the full compositions on an individual basis with further reference groups (in Database 1), the following associations of origin are made:

AN1, 5, 10, 22, 32, 41, 43, 58, 61, O1-13 and **ORL1** resemble the Mycenae group and are therefore classified as 'typical' of the (North) Peloponnese. Also probably from the Peloponnese but from other centres are **AN6, 47** which are distinguished by lower Cr and Ni, **AN19** by lower Mg, and **AN35** and **36** which are similar to each other. **AN28** is closer to the local group than to these proposed Peloponnese imports.

Central Crete jar, accounts for **AN23, AN49** (a Minoan-type pithos) and **DO1-2. AN57**, a coarse ware stirrup jar whose composition has recently been treated by Haskell *et al.* (2011, **ANT01**), is less confidently linked to Central Crete; it is classified there as 'Central Crete/Boeotia less confident'. Another coarse ware stirrup jar, **AN62**, is linked to West Crete (**ANT02** in Haskell *et al.* 2011).

The following are classified in Cluster 2 among the local samples, but a good case can be adduced for treating them as *imports* because they resemble White ware from Chania which has a distinctive composition with notably low iron content: **AN3, 9, 18, 26** and **27**.

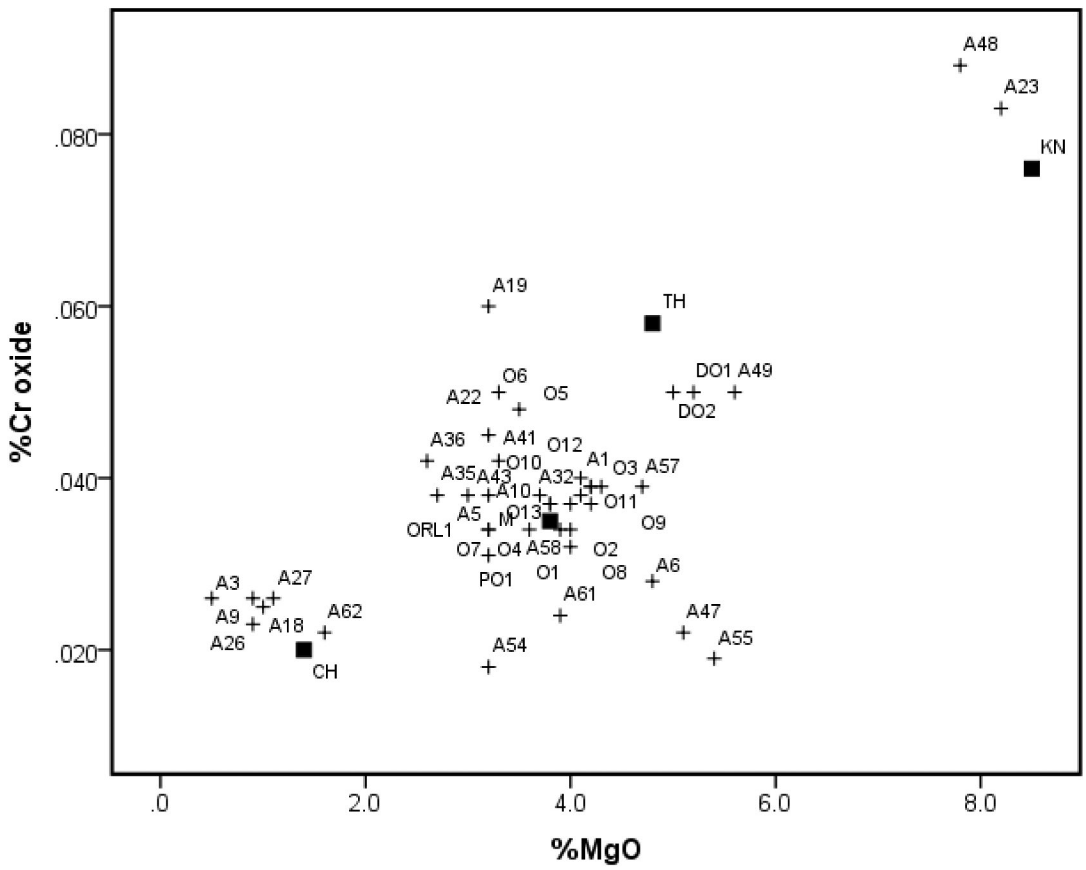


Fig. 4.38. Mg-Cr oxide plot of the suspected imports found on Sardinia, and mean values for the reference groups for the Aegean (M Mycenae, KN Knossos, TH Thebes and CH Chania). AAS data.

The Cypriot-style pithos, **AN48**, is similar to that found at Kommos and moreover to the reference groups for Maroni and Ayios Demetrios in South Central Cyprus, rather than to the south west of Sardinia (Database 1).

Pozzomaggiore **PO1** is a likely Peloponnese import, although it lies on the edge of the cluster of imports from that region (but see Chapter 2.3).

4.5. Italo-Mycenaean fabrics

In this section an attempt is made on the basis of the data presented in Parts 4.3 and 4.4 to test the hypothesis of *regionally*-based production of Italo-Mycenaean in Apulia, Basilicata, Calabria, Latium, Marche, Veneto and Sardinia. Discriminant Analysis (DA) has been employed for this purpose to establish whether chemically-defined groups of Italo-Mycenaean can be differentiated. The outcome of this exercise supports this hypothesis. In Figs. 4.39-42 a cluster has been drawn around the *majority* of members of each group.

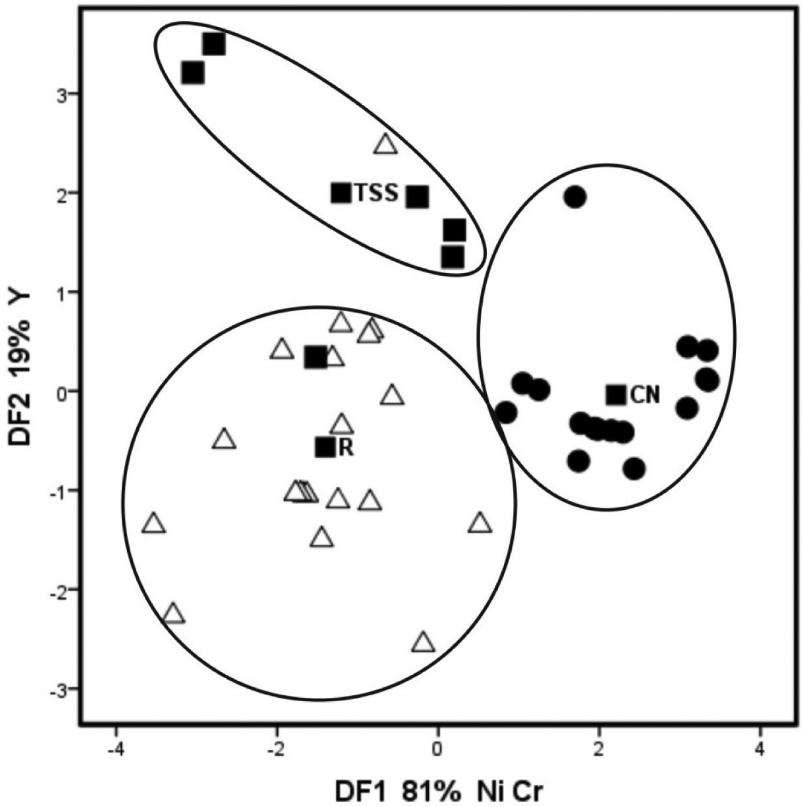


Fig. 4.39. DA plot of the Italo-Mycenaean groups at Torre Santa Sabina (TSS ■), Rocavecchia (R Δ) and Coppa Nevigata (CN ●) in Apulia. Group centroids are marked with black square. ICP data, log transformed.

1. Apulia

Italo-Mycenaean production *within* Apulia is examined here on the basis of three groups (defined by ICP-ES): Coppa Nevigata, Rocavecchia and Torre Santa Sabina. Bearing in mind the small size of the groups, especially that at Torre Santa Sabina, DA discriminates well Rocavecchia and Torre Santa Sabina from Coppa Nevigata (Fig. 4.39). Local production of Italo-Mycenaean at these sites, if not all of them, looks likely; this view is further supported by discrimination of Coppa Nevigata and Taranto in Fig. 4.40.

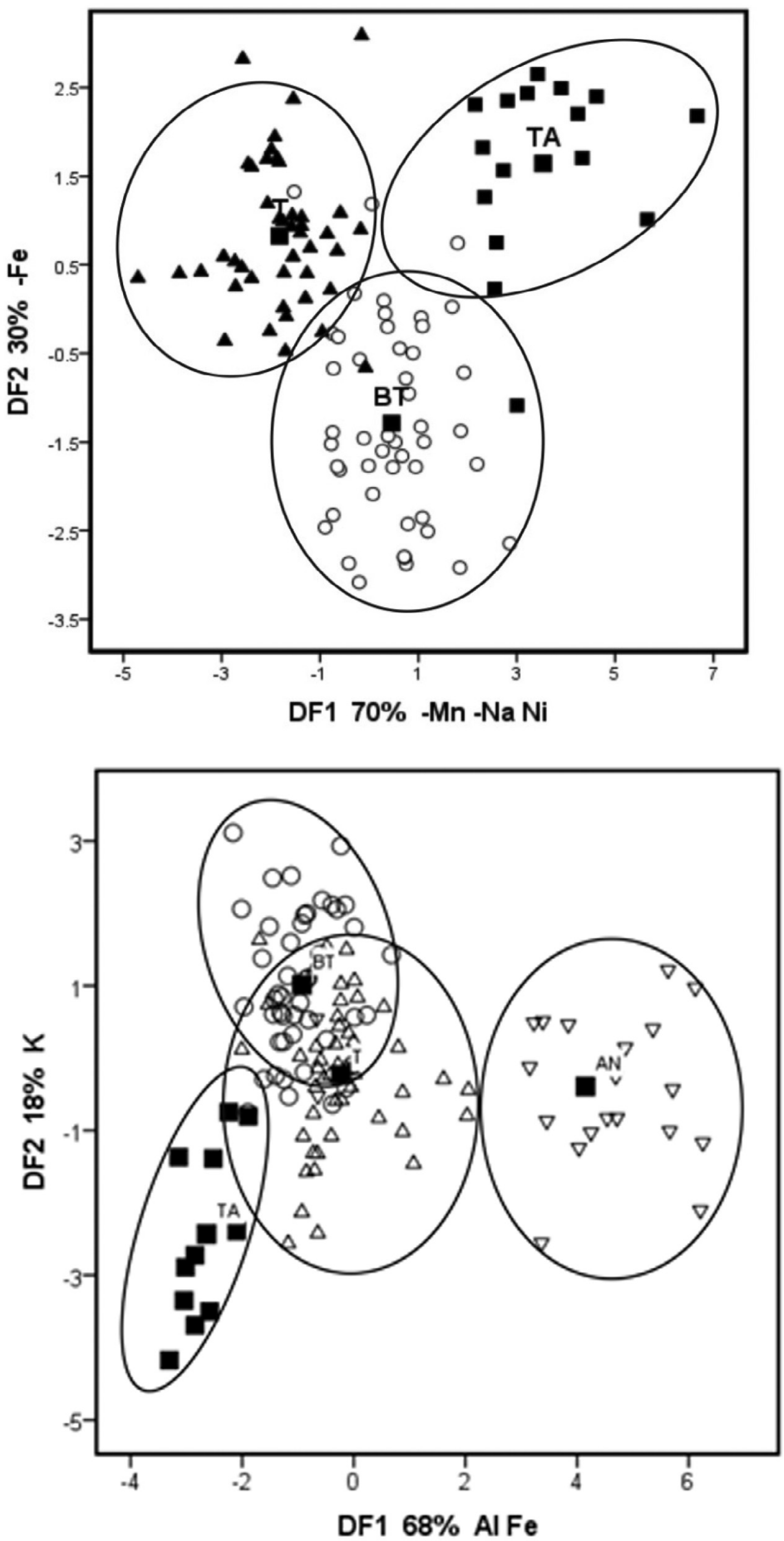


Fig. 4.40. DA plots of Italo-Mycenaean groups at (a) Porto Perone in the Taranto area in Apulia (TA ■), Termitito in Basilicata (T ▲) and Broglio di Trebisacce in Calabria (BT o), and (b) Apulia (TA ■), Basilicata (T Δ), Calabria (BT o) and Antigori, Sardinia (AN ∇). Group centroids are marked with black square. AAS data.

2. Apulia-Basilicata-Calabria-Sardinia

Three groups of Italo-Mycenaean – Porto Perone representing the Taranto area in Apulia, Termitito for Basilicata and Broglio di Trebisacce for Calabria – can be discriminated with some confidence (Fig. 4.40a). Adding Italo-Mycenaean at Antigori representing Sardinia to this DA separates Antigori from the mainland sites owing to its high Al and Fe but low K contents (Fig. 4.40b).

3. Latium

The previous section identified a small group comprising probable regional products: **CNU2**, **4**, **5**; **LUN1-4**; **MRO1**. These are treated below as a group for comparison with other regional groups. **CNU1**, **2**, **4**, **5** and **6** should probably be classified as Italo-Mycenaean but more than source; **CNU5** in particular stands apart from the others having low Cr, Ni and K contents.

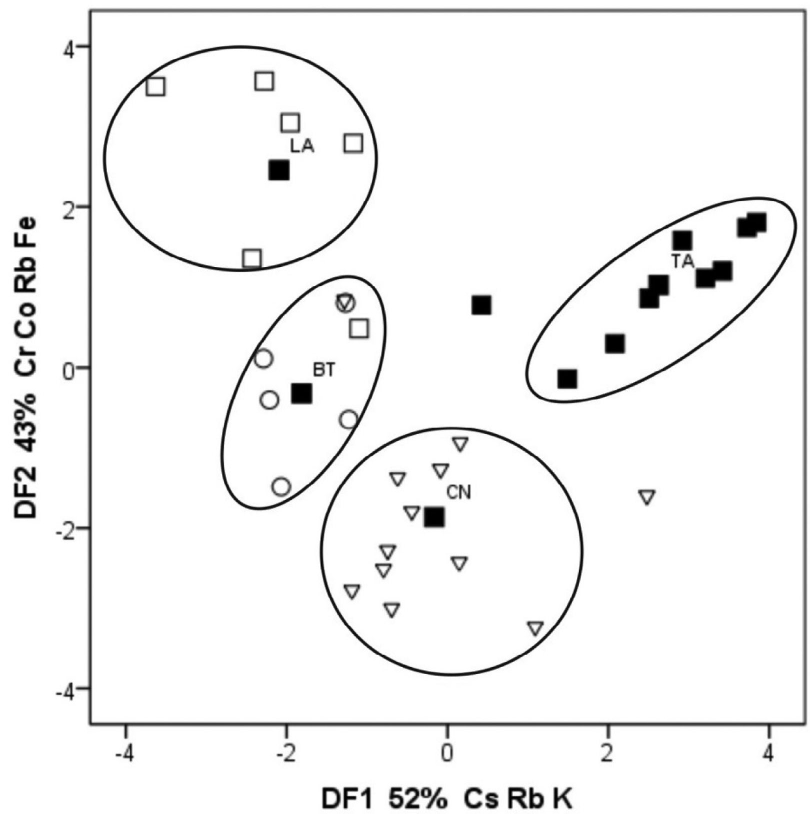


Fig. 4.41. DA plot of the Italo-Mycenaean groups at sites in Latium (LA □), Broglio di Trebisacce (BT o), Coppa Nevigata (CN ∇) and Porto Perone, Taranto (TA ■). Group centroids are marked with black square. INAA data, log transformed. 14 elements.

4. Apulia-Marche-Latium

Four *INAA*-defined groups were compared: the Taranto region represented by Scoglio del Tonno and Porto Perone; northern Apulia by Coppa Nevigata; Calabria by Broglio di Trebisacce; Latium (see 3. above). Despite the small numbers of samples in each of the four groups and the relative lack of coherence of most of them, there is at least an indication of the identity of Italo-Mycenaean production in Latium (Fig. 4.41).

5. Po Valley

From Fig. 4.21 **FRA1-2**, **MON1**, **FPA1**, **FDS1** and **CTA1** were classified as Italo-Mycenaean, and more precisely they can in principle be regarded as products of the Valley, albeit not from clays exploited in the vicinity of Frattesina for *impasto* production. However, as inspection of the individual compositions reveals, this resemblance is superficial: Ce, Cs, Hf, La, Th and Ta contents are generally lower in the Mycenaean sherds than in the *impasto*. Furthermore, **MON1** and **FRA1**, have anomalously high calcium contents. In reaching a consensus on these six sherds, the observations of Picon and others (see Part 3) are pertinent: the feature of variable and even very high calcium contents occurs in clays from locations in the western Po Valley, extending, albeit not as extremely, also to the Cr and Ni contents. Our view is that these six sherds are likely products of the Po Valley and not from sources in Apulia. Further remarks are made below.

6. Apulia-Marche-Po

DA was applied to four *ICP-ES*-defined groups: Apulia represented by Coppa Nevigata and Torre Santa Sabina, Calabria by Broglio, Marche by Tolentino, Jesi and Ancona, and Po by Lovara (**LOV1-3**), Bovolone (**BOV1-4**), Terranegra (**TNE1-2**) and Fondo Paviani (**FPA8-9**). Fig. 4.42 shows the Po Valley group well separated from the others, but, as inspection of the individual compositions has already indicated, this group is not uniform; for example, **BOV4** has an anomalously high Ca content. Furthermore, as a heuristic exercise, when the DA is repeated with the Po samples being

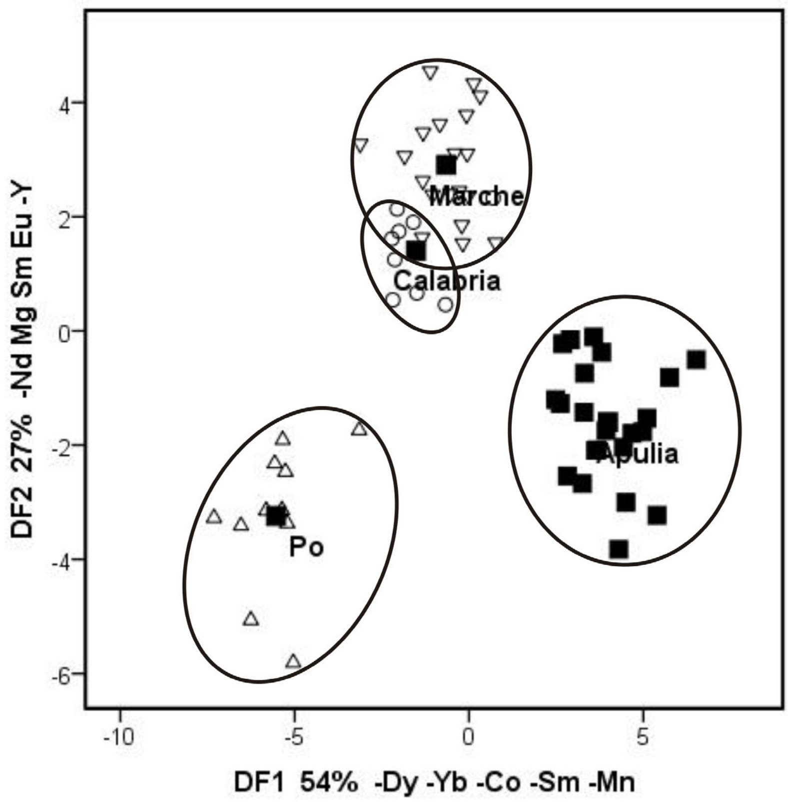


Fig. 4.42. DA plot of the Apulia (Coppa Nevigata and Torre Santa Sabina) (■), Calabria (Broglio di Trebisacce o), Marche (∇) and Po Valley (Δ) Italo-Mycenaean groups. ICP data, log transformed.

added *individually rather than as a group*, the Po samples distribute themselves widely. **BOV1-3** form a distinct group of their own, close to some of the Tolentino material yet unlikely to be from Marche. Separate from **BOV1-3** are **LOV2-3** which have anomalously high Co contents, but for most other elements **LOV1** and **3** form a pair. Neither the pair comprising **TNE1-2** nor the weak association of **FPA8-9** is confidently linked to Apulia, Calabria or Marche.

Multivariate treatment of the respective INAA and ICP data sets has not reached a confident assessment of the status of the Italo-Mycenaean in the Po Valley. There are two reasons for this: first is the small number of samples analysed from the Po Valley which in turn can pose problems for the reliability of DA; if a given composition is atypical, for whatever reason, of its hypothetical parent group, its origin attribution by DA may be biased. The second, already acknowledged, concerns the wide composition ranges in many elements in the Valley's clays which furthermore could encompass those of the Italo-Mycenaean samples giving rise to potential mis-classification. But on balance our working hypothesis is that that most of the Italo-Mycenaean samples were made in the Po Valley at more than one location there.

4.6. Archaeological Overview: Aegean Summary and Illustration of Samples

Marco Bettelli, Sara T. Levi

In this section a list of the sampled pottery is presented focusing on the Aegean, Cypriot and Italo-Mycenaean fabrics. The other Mixed Italian products and the *impasto* are not included.

Samples are divided by site, according to the topographic order of the gazetteer. In each site samples are organized by wares, starting from those of Middle Helladic tradition, such as Matt-painted and Burnished, through the Mycenaean imports up to the Italo-Mycenaean.

In this list, the so-called "Aegean Summary", a brief description of each piece is provided, together with date, suggested origin, type of analyses carried out, bibliography and, when available, inventory number and context of provenance. Figures 4.43-103 with the illustrations of samples, organized according to the list presented in the Aegean Summary, complete the chapter. The illustrations of the samples are taken from the publications mentioned in the Aegean Summary. The drawings of some sherds from Torre Castelluccia, Porto Perone-Satyrion and Scoglio del Tonno are graphically reworked after Fisher 1988.

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
APULIA								
MANACCORA (1)								
MAN1	MP	Closed vessel bichrome	I-II	Peloponnese	INAA	Marazzi 1993, fig. 1:1a		Trench S
MAN2	MP	Closed vessel bichrome	I-II	Peloponnese	INAA	Marazzi 1993, fig. 1:1b		Trench S IIIb
MAN3	M	Open vessel	IIIB-C	Peloponnese	INAA	Marazzi 1993, fig. 1:2		Trench AI37a
MAN4	M	Stirrup jar?	IIIB	Peloponnese	INAA	Marazzi 1993, fig. 1:3		Trench St1:1,16 m.
COPPA NEVIGATA (3)								
CN2013	BU	Open vessel, burnished?	IIIC?	Local	ICP	Cazzella *et al.* 2012, fig. 12:76		CN89 F3c 2II
CN2014	BU	Open vessel? Burnished?	IIIC?	Local	ICP	Cazzella *et al.* 2012, fig. 12:77		CN93 G20 1IVa 251
CN303	M			Peloponnese	INAA			D5 (1-4)S5
CN310	M	Amphora	IIIC	Peloponnese ?	INAA	Cassano *et al.* 1987, fig. 89; Cazzella *et al.* 2012, fig. 8:33		CN75 D5(G21)-E5(G1)
CN69	IM			Local	ICP			ES
CN71	IM			Local	INAA			CN83 SUD SUP
CN72	IM			Local	INAA			CN 83 SUD SUP
CN301	IM			Local	INAA			E4 (2-1) S1
CN302	IM			Local	INAA			R1 fs3
CN304	IM			Local	INAA			M(1)S
CN305	IM			Local	INAA			CN94 G3A 1Va
CN308	IM	Jug or amphora	III	Local	INAA	Cazzella *et al.* 2012, fig. 7:31		CN75 E4(V2)2e
CN309	IM	Closed vessel?	III	Local	INAA	Boccuccia 1995, tav. XXVI:26		L4P 4Va
CN311	IM			Local	INAA			CN94 G3A 1Va
CN312	IM			Local	INAA			CN94 G3A 1IIb
CN313	IM			Local	ICP			G20
CN314	IM			Local	ICP			N=3 Ia
CN315	IM			Local	ICP			N=3 I alfa
CN316	IM			Local	ICP			G3a
CN2001	IM	Necked jar	IIIC	Local	ICP	Cazzella *et al.* 2012, fig. 10:61		CN88 F3c S

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
CN2002	IM	Necked jar	IIIC	Local	ICP	Cazzella *et al.* 2012, fig. 10:60g		CN88 F3c S
CN2003	IM	Necked jar	IIIC	Local	ICP	Cazzella *et al.* 2012, fig. 10:60h		CN88 F3c S + CN89 FRc S
CN2004	IM	Necked jar	IIIC	Local	ICP	Cazzella *et al.* 2012, fig. 6:16		CN91 F3c 2II alfa 392
CN2007	IM	Necked jar	IIIC	Local	ICP	Cazzella *et al.* 2012, fig. 6:13		CN89 F3b 1IIb (37)+ CN89 F3BS (60)
CN2008	IM	Deep bowl	IIIC	Local	ICP	Cazzella *et al.* 2012, fig. 6:14		CN89 F3b S+ CN90 F3c 2II-545
CN2010	IM	Closed vessel	IIIC	Local	ICP	Cazzella *et al.* 2012, fig. 10:62		CN90 F3D SIII
CN2011	IM	Bowl/cup	IIIC?	Local	ICP	Cazzella *et al.* 2012, fig. 6:15		CN90 F3c 2II 192, 193, 194, 71
CN7337	IM	Necked jar	IIIC	Local	ICP	Taylour 1958, pl. 15:3		
CNS165	IM			Local	INAA			15 E'F'-f
CHIANCUDDA (12)								
CH1	M	Deep bowl	IIIB-C	Peloponnese	ICP	Bettelli 2010b, 332: n.17.21	E44218	Surface
TORRE S. SABINA (13)								
TSS2	M	Closed vessel	IIIB-C	Peloponnese	ICP	Coppola, Raimondi 1995, tav. LVI:22	30399	Surface
TSS3	M			Peloponnese	ICP	Coppola, Raimondi 1995, 385, n. 11	30413	
TSS5	M			(N) Peloponnese	ICP		30516	
TSS6	M	Open vessel	IIIB-C	(N) Peloponnese	ICP	Coppola, Raimondi 1995, tav. LVI:21	30400	Surface
TSS7	M	Cup or deep bowl		(N) Peloponnese	ICP	Coppola, Raimondi 1995, 392	30402	Surface
TSS8	M	Wall, uncertain		(N) Peloponnese	ICP	Coppola, Raimondi 1995, 393	30404	Surface
TSS11	M	Deep bowl? Krater?	IIIC	(N) Peloponnese	ICP	Coppola, Raimondi 1995, tav. LII:13	30390	Structure 1, levels 7, 8
TSS13	M	Necked jar	IIIC middle/ late	(N) Peloponnese	ICP	Coppola, Raimondi 1995, tav. LVI:12	30396	Surface; Structure 1, levels 5, 6
TSS1	IM			Local	ICP	Coppola, Raimondi 1995, 385, n. 11	30410	
TSS4	IM			Probably Local	ICP	Coppola, Raimondi 1995, 385, n. 11	30415	
TSS9	IM	Basin	IIIC	Local	ICP	Coppola, Raimondi 1995, tav. LVI:18	30388	Surface
TSS10	IM	Open vessel	IIIB-C	Local	ICP	Coppola, Raimondi 1995, tav. LVI:24	30395	Surface

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
TSS12	IM	Closed vessel	IIIC	Local	ICP	Coppola, Raimondi 1995, tav. LVI:14	30394	Structure 2, level 3
TSS21	IM	Lid	III	Local	ICP	Cinquepalmi 1998a, 9.005	27231	Tomb 5
PUNTA LE TERRARE (16)								
PT1	M	Jar	IIIA1	Probably Peloponnese	INAA	Franco 1996, tav. I:7	41131	Trench 1966, levels 85-110
PT2	IM	Jug?	IIIB-C	Local	INAA	Franco 1996, tav. II:8	41133	Trench 1966, level 50, hut 4
ROCAVECCHIA (17)								
RO34	MP	Necked jar	I-II	(N) Peloponnese	ICP	Guglielmino *et al.* 2010, fig. 8:34	62	US 1152
RO36	BU	Kantharos? jar?	I-II	Import	ICP	Guglielmino *et al.* 2010, fig. 8:36	61	US 1197
RO356	MIN	Kantharos	I-II	Import	ICP	Guglielmino *et al.* 2010, fig. 10:356	81962	SAS X, US 2051, 2070
RO360	MIN	Bowl? kantharos?	I-II	Import	ICP	Guglielmino *et al.* 2010, fig. 10:360		
RO23	M	Krater	IIIB2-C	(N) Peloponnese	ICP	Guglielmino *et al.* 2010, fig. 8:23	3	Underwater discovery
RO25	M	Krater	IIIB-C	(N) Peloponnese	ICP	Guglielmino *et al.* 2010, fig. 8:25		
RO26	M	Deep bowl	IIIB2	(N) Peloponnese	ICP	Guglielmino *et al.* 2010, fig. 8:26	16	US 106/90
RO35	M	Deep bowl	IIIB2	(N) Peloponnese	ICP	Guglielmino *et al.* 2010, fig. 8:35	58	US 1148
RO37	M	Goblet	IIB-IIIA	(N) Peloponnese?	ICP	Guglielmino *et al.* 2010, fig. 8:37	81961 (60)	US 1160
RO38	M	Mycenaean; burnt?		(N) Peloponnese?	ICP			
RO39	M	Deep bowl	IIIC late	(N) Peloponnese	ICP	Guglielmino *et al.* 2010, fig. 9:39	64	US 1306
RO49	M	Stemmed bowl	IIIB2	(N) Peloponnese	ICP	Guglielmino *et al.* 2010, fig. 9:49		SAS IX, US 11379
RO6P	M	Decorated fragment		(N) Peloponnese	ICP	Guglielmino *et al.* 2010, fig. 6:6		
RO10P	M	Decorated fragment		Peloponnese?	ICP	Guglielmino *et al.* 2010, fig. 6:10		
RO42	M	Stirrup jar	IIIC late	Central Greece/Central Crete?	ICP	Guglielmino *et al.* 2010, fig. 9:42	81959	
RO8P	M	Decorated fragment		Central Greece/Central Crete?	ICP	Guglielmino *et al.* 2010, fig. 6:8		
RO11P	M	Decorated fragment		Central Greece/Central Crete?	ICP	Guglielmino *et al.* 2010, fig. 6:11		

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
RO364	M	Coarse ware stirrup jar	IIIB	(W) Crete	ICP	Guglielmino *et al.* 2010, fig. 11:364		
RO430	M	Coarse ware stirrup jar	IIIB	(W) Crete	ICP	Guglielmino *et al.* 2010, fig. 11:430		SAS IX, US 11349
RO531	M	Coarse ware stirrup jar	IIIB	(W) Crete	ICP	Guglielmino *et al.* 2010, fig. 11:531		SAS IX, US 11349
RO461	M	Stirrup jar	IIIB	Not Crete	ICP	Guglielmino *et al.* 2010, fig. 11:461		SAS IX, US 11349
RO5P	M	Decorated fragment		Peloponnese?	ICP	Guglielmino *et al.* 2010, fig. 6:5		
RO22	IM	Deep bowl	IIIC late	Probably local	ICP	Guglielmino *et al.* 2010, fig. 8:22		
RO32	IM	Fragment with band		Local	ICP			
RO33	IM	Closed shape	IIIC late	Local	ICP	Guglielmino *et al.* 2010, fig. 8:33	131	US 2684
RO47	IM	Decorated closed shape	IIIB-C	Local	ICP	Guglielmino *et al.* 2010, fig. 9:47		
RO48	IM	Amphora?	IIIC middle	Probably local/regional	ICP	Guglielmino *et al.* 2010, fig. 11:48		
RO55	IM	Closed shape	IIIA-B	Local	ICP	Guglielmino *et al.* 2010, fig. 9:55	81968	SAS IX, US 9276, 9961
RO74	IM	Cup	IIIA	Local	ICP	Guglielmino *et al*. 2010, fig. 10:74	81960	SAS XII, US 7684
RO101	IM	Krater	IIIB-C	Local	ICP	Guglielmino *et al.* 2010, fig. 10:101		
RO151	IM	Necked jar	IIIC	Local	ICP	Guglielmino *et al*. 2010, fig. 10:151		
RO282	IM	Carinated cup monochrome	IIIC	Probably local/regional	ICP	Guglielmino *et al*. 2010, fig. 10:282		
RO353	IM	Carinated cup? monochrome	IIIC	Local	ICP	Guglielmino *et al*. 2010, fig. 10:353		
RO1P	IM	Decorated fragment		Local	ICP	Guglielmino *et al.* 2010, fig. 6:1		
RO2P	IM	Decorated fragment		Local	ICP	Guglielmino *et al*. 2010, fig. 6:2		
RO3P	IM	Decorated fragment		Local	ICP	Guglielmino *et al.* 2010, fig. 6:3		
RO4P	IM	Decorated fragment		Local	ICP	Guglielmino *et al.* 2010, fig. 6:4		
RO7P	IM	Decorated fragment		Local	ICP	Guglielmino *et al.* 2010, fig. 6:7		
RO9P	IM	Decorated fragment		Local	ICP	Guglielmino *et al.* 2010, fig. 6:9		
OTRANTO (18)								
OTR2	M			Peloponnese?	INAA			
TORRE CASTELLUCCIA (24)								
TCA1	M	Closed vessel	IIIC	Central Crete/Central Greece?	AAS	Fisher 1988, n. 250?	55033	

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
TCA22	IM	Bowl/cup	IIIB?	Local	AAS	Fisher 1988, n. 260	55036	
TCA13	IM?	Painted		Local	INAA		43749	
PORTO PERONE-SATYRION (25)								
PP16	MP	Amphora matt-painted	I-II	Peloponnese	AAS- INAA-ICP	Lo Porto 1963, fig. 47	PP120920	Trench 1, layer e
PP17	P	Pithos		Atypical local	AAS- INAA-ICP	Lo Porto 1963, fig. 53	PP121138	Trench 1, hut d
PP23	P	Transport amphora or pithos	IIIB	Uncertain	INAA-ICP	Lo Porto 1963, fig. 52	PP120137	Trench 1, outside hut c
PP2	IM	Closed vessel, handle	III	Probably local	AAS	Lo Porto 1964, fig. 19:6	PS120161	Layer f
PP3	IM	Jar/amphora	IIIC	Local	AAS	Lo Porto 1964, fig. 18:9	PP120163	Layer f
PP4	IM	Open vessel	IIIC	Local	AAS	Lo Porto 1964, fig. 18:4	PP120166	
PP5	IM	Closed vessel	IIIC	Local	AAS	Lo Porto 1964,fig. 18:5	PP120169 or 159	
PP8	IM	Jug	IIIC	Local	AAS	Lo Porto 1964, fig. 17	PS120216	Layer f
PP10	IM	Closed vessel	IIIC	Local	AAS	Lo Porto 1963, fig. 54:3	PP120333	Trench 1, hut a
PP11	IM	Cup	IIIC?	Local	AAS	Lo Porto 1963, fig. 54:1	PP120336	Trench 1, hut a
PP15	IM	Closed vessel	IIIC	Local	AAS	Lo Porto 1963, fig. 55:4	PP120681	Trench 2
PP18	IM	Jug?	IIIC	Local	AAS	Lo Porto 1963, fig. 69:9	PP55397	
PP20	IM	Closed vessel	IIIA?	Local	AAS	Lo Porto 1963, fig. 69:2	PP5551	
PP21	IM	Carinated cup	IIIC	Atypical local	AAS	Biancofiore 1967, fig. XXXVI:1	PP5567	
PP22	IM	Carinated cup same as 21	IIIC	Atypical local	AAS	Lo Porto 1963, fig. 69:4	PP5568	
PP24	IM	Closed vessel	IIIC	Local	INAA	Lo Porto 1963, fig. 69:3	PP5563	
PP25	IM	Open vessel (krater?)	IIIC	Local	INAA	Lo Porto 1964, fig. 20:6	PS120133	Layer d
PP26	IM	Closed vessel	IIIC	Local	INAA	Lo Porto 1964, fig. 20:4	PS120175	Layer d
PP27	IM	Jar/amphora	IIIC	Undetermined	INAA	Lo Porto 1963, fig. 54:10	PP120326	Trench 1, layer a
PP28	IM	Closed vessel	IIIC	Local	INAA	Lo Porto 1964, fig. 20:2	PS120171	Layer d
PP1	IM-PG?	Closed vessel	IIIC?	Local	AAS	Lo Porto 1964, fig. 20:3	PS119993	Layer d

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
TARANTO (26b)								
ST87	BU	Cup		Local	ICP	Gorgoglione *et al.* 2006, fig. 4:3	203313	
ST1	M	Piriform jar	IIIA2	Peloponnese	AAS	Biancofiore 1967, tav. XIII:55; Taylour 1958, pl. 10:3-6	18617a	
ST2	M	Piriform jar	IIIA2	Peloponnese	AAS	Biancofiore 1967,tav. IV:5	18631	
ST3	M	Piriform jar	IIIA2	Peloponnese	AAS	Biancofiore 1967,tav. V:7	18632	
ST4, ST54	M	Jug with cutaway neck	IIIA2	Peloponnese	AAS-INAA	Biancofiore 1967,tav. XV:68	18639c	
ST7	M	Cup	IIIB-C?	Peloponnese?	AAS	Biancofiore 1967,tav. XIV:63	18846	
ST21	M	Deep bowl?	IIIB-C	Peloponnese	AAS	Vagnetti, Jones 1988, fig. 1.1	7133	
ST23	M	Deep bowl/krater?	IIIB	Peloponnese	AAS	Fisher 1988, fig. 25:155	7138	
ST25	M	Cup with wishbone handle	III	Peloponnese ?	AAS	Biancofiore 1967, tav. XXXIVa+b.	7146	
ST26	M	Piriform jar	IIIB	Peloponnese	AAS	Biancofiore 1967,tav. II:98	7150	
ST30	M	Stirrup jar	IIIB	Peloponnese	AAS	Biancofiore 1967,tav. X:140	7179	
ST31	M	Goblet	IIIA2-B	Peloponnese	AAS	Biancofiore 1967,tav. XII:141	7180	
ST33	M	Piriform jar	IIIA	Peloponnese	AAS	Biancofiore 1967,tav. IV:14	7195	
ST35	M	Kalathos	IIIA?	Peloponnese	AAS	Biancofiore 1967,tav. XXV:176	7202	
ST42	M	Piriform jar	IIIA2	Peloponnese	INAA	Gorgoglione 1982, tav. XII:3	18660A	
ST43	M	Piriform jar	IIIA?	Peloponnese	INAA	Biancofiore 1967,tav. III:5	18751	
ST44	M	Piriform jar	IIIA2	Peloponnese	INAA	Biancofiore 1967,tav. XX:94-95	18604C	
ST47, ST59	M	Jug? stirrup jar?	IIIA2	Peloponnese	INAA	Biancofiore 1967,tav. XV:69	18634	
ST27	M	Basin	IIIC?	Atypical Peloponnese; closer to C Crete or C Greece	AAS	Drago 1940, tav. 1:1	7157	
ST41*	M	Piriform jar	IIIC	Central Grecee	INAA	Biancofiore 1967,tav. XXV:169	18746	
ST60*	M	Piriform jar	IIIC	Central Greece?	ICP	Biancofiore 1967,tav. XXV:169	18746	
ST5	M	Basin or kalathos	IIIB?	Rhodes	AAS	Biancofiore 1967,tav. XIV:151	18778	
ST6	M	Mug	IIIB	Rhodes	AAS	Biancofiore 1967,tav. XXV:180	18831	
ST8, ST50	M	Stirrup jar	III	Rhodes	AAS-INAA	Biancofiore 1967,tav. XI:34	18855a	
ST9	M	Alabastron?	IIIC	Rhodes	AAS	Biancofiore 1967,tav. XLI:o	18902	

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
ST10	M	Piriform jar or alabastron	IIIA?	Rhodes	AAS	Biancofiore 1967,tav. XIX: 84	18916cd	
ST32, ST63	M	Stirrup jar	IIIC	Rhodes	AAS-ICP	Biancofiore 1967,tav. VIII:129	7193	
ST34, ST58, ST64	M	Stirrup jar	IIIC	Rhodes	AAS-INAA-ICP	Biancofiore 1967,tav. XXIII:113	7197	
ST36	M	Stirrup jar	IIIC	Rhodes	AAS	Biancofiore 1967,tav. XXIII:115, cfr. ST 57	7205	
ST40	M			Rhodes?	INAA-ICP	not ill.	18919	
ST52, ST65	M	Krater	IIIC	Rhodes	INAA-ICP	Gorgoglione 1982, tav. XIII:5	7200	
ST57	M	Stirrup jar	IIIC	Rhodes	INAA	Biancofiore 1967,tav. XXIII:114, cfr. ST 36	18845	
ST92	M	Krater	IIIC	Rhodes	AAS	Taylour 1958, tav. 13:7; Biancofiore 1967, tav XXIV:155	7174	
ST46	M	Necked jar	IIIC	(S) Cyprus	INAA	Biancofiore 1967,tav. XXXV:n	18891B	
ST61	M	Necked jar	IIIC	Rhodes	ICP	Biancofiore 1967,tav. XXXV:n	18891B	
ST49	M	Necked jar	IIIC	(S) Cyprus	INAA	Biancofiore 1967,tav. XXXV:i	18896	
ST55	M?	Jug or amphora	IIIC	Uncertain	INAA	Drago 1940, tav. I:6	7135	
ST56	M?	Piriform jar	IIIA2	Import (but problem of incomplete composition)	INAA	Biancofiore 1967, tav. V:8	18615	
ST84	CW	Tripod	IIIC	Rhodes	PE-ICP	Gorgoglione *et al.* 2006, fig.5:4	203322	
ST83	CW	Tripod		Aegina	PE-ICP	Gorgoglione *et al.* 2006, fig. 5:3	203329	
ST85	CW	Tripod		Local	PE-ICP	Gorgoglione *et al.* 2006, fig. 5:1	203326	
ST86	CW	Tripod		Local	PE-ICP	Gorgoglione *et al.* 2006, fig. 5:2	203338	
ST11, ST12	IM	Closed vessel	IIIC-Submyc	Atypical local?	AAS	Biancofiore 1967,tav. XLI:e	203151	
ST22, ST62	IM	Necked jar/amphora	IIIC	Uncertain/Probably local	AAS-ICP	Vagnetti 2000-01, fig. 20	7136	
ST24	IM	Piriform jar or krater	IIIB?	Probably local?	AAS	Fisher 1988, fig. 9:39	7139	
ST28	IM	Piriform jar	IIIC?	Local	AAS-INAA	Biancofiore 1967,tav. XVI:73	7164	
ST29	IM	Bowl/cup	IIIB	Local	AAS	Biancofiore 1967,tav. XV:142	7178	
ST45	IM	Krater	IIIC	Local	INAA	Biancofiore 1967,tav. XXXV:a	18882	
ST51	IM	Bowl	IIIC	Local	INAA	Biancofiore 1967,tav. XXXV:h	18888A	
ST90	IM	Carinated cup	IIIC	Local	ICP	Gorgoglione *et al.* 2006, fig. 4:4	203319	

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
BASILICATA								
S.VITO (29)								
SV3	IM	Deep bowl?	IIIB2	Local	AAS	De Siena 1986, fig. 19	149675 sv 32	
TERMITITO (30)								
T37	M	Stirrup jar	IIIB-C	(N) Peloponnese	AAS		147207	
T1	IM	Stirrup jar?	IIIC	Local	AAS		47181	
T2	IM	Closed vessel	IIIC	Local	AAS		47182	
T3	IM	Deep bowl	IIIB-C	Local	AAS		47184	
T4	IM	Cup	IIIC	Local	AAS		47180	
T5	IM		IIIB-C	Local	AAS		47183	
T6	IM			Local	AAS		47144	
T7	IM	Closed vessel?	IIIC	Local	AAS		47151	
T8	IM	Closed vessel?	IIIB-C	Local	AAS		47150	
T9	IM	Deep bowl	IIIB-C	Local	AAS	De Siena, Bianco 1982, tav. XXV:6	47114	A 80 M
T10	IM	Vertical handle, closed vessel	IIIB-C	Local	AAS		47115	
T11	IM	Horizontal handle, open vessel	IIIB-C	Local	AAS		47117	
T12	IM	Base	III	Local	AAS		47119	
T13	IM	Closed vessel, base	IIIB-C	Local	AAS		47106	
T14	IM	Krater?	IIIB-C	Local	AAS		47111	
T15	IM	Uncertain shape	IIIB-C	Local	AAS		47082	
T16	IM	Uncertain shape	IIIB-C	Local	AAS		47080	
T17	IM	Closed vessel	IIIC	Local	AAS		47073	
T18	IM	Uncertain shape	III	Local	AAS		47074	
T19	IM	Open vessel?	IIIC	Local	AAS		47079	
T20	IM	Closed vessel	IIIB-C	Local	AAS		47066	
T21	IM	Open vessel	IIIB-C	Local	AAS		47039	

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
T22	IM	Uncertain shape	IIIB-C?	Local	AAS		47045	
T23	IM	Open vessel?	IIIB-C	Local	AAS		47041	
T24	IM	Necked jar?	IIIC	Local	AAS		322269	
T25	IM	Uncertain shape	III	Local	AAS			
T26	IM	Uncertain shape	III	Local	AAS			
T27	IM	Open vessel (cup?)	IIIB-C?	Local	AAS			
T28	IM	Uncertain shape	III	Local	AAS		322267	
T29	IM	Deep bowl?	IIIB-C	Local	AAS			
T30	IM	Closed vessel	III	Local	AAS			
T31	IM	Krater?	IIIB-C	Local	AAS			
T32	IM	Uncertain shape	III	Local	AAS			
T33	IM	Lid?	IIIB-C	Local	AAS			
T35	IM	Cup	IIIC	Local	AAS			
T38	IM	Closed vessel (jar)	IIIC	Local	AAS	De Siena 1986, fig. 12	147212	
T39	IM	Deep bowl pictorial	IIIB	Local	AAS	De Siena, Bianco 1982, tavv. XXII:2; XXIII:2: Vagnetti 2000-2001, fig.3	147216(48098)	BT 3 m. 2-1
T40	IM	Deep bowl pictorial	IIIC	Local	AAS	De Siena 1986, fig. 6; Vagnetti 2000-2001, fig. 7	147202	
T41	IM	Shallow carinated bowl	IIIB-C	Local	AAS	De Siena 1986, fig. 13.	147211 (48105)	
T42	IM	Closed vessel	IIIB-C	Local	AAS		147210	
T43	IM	Amphora	IIIC	Local	AAS	De Siena 1986, fig. 11.	147206	
CALABRIA								
BROGLIO DI TREBISACCE (32)								
A23, A24	M	Jug?	IIIB	Peloponnese	AAS	*EMS*, tav. 74:2, tav. 73:13		BT85.DW.K'3INF
A40	M	Necked jar?	IIIC	Peloponnese	AAS	*EMS*, tav.. 72:3	773	BT82.DEST.DG1
A51	M	Necked jar?	IIIC middle?	Peloponnese	PE-AAS	*N.Ric.*, tav. 49:1	772	BT83.DEST.DG1
A53	M	Deep bowl?	IIIB2-C	Peloponnese	AAS	*EMS*, tav. 71:1	1120?1221	BT84.DW.L1A
A54, BT703	M	Stirrup jar	IIIC	Peloponnese	AAS-INAA	*EMS*, tavv. 75:11; 80:3c	628	BT85.DW.K3

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
A63, BTA068	M			Peloponnese	PE-XRD-INAA	not ill.		BT81.DMO1A
A48, A49, BT704, BTA003*	M	Necked jar	IIIB	Central Greece/Central Crete?	AAS-INAA	*EMS*, tav. 73:12		BT84.DW.2B+ALIA
BTA003*	M	Necked jar	IIIB	Peloponnese	INAA (Demokritos)			
A56	M	Alabastron/jar?	IIIA1	Central Greece/Central Crete?	AAS	*Ric.1*, tav. 24:3	17036	BT79.D12.3/4W
A11, A34, BT707	CW?	Jar		Import?	PE-XRD-AAS-INAA-ICP	*Ric.2*, tavv. 26,9; 28:3-4		BT80.G17.1B
BT712	CW?	Closed vessel		Import?	PE-ICP		6945	BT99 2O28. 69. Pul
A1	IM	Necked jar	IIIB	Local/regional	PE-XRD-AAS	*N.Ric.*, tav. 48:2		BT80.G17.0-25/I
A2	IM	Necked jar	IIIB-C	Local/regional	AAS	*Ric.2*, tav. 23:9		BT80.G17.1I
A3, BT702	IM	Jar	IIIA1	Atypical local/regional	AAS-INAA	*Ric.2*, tav. 24:2		BT80.G17.1III
A4	IM	Necked jar	IIIB	Local/regional	AAS	*Ric.2*, tav. 24:7		BT80.G17.1III
A5	IM	Necked jar	IIIB-C	Local/regional	AAS	*Ric.2*, tav. 24:5		BT80.G17.1III
A6	IM	Carinated cup	IIIC	Local/regional	AAS	*Ric.2*, tav. 23:11		BT80.G17.1III
A7	IM	Open shape base	III	Local/regional	AAS	*Ric.2*, tav. 24:4		BT80.G17.1B
A8, A33, BTA005	IM	Necked jar	IIIB	Local/regional	AAS	*N.Ric.*, tav. 48:1		BT80.G17.1B
A9, A65, BT705, BTA004	IM	Necked jar	IIIC	Local/regional	PE-XRD-AAS, INAA-ICP	*N.Ric.*, tav.49:3		BT80.G17.1B
A10	IM	Closed vessel		Local/regional	AAS	*Ric.2*, tav. 26:3		BT80.G17.1B
A12	IM	Closed vessel		Local/regional	AAS	*Ric.1*, tav. 24:6		BT79.PEND EST
A13, BT706, BTA001	IM	Necked jar	IIIB	Local/regional	PE-XRD-AAS-INAA-ICP	*N.Ric.*, tav. 46:3		BT81.DX-S
A14	IM	Deep bowl	IIIB-C	Local/regional	AAS	*Ric.3*, tav. 44:1		BT81.DQS
A15, A37	IM	Necked jar	IIIB	Local/regional	AAS-XRD-AAS	*Ric.3*, tav. 45:3, fig. 45:4	86-17045a	BT81.DYS
A16	IM	Deep bowl	IIIC	Local/regional	AAS	*EMS*, tav. 78:3	638	BT84.DW.KK2B

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
A17	IM	Amphoroid krater?	III	Local/regional	AAS	*EMS*, tav. 78:17	85	BT84.DW.KK2B
A18	IM	Necked jar?	IIIB	Local/regional	PE-XRD-AAS	*EMS*, tav. 74:5a-i	1230b	BT84.DP'3
A19	IM	Carinated bowl	IIIB	Local/regional	AAS	*EMS*, tav. 72:18	(95)124	BT83.DEST
A20	IM	Necked jar?	IIIC	Local/regional	AAS	*EMS*, tav. 74:4		BT85.DW.K'3INF
A21	IM	Necked jar	IIIB-C	Local/regional	AAS	*EMS*, tav. 75:3	132	BT85.DW.KK3
A22	IM	Alabastron/piriform jar	IIIA	Atypical local	AAS	*N.Ric.*, tav. 47:8	881	BT82.DL1B
A25	IM	Necked jar	IIIB-C	Local/regional	AAS	*EMS*, tav. 70:12	625	BT85.BW.P2 A-B
A26	IM	Closed vessel	(MB3 context)	Local/regional	AAS	*EMS*, cat. 27		BT85.DEST.DG3.BIB
A27	IM	Necked jar	IIIB-C	Local/regional	AAS	*EMS*, tav. 76:3	130	BT84.DK'.2B'
A28	IM	Mug	IIIB-C	Local/regional	AAS	*EMS*, tav. 75:4	145	BT85.DW.KK3
A29	IM	Necked jar	IIIB-C	Local/regional	AAS	*EMS*, tav. 73:2	410	BT85.DEST.JKS
A30	IM	Necked jar	IIIA	Local/regional	PE-AAS	*N.Ric.*, tav. 46:1		BT84.DW.KK2B
A31	IM	Closed vessel	IIIB-C	Local/regional	AAS	*EMS*, tav. 71:8	394	BT85.BWUVWS
A32	IM	Necked jar	IIIC	Local/regional	AAS	*N.Ric.*, tav. 50:3		BT82.DL1A IV
A35	IM	Necked jar?	IIIB?	Local/regional	AAS	*EMS*, tav. 75:7	133	BT85.DW.KK3
A36	IM	Deep bowl	IIIC	Local/regional	AAS	*N.Ric.*, tav. 45:7	830	BT82.DK1Bb
A37	IM	Necked jar	IIIB	Local/regional	AAS-XRD-AAS	*Ric.3*, tav. 45:4		
A38	IM	Carinated cup	IIIC	Local/regional	PE-XRD-AAS	*N.Ric.*, tav. 51:2	563-17049bis	BT82.DT1A IV
A39	IM	Stirrup jar?	IIIB	Local/regional	AAS	*N.Ric.*, tav. 45:6	301	BT82.DK'OA
A41	IM	Closed vessel	IIIB-C	Local/regional	AAS	*EMS*, tav. 72:1	590	BT83.DEST.DG1
A42	IM	Open vessel	IIIC?	Local/regional	AAS	*Ric.3*, tav. 41:3	438-17054	BT81.DO1A
A43	IM	Necked jar?	IIIC	Local/regional	PE-XRD-AAS	*Ric.2*, tav. 26:6	73	BT85.DW
A44	IM	Necked jar		Local/regional	AAS	*EMS*, tav. 78:10	894	BT84.DK'2B
A45	IM	Jar		Local/regional	AAS	*EMS*, tav. 73:1	464	BT84.DZS
A46	IM	Bowl/cup	IIIC	Local/regional	AAS	*EMS*, tav. 78:9	850	BT84.DW.KK2B
A47	IM	Necked jar	IIIC	Local/regional	AAS	*N.Ric.*, tav. 45:3		BT84.DP'2B+ALIA
A50, BT701	IM	Necked jar	IIIA?	Local/regional	AAS-INAA-ICP	*N.Ric.*, tav. 54:9, EMS, tav. 76:2	CAT 90	

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
A52	IM	Base	III	Local/regional	AAS	*Ric.3*, tav. 39:15		BT81.DNO.1A'
A55	IM	Closed vessel	IIIB-C	Local/regional	AAS	*EMS*, tav. 75:13	126	BT85.DW.KK3
A57	IM	Closed vessel	IIIC?	Local/regional	AAS	*EMS*, tav. 70:1	1227	BT85.BWQ.3BI
A60	IM			Local/regional	PE-XRD-INAA	not ill.		BT81.DM1A
A64	IM			Local/regional	PE-XRD-INAA	not ill.	788	BT82.DQ1B
A69, BTA069	IM			Local/regional	PE-XRD-INAA	not ill.		BT84.DP'3
A72	IM			Local/regional	PE-XRD-INAA	not ill.		84.DW.KKS
A74 (G12)	IM	Jug	III	Atypical local	AAS	*Ric.3*, tav. 44:6		
BT709	IM	Closed vessel	IIIA?	Local/regional	INAA	Bettelli 2002, fig. 67:61	1500	
BT710	IM	Jar	IIIB-C	Local/regional	ICP	Bettelli 2002, fig. 63:22	702	
BT711	IM	Amphora	IIIB-C	Local/regional	ICP	Bettelli 2002, fig. 70:90	6369	
BT713	IM	Necked jar	IIIB-C	Local/regional	ICP		12480	BT03 7M11 7194
BT714	IM	Piriform jar?	IIIA2?	Local/regional	ICP		10787	BT02 3EF26.1746
TORRE MORDILLO (34)								
TM10	M	Alabastron	IIIA	Import?	AAS	Trucco, Vagnetti 2001, fig. 95:27	11.47	D 11 d V, US 11/87
TM15	M	Handle, open vessel	I-II	Import?	AAS	Trucco, Vagnetti 2001, fig. 95:36	7.27	D 11 d V, US 11/87
TM45	M	Cup	IIIB-C	Import?	AAS	Trucco, Vagnetti 2001, fig. 96:51	7.97	D 12 d II, US 14
TM56	M	Open vessel	IIIC?	Import?	AAS	Trucco, Vagnetti 2001, fig. 96:63	6.86	D 12 e II, US 22
TDM1, 2	IM	Closed vessel	IIIB-C	Local/regional	PE-XRD-AAS	*Ric.1*, tav. 24:7		Surface
TM1	IM	Deep bowl	IIIB-C	Local/regional	AAS	*EMS* II 737, tav. 151:9-10	8.53	Surface
TM2	IM	Bowl/cup	IIIC	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 101:142	5.6	Surface
TM6	IM	Deep bowl	IIIC middle	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 96:46	6.58	D 11 d IV, US 12/87
TM8	IM	Deep bowl	IIIB	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 95:23	5.04	D 11 d IV, US 11/87
TM9	IM	Stirrup jar		Local/regional	AAS	Trucco, Vagnetti 2001, fig. 95:28	7.41	D 11 d V, US 11/87
TM11	IM	Closed vessel	IIIB-C	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 95:34	5.93	E 11 A IV, US 11/87
TM12	IM	Closed vessel	IIIB-C	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 95:30	5.6	D 11 d V, US 11/87
TM18	IM	Closed vessel	IIIC	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 95:19	7	E 11 a IV, US 8/87
TM20	IM	Bowl	IIIC	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 94:2	7.27	D 11 d III, surface
TM21	IM	Alabastron/piriform jar	IIIA2	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 95:38	7.27	D 11 d IV, US1-2x/87

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
TM22	IM	Closed vessel	IIIC	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 101:141	6.44	Surface
TM43	IM	Stirrup jar?	IIIB	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 100:137	5.88	E 8 d V, US 9
TM44	IM	Cup	IIIB-C	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 94:8	6.16	D 12 c III
TM47	IM	Closed vessel		Local/regional	AAS	Trucco, Vagnetti 2001, fig. 96:49	7.27	D 12e III, US 13
TM51	IM			Local/regional	AAS-ICP			
TM61	IM	Bowl/cup	IIIB	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 97:68	7	D 12 d III, US 36-36x
TM70	IM	Closed vessel	IIIA?	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 94:10	8.67	D 12-13
TM71	IM			Local/regional	AAS		7.83	D 12-13
TM72	IM	Mug	IIIB	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 97:70	8.25	D 12 d IV, US36-36x
TM73	IM	Closed vessel	IIIB-C	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 100:132	13.57	E 8 e IV, US 4
TM75	IM	Closed vessel		Atypical local	AAS	Trucco, Vagnetti 2001, fig. 101:140	19.59	E 9 c II, US 213
TM78	IM			Local/regional	AAS-ICP			
TM79	IM	Open vessel	IIIC	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 101:143	5.46	Area F, surface
TM82	IM			Local/regional	AAS		11.47	D 11 d V US 121
TM83	IM	Carinated cup	IIIC middle	Atypical regional	AAS	Trucco, Vagnetti 2001, fig. 99:103	7.49	D 11 d IV, US 121
TM84	IM			Local/regional	AAS-ICP			
TM86	IM	Open vessel	IIIB-C	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 99:114	10.49	D 11 c V, US 128
TM88	IM	Open vessel	IIIB-C	Atypical regional	AAS	Trucco, Vagnetti 2001, fig. 99:115	13.38	D 11 d V, US 128
TM89	IM	Closed vessel	IIIC middle?	Local/regional	AAS	Trucco, Vagnetti 2001, fig. 100:119	7	D 12 b I
TM91	IM			Local/regional	AAS		6.44	D 12 b IV
TM92	IM			Local/regional	AAS		5.18	
TM93	IM			Local/regional	AAS		6.16	
CAPO PICCOLO (37)								
CP	M	Closed vessel	I-II	(N) Peloponnese	AAS	Lattanzi *et al.* 1987, figs. 6-7		
CP501	M	Cup		Import; not Peloponnese	INAA	Bianco, Marino 1991-92, not ill.		
CP502	M	Amphora		Import; not Peloponnese; different source from 501	INAA			

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
TAUREANA DI PALMI (39)								
TAU19	M	Cup	IIIA2	Peloponnese	ICP	Agostino *et al.* 2012, fig.8:1	18	I Strada, US 700
PUNTA ZAMBRONE (40)								
PZ1	IM	Open vessel?	I-II?	Local/regional?	AAS	Pacciarelli, Vagnetti 2004		Surface
CAMPANIA								
GROTTA DEL PINO (42)								
GSA1	MP	Necked jar	I-II	Uncertain	INAA	Piperno, Pellegrini 2000-2001, tav. M	132848	
GSA2	MP	Closed vessel	I-II	Import	INAA	Piperno, Pellegrini 2000-2001, tav. N:1-2	132849	
GSA3	MP	Closed vessel	I-II	Regional?	INAA	Piperno, Pellegrini 2000-2001, tav. N:5	132850	
GSA4	MP	Necked jar	I-II	Regional?	INAA	Piperno, Pellegrini 2000-2001, tav. N:3-4	132851	
PONTECAGNANO (46)								
PON1	IM	Necked jar	IIIC	Local/regional	ICP	Bettelli, Vagnetti 2004-2005, figs. 12:3; 14		Hut 2, US 17059
VIVARA (47)								
V39	MP	Closed vessel, bichrome	I	Import, not Peloponnese	AAS	Panichelli, Re 1994, fig. 8:88	168	ED' 9-13
V40	MP	Closed vessel	I	Peloponnese	AAS	Panichelli, Re 1994, fig. 8:89	170	ED' 9-13
V48	MP	Closed vessel	I	Peloponnese	AAS	Panichelli, Re 1994, fig.8:90	248	EG' 14-15
V54	MP			Peloponnese	AAS		87/49	EJ 6-9
V55	MP			Peloponnese	AAS		87/53	EJ 9-13
V56	MP			Peloponnese	AAS		87/54	EJ 9-13
V62	MP			(S) Peloponnese	AAS		87/73	EJ 6-9
V69	MP			Peloponnese?	AAS		86/14	EP 1
V70	MP			Peloponnese?	AAS		86/25	EP 1
V71	MP			(S) Peloponnese	AAS		86/12	EM 1
VD2=R1600	MP	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, fig.14:224	6	EA 44
VD7	MP	Closed vessel		Local?	AAS	Panichelli, Re 1994, n. 215	409	CAP 5
VD8	MP	Closed vessel		Peloponnese?	AAS	Panichelli, Re 1994, n. 327	413	E PEP 27
VR3220=R8	MP	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, n. 329	222	E KZV

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
VR3224=R7	MP	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, n. 220	226	EG 12-13
V59	BU			Uncertain	AAS		87/60	EJ 6-9
V61	BU			Local?	AAS		87/72	EJ 9-13
VD6	BU	Closed vessel		Local?	AAS	Panichelli, Re 1994, n. 206	411	EI 11-14
VR3212=R2	BU	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, n. 201	214	EG 6-7
V1	M	Closed vessel	IIA	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 11:120	295	E pit alfa bottom
V2	M	Handle alabastron?	I-II	Peloponnese	AAS	Panichelli, Re 1994, fig. 10:115	293	E excavation pit alfa 29
V3	M	Closed vessel	II	Peloponnese	AAS	Panichelli, Re 1994, fig. 12:125	387	E pit alfa bottom
V4	M	Closed vessel	II-III	Peloponnese	AAS	Panichelli, Re 1994, fig. 10:109	194	PEB 28
V5	M	Closed vessel	II-III	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 11:117	280/242	E KZQ 32; E pit alfa 29-33
V6	M	Alabastron?	II	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 10:113	291	E pit alfa 29
V7	M	Closed vessel ?	II	Peloponnese	AAS	Panichelli, Re 1994, fig. 11:119	379	E pit beta 33 bottom
V8	M	Closed vessel, handle		Uncertain	AAS	Panichelli, Re 1994, fig. 6:48	365	EG I 6-9
V9	M	Handle of jar		(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 6:47	274	E I 18-22
V10	M	Alabastron?	IIA-B	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 3:19-20	77	EC 14
V11	M	Closed vessel	I-IIA	Peloponnese	AAS	Panichelli, Re 1994, fig. 4:25	155bis	ED' 5-9
V12	M	Closed vessel	IIA	Peloponnese	AAS	Panichelli, Re 1994, fig. 1:4	23	EB I 18
V13, V30	M	Handle alabastron?	I-II	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 5:37	209	E filling
V14	M	Closed vessel	II	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 6:46	364	EG' 10-13
V15	M	Alabastron or jug		(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 4:28	161	ED' 9-13
V16	M	Uncertain shape		(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 4:27	163	ED I 9-13
V17	M	Alabastron or jug		(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 5:43	246	EG 16
V18	M	Closed vessel	II	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 2:10	50	EC 6
V19	M	Closed vessel	II	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 5:42	239	EG 14-15
V20	M	Closed vessel		Peloponnese	AAS	Panichelli, Re 1994, fig. 7:51	12	EB 10
V21	M	Closed vessel		(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 7:59	56/260	EC 8, EC 18
V22	M	Goblet	IIA	Peloponnese	AAS	Panichelli, Re 1994, fig. 7:75	198	various
V23	M			Peloponnese	AAS		158/175	

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
V24	M	Closed vessel		(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 7:65	65	EC 11
V25	M	Closed vessel		(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 8:77	164	ED' 9-13
V26	M	Closed vessel		Peloponnese	AAS	Panichelli, Re 1994, n. 63	78	EC 16
V27	M	Alabastron	IIA	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 3:16	94/369/ 177/72/14	various
V28, V43	M	Jar	IIA	Peloponnese	AAS	Panichelli, Re 1994, fig. 10:111	202	EB PEA 29
V29	M	Closed vessel	II	Peloponnese	AAS	Panichelli, Re 1994, fig. 10:107	203	EB 27 KZP
V31, V45	M	Vaphio cup	I-IIA	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 12:131	211	AJ 31
V32	M	Cup	IIA	Peloponnese	AAS	Panichelli, Re 1994, fig. 13:136	1	
V33	M	Cup	IIA	Peloponnese	AAS	Panichelli, Re 1994, fig. 1:1	5	various
V34	M	Piriform jar?	II-III	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 2:14	70	EC 12
V35	M	Vaphio caup	I	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 12:128	102	BT SI
V36	M	Cup	I	(S) Peloponnese	AAS	Panichelli, Re 1994, fig. 12:129	103	BT SI
V37	M	Closed vessel	I-IIA	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig. 8:91	138	ED 6-7
V38	M	Vaphio cup	I	(S) Peloponnese	AAS	Panichelli, Re 1994, fig. 3:24	150	ED 14
V41	M	Vaphio cup	I-IIA	(S) Peloponnese	AAS	Panichelli, Re 1994, fig. 4:30	180	ED' 9-13
V42	M	Vaphio cup	IIA	(S) Peloponnese	AAS	Panichelli, Re 1994, fig.12:130	201	BS SI
V44	M	Vaphio cup	I	(S) Peloponnese	AAS	Panichelli, Re 1994, fig.5:40	204	EG 8-9
V46	M	Closed vessel	I	Peloponnese	AAS	Panichelli, Re 1994, fig.13:132	234	BS 2 alfa
V47	M	Jug	IIA-B	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig.5:39	238	EG 6-16
V49	M	Vaphio cup	I	(S) Peloponnese	AAS	Panichelli, Re 1994, fig.13:137	259	
V50	M			(NE) Peloponnese	AAS		262	
V51	M	Alabastron?	IIB	(NE) Peloponnese	AAS	Panichelli, Re 1994, fig.10:114	292	E pit a 29
V52	M			Peloponnese	AAS		294	
V53	M	Vaphio cup	I-IIA	Peloponnese	AAS	Panichelli, Re 1994, fig.11:124	389	E pit a bottom
V57	M			(S) Peloponnese	AAS		87/56	EJ 13-15
V58	M			(NE) Peloponnese	AAS		87/57	EJ 9-13
V60	M			(NE) Peloponnese	AAS		87/71	EJ 9-13
V64	M			(NE) Peloponnese	AAS		87/153	EJ 18

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
V65	M			(S) Peloponnese	AAS		87/154	EJ 18-F
V66	M			(NE) Peloponnese	AAS		87/164	Between huts 2 and 3
V67	M			Peloponnese	AAS		87/165	EJ hut 3
V68	M			Peloponnese	AAS		87/166	EJ hut 3
VD1	CW	Closed vessel		Local?	AAS	Panichelli, Re 1994, n. 154	137	ED 6-7
VD10	CW	Closed vessel		Local?	AAS	Panichelli, Re 1994, tav. VIII:153	105bis	EE 4
VD11=R1604	CW	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, n. 240	22	EB I 17
VD12	CW	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, n. 272	414	
VD3	CW	Closed vessel		Local?	AAS	Panichelli, Re 1994, fig.16:336	412	E 29 PEK
VD4	CW	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, fig.15:269	408	EC 12
VD9	CW	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, tav. X:325	218	EB 29 KZP
VR3219=R5	CW	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, n. 161	221	ED 6-7
VR3222=R4	CW	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, n. 144	224	EG 12-13
VR3223=R1	CW	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, n. 256	225	EG 12-13
VR3235=R6	CW	Closed vessel		Uncertain	AAS	Panichelli, Re 1994, n. 150	237	ED I 9-13
VR3242=R3	CW			Uncertain	AAS	Panichelli, Re 1994, n. 258	244	
V63				Uncertain	AAS		87/76?	
VD5				Local?	AAS		410	
MOLISE								
MONTERODUNI (50)								
ROD1	IM	Closed vessel	IIIC	Regional?	ICP	Bettelli 2006, fig. 1		MP05 square B2R q.27 US 184
LATIUM								
CASALE NUOVO (51)								
CNU3	M			Peloponnese	AAS			
CNU1	IM			Local/regional	AAS			
CNU2	IM	Stirrup jar	IIIB-C early	Local/regional	AAS	Bettelli *et al.* 2006, fig. 5:8		L 26 III, US 141
CNU4	IM			Local/regional	AAS			

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
CNU5	IM			Local/regional	AAS			
CNU6	IM			Local/regional	AAS			
MONTE ROVELLO (53)								
MRO1	IM	Closed vessel	LH IIIB-C?	Local/regional	INAA	Bettelli *et al.* 2006, fig. 5:6		Hut A, US9
LUNI SUL MIGNONE (54)								
LUN5	M?	Stirrup jar/piriform jar ?	IIIA?	Uncertain	INAA	Bettelli *et al.* 2006, fig. 5:5		Trench12, level 6
LUN1	IM	Alabastron ?	IIIB-C	Local/regional	INAA	Bettelli *et al.* 2006, fig. 5:1		Trench 13A, level 2B
LUN2	IM	Closed vessel	III	Local/regional	INAA	Bettelli *et al.* 2006, fig. 5:2		Trench 13B, level 2B
LUN3	IM	Jug? Stirrup jar?	IIIC?	Local/regional	INAA	Bettelli *et al.* 2006, fig. 5:3		Trench 15A, level 4
LUN4	IM	Bowl/cup	IIIB-C	Local/regional	INAA	Bettelli *et al.* 2006, fig. 5:4		Trench 16A, level 4
S. GIOVENALE (55)								
SGI1	M?	Closed vessel	IIIC	Uncertain	INAA	Bettelli *et al.* 2006, fig. 5:7		Area D west, trench 3, close to 163 G
MARCHE								
TREAZZANO DI MONSAMPOLO (57)								
TRE1	M	Stirrup jar	IIIB	Peloponnese	ICP	Lollini 1982, tav. LXXIV	40645	
CISTERNA DI TOLENTINO (58)								
TOL1	IM	Lekythos	IIIB-C	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:8	r.s 14	2001 US230
TOL2	IM	Amphoroid krater?	IIIB-C	Local/regional	ICP			2003 US805 L7Y
TOL3	IM	Basin	IIIB-C	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:11		1993 SgB Str3
TOL4	IM	Closed vessel	IIIB-C	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:2		2000 US110
TOL5	IM	Deep bowl	IIIC middle?	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:1	r.s. 66	2000 US420
TOL6	IM	Bowl/cup	IIIB-C	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:3		2002 US802
TOL7	IM	Bowl/cup	IIIB-C	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:5		2002 US802
TOL8	IM	Bowl/cup	IIIC?	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:4	r.s 36	2000 SPOR
TOL9	IM	Necked jar	IIIC middle?	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:10	r.s. 42+36	2000 US230+SPOR
TOL10	IM	Stirrup jar/alabastron	IIIB-C	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:13	r.s. 36	2000 SPOR
TOL11	IM			Local/regional	ICP		r.s. 13	2001 US200

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
TOL12	IM	Uncertain shape	IIIC	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:12	r.s. 26	2000 US230
TOL13a	IM	Jug/amphora	IIIC?	Local/regional	ICP	Percossi *et al.* 2005, fig. 4:9	r.s. 48	2000 US110
TOL13b	IM			Local/regional	ICP	Percossi *et al.* 2005, fig. 4:9	r.s.60+104	2000-01 us420+200
TOL14	IM			Local/regional	ICP		r.s. 21	2001 US230
JESI (59)								
JES1	IM	Jar	IIIC?	Local/regional	ICP	Vagnetti *et al.* 2006, fig. 2:5	66496	C2 US41 VI TG
JES2	IM	Closed vessel	III	Local/regional	ICP	Vagnetti *et al.* 2006, fig. 2:6	66487	EF6 US118 II
JES3	IM			Local/regional	ICP		66488	EF6 US118 II
ANCONA-MONTAGNOLO (60)								
ANC1	IM	Closed vessel (alabastron?)	IIIB-C	Local/regional	ICP	Vagnetti *et al.* 2006, fig. 2:2	40646	AZ8 Ad E1b
ANC2	IM	Jug/amphora	IIIB-C	Local/regional	ICP	Vagnetti *et al.* 2006, fig. 2:3	61030	AX8 bc 1a
VENETO								
FRATTESINA (61)								
FRA1	IM	Bowl/cup	IIIC	Local/regional	AAS-INAA	Jones *et al.* 2002, fig. 3:1	149500	Surface
FRA2	IM	Open vessel	IIIC	Local/regional	AAS-INAA	Jones *et al.* 2002, fig. 3:2	149501	Excavation
LOVARA (62)								
LOV1+3	IM	Necked jar?	IIIC middle?	Regional	ICP	Salzani *et al.* 2006, fig. 2:2		US3045-3067
LOV2	IM	Jug	IIIB-C	Regional	ICP	Salzani *et al.* 2006, fig. 2:1		US3066
FABBRICA DEI SOCI (63)								
FDS3	M	Necked jar?	IIIC?	Peloponnese/ W Greece?	INAA	Jones *et al.* 2002, fig. 2:6		Surface
FDS4	M	Closed vessel	IIIC?	Peloponnese/ W Greece?	INAA	Jones *et al.* 2002, fig. 2:7		Surface
FDS1	IM	Necked jar	IIIC middle	Local/regional	INAA	Jones *et al.* 2002, fig. 2:3		Surface
FDS2	IM	Closed vessel	IIIC?	Local/Regional but different from FDS1	INAA	Jones *et al.* 2002, fig. 2:4		Surface

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
FONDO PAVIANI (64)								
FPA2	M	Closed vessel	IIIC?	Peloponnese/ W Greece?	INAA	Jones *et al.* 2002, fig. 2:2		Field 2
FPA1	IM	Small juglet?	IIIC middle	Local/regional	INAA	Jones *et al.* 2002, fig. 2:1	36171	Surface
FPA8	IM	Open vessel	IIIC?	Local/regional	ICP		84314	Surface
FPA9	IM	Open vessel (krater)	IIIC?	Local/regional	ICP	Bettelli, Cupitò 2010, fig. 5	84313	Surface
CASTELLO DEL TARTARO (65)								
CTA1	IM	Closed vessel	IIIC?	Local/regional	INAA	Jones *et al.* 2002, fig. 2:5		Surface
TERRANEGRA (66)								
TNE1	IM?	Closed vessel	IIIC? or IA	Local/regional	ICP	Salzani *et al.* 2006, fig. 3:5		US949 Area Lotti
TNE2	IM?	Closed vessel	IIIC? or IA	Local/regional	ICP	Salzani *et al.* 2006, fig. 3:4		Area strada?
BOVOLONE (67)								
BOV1	IM	Closed vessel	IIIA2-B1	Local/regional?	ICP	Salzani *et al.* 2006, fig. 3:2		US2722
BOV2	IM	Closed vessel	IIIB-C	Local/regional?	ICP	Salzani *et al.* 2006, fig. 3:3		US2722
BOV3	IM	Krater? Hig-swung handle	IIIB-C	Local/regional?	ICP	Salzani *et al.* 2006, fig. 3:1		US2723
BOV4	IM	Open shape	III	Local/Regional but different from BOV1-3	ICP			US2013
MONTAGNANA (68)								
MON1	IM	Closed vessel?	IIIC	Local/regional?	AAS-INAA	Jones *et al.* 2002, fig. 3:3		
SICILY								
MULINELLO DI AUGUSTA (69)								
MOL1	M	Piriform jar	IIIA2	Peloponnese	ICP	Orsi 1902, 416, fig. 6	21821	Tomb E
THAPSOS (71)								
THA26	M	Alabastron	IIIA2	Peloponnese but different from THA28-33	ICP	Orsi 1895, fig. 52		Tomb 64
THA27	M	Alabastron	IIIA2?	Peloponnese but different from THA28-33	ICP	Orsi 1895, col. 103		Tomb 7

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
THA28	M	Handle	III	Peloponnese	ICP	Orsi 1895, col. 103		Tomb 7
THA29	M	Stirrup jar	IIIA2	Peloponnese	ICP	Orsi 1895, fig. 42		Tomb 53
THA30	M	Base	III	Peloponnese	ICP	Orsi 1895, col. 98-99		Tomb 2
THA31	M	Alabastron	IIIA1?	Peloponnese	ICP	Taylour 1958, 58, n. 11	63750	Tomb C
THA32	M	Piriform jar	IIIA2-B	Peloponnese	ICP	Voza 1973, 35, tav. VI, 78	69345	Tomb D
THA33	M	Base (closed vessel?)	III	Peloponnese	ICP	Orsi 1895, col. 98-99		Tomb 2
BUSCEMI (73)								
MAI1	M	Stirrup jar	IIIB	Peloponnese	ICP	Tinè, Vagnetti 1967, tav. 17:73	72357	
MADRE CHIESA (78)								
MC3	M	Piriform jar	IIIA	Peloponnese	INAA	Castellana 2000, fig. 48d	MC93/15	
MONTE GRANDE (79)								
MG1	MP	Closed vessel	I-II	Attica	INAA	Castellana 1998, fig. 125,II:15	93/84	
MG2	MP	Open vessel	I-II	Attica	INAA	Castellana 1998, fig.125,II:18	93/89	
MG3	MP	Closed vessel	I-II	Attica	INAA	Castellana 1998, fig.125,II:21	93/118	
MG7	BU?	Open vessel	I-II	Attica	INAA	Castellana 1998, fig. 125,III:28	93/67	
MG8	BU?	Open vessel	I-II	Attica	INAA	Castellana 1998, fig.125,III:27	93/101	
MG9	BU?	Open vessel	I-II	Attica	INAA	Castellana 1998, fig.125,III:26	93/90	
MG6	M?	Open vessel	I-II?	Attica	INAA	Castellana 1998, 227, n. 1	93/66	
MILENA - MONTE CAMPANELLA (80)								
MIL57	M	Amphoroid krater	IIIB2-C early	Central Crete or Peloponnese	AAS-XRF-INAA	La Rosa 1986, fig. 10		Tomb A
MIL56	IM?	Amphora	IIIB2-C early	Uncertain	AAS-XRF-INAA	La Rosa 1986, fig. 9		Tomb B
CANNATELLO (82)								
CAN4570	M	Wall of closed vase, red band		Peloponnese?	ICP			
CAN4592	M	Foot of small amphora		Peloponnese?	ICP			
CAN4766	M	stem of bowl		Peloponnese	ICP			

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
CAN4771	M	Wall of amphora or jug with brown band		Peloponnese	ICP			
CAN4774	M	Shoulder and wall of stirrup jar with band		Peloponnese?	ICP			
CAN4885	M	Small amphora with bands		Peloponnese	ICP			
CAN4896	M	Wall of small amphora with bands		Peloponnese	ICP			
CAN4913	M	Wall of small amphora		Peloponnese	ICP			
CAN4916	M	Decorated amphora with brown glossy paint and bands		Peloponnese?	ICP			
CAN4601	M	Stirrup jar		C. Greece/C. Crete	ICP			
CAN4571	M	Shoulder of container vessel with brown paint		not Mainland or C. Crete; could be Cyclades	ICP			
CAN401	P	Pithos. Yellowish, with grooves		(S) Cyprus	ICP			
CAN402	P	Pithos. Yellowish, with horizontal and wavy grooves		(S) Cyprus	ICP		AG/54644	
MARINA DI AGRIGENTO (83)								
AGR1	M	Piriform jar	IIIA2	(N) Peloponnese	INAA	Tusa 1997a, 186, V.57	AG/20448	25359
USTICA (86)								
UST1	IM?			Uncertain	ICP			
SALINA (88)								
POR1	P	Pithos	MB3 context	(S) Cyprus	ICP	Martinelli 2005, fig. 98	24923	Trench 1 above hut P, US38
POR3	P	Pithos	MB3 context	(S) Cyprus	ICP	Martinelli 2005, fig. 98	ME16234	Trench 1 above hut P, US38

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
LIPARI (89)								
MIC2	M	Amphora or jug	IIIB-C	Peloponnese	PE-ICP	Taylour 1980, tav. CLX:19	6688	BM13 hut gamma XII
MIC3	M	Necked jar	II	Peloponnese	ICP	Taylour 1980, tav. CXLVIII:1	7991	N2
MIC4	M	Closed vessel	IIIC	Peloponnese	ICP	Taylour 1980, tav. CCXLV:9	5746	CC-CE 14-16,17
MIC5	M	Krater?	III	Peloponnese	ICP	Taylour 1980, tav. CCXLIV:5	8996	BH 20 est a II
MIC7	M	Bridge-spouted jug	I-II	Peloponnese	ICP	Taylour 1980, tav. XLIV:12; XLV, e	7971	OE2 hut delta V
MIC8	M	Krater	IIIB	Peloponnese	ICP	Taylour 1980, tav. CLX:14, CLXI, n	7898	BC 17
MIC9	M	Jug with cut-away neck	II-IIIA	Aegean?	ICP	Taylour 1980, tav. CXLVIII:17	7988	N2
MIC10	M	Amphora or jug	IIIB?	Aegean	ICP	Taylour 1980, tav. CXCIII:h	6670	BM 65 10-11
MIC1	M?	Base of uncertain shape	III	Uncertain	ICP	Taylour 1980, tav. CLII:25	7822	Hut gamma II (A I)
MIC6	P	Base, pithos?	?	Uncertain	PE-ICP	Taylour 1980, tav. CLXII:20	7478	T2 hut gamma III
SARDINIA								
OROSEI (92)								
O21, O22	M	Krater	IIIB	Peloponnese	AAS	Vagnetti 1982e, tav. LXIX:1b; 1a	38892, 38893	
O23	M	Deep bowl?	IIIB-C	Peloponnese	AAS	Vagnetti 1982e, tav. LXIX:2	38894	
O24	M	Base	III	Peloponnese	AAS		38895	
O25	M	Open vessel	IIIB-C	Peloponnese	AAS	Vagnetti 1982e, tav. LXIX:3	38896	
O26	M	Open vessel	IIIB-C	Peloponnese	AAS	Vagnetti 1982e, tav. LXIX:4	38897	
O27	M	Vertical handle, closed shape?	IIIB-C	Peloponnese	AAS	Vagnetti 1982e, tav. LXIX:5	38898	
O28	M	Uncertain shape	IIIB-C	Peloponnese	AAS		38899	
O29	M	Bowl/cup	IIIB-C	Peloponnese	AAS		38900	
O30	M	Krater?	IIIB-C	Peloponnese	AAS		38901	
O31	M	Closed vessel	IIIB-C	Peloponnese	AAS		38902	
O32	M	Uncertain shape	IIIB-C	Peloponnese	AAS		38904	
O33	M	Uncertain shape	IIIB-C	Peloponnese	AAS		38905	
NURAGHE ARRUBIU (94)								
ORL1	M	Alabastron	IIIA2	Peloponnese	AAS	Lo Schiavo, Vagnetti 1993, fig. 4		

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
NURAGHE ANTIGORI (98)								
AN1	M	Large container jar	III	Peloponnese	AAS	Ferrarese Ceruti 1982a, tav. LXV:8	97709	
AN5	M	Rhyton	IIIB	Peloponnese	AAS	Ferrarese Ceruti 1982a, tav. LXIII:5	97720	Room a
AN6	M	Uncertain shape	IIIB-C	Peloponnese	AAS	Ferrarese Ceruti 1981, 608, m7	97721	
AN10	M	Stirrup jar	IIIB-C	Peloponnese	AAS	Ferrarese Ceruti 1982, tav. LXIII:9	97739	
AN19	M	Kylix?	IIIB-C	Peloponnese	AAS	Ferrarese Ceruti 1987 *et al.*, fig. 2.4:1		Room a
AN22	M	Closed vessel	IIIB-C	Peloponnese	AAS	Ferrarerse Ceruti 1986, fig. 4:1		Tower c, layer 3b
AN32	M	Krater	IIIB-C	Peloponnese	AAS	Ferrarese Ceruti 1986, fig. 8:5		Room q, layer 2
AN35	M	Stirrup jar?	IIIB-C	Peloponnese	AAS	Ferarese Ceruti 1983, fig. 8:3		Torre f, room f, layer 9
AN36	M	Closed vessel	IIIB-C	Peloponnese	PE-AAS	Ferarese Ceruti 1983, fig. 8:9		
AN41	M	Deep bowl	IIIC?	Peloponnese	AAS	Ferrarese Ceruti *et al.* 1987, fig. 2.4:2		Room n, layer 4
AN43	M			Peloponnese	AAS			
AN47	M	Piriform jar/amphora?	III	Peloponnese	AAS			Room n, surface
AN58	M			Peloponnese	PE-AAS			
AN61	M	Bowl?	IIIB?	Peloponnese	AAS	Ferrarese Ceruti 1982a, tav. LXIII:3a-b		Room a, layer 9
AN3	M	Cup	IIIB2	(W) Crete	AAS	Ferrarese Ceruti 1982a, tav. LXIII:1	97713	Room a, layer 9
AN9	M	Stirrup jar	IIIB-C	(W) Crete	AAS	Ferrarese Ceruti 1982a, tav. LXIII:7	97738	Room a, layer 13
AN18	M	Bowl/krater	IIIB2	(W) Crete	AAS			
AN23	M	Closed vessel	IIIB-C	(C) Crete	PE-AAS	Ferrarese Ceruti 1986, fig. 4:3		Tower c, layer 3b
AN26	M	Bowl/cup	IIIB2-C	(W) Crete	AAS	Ferrarese Ceruti 1986, fig. 7:3		Room p, layer 4
AN27	M	Stirrup jar	IIIB-C	(W) Crete	AAS	Ferrarese Ceruti 1986, fig. 7:1		Room p, layer 4
AN57	M	Stirrup jar	IIIB	C. Crete/Boeotia	AAS	Ferrarese Ceruti 1982a, fig. LXIII; Ferrarese Ceruti *et al.* 1987, fig. 2.4:3		Room a
AN62	M	Coarse ware stirrup jar		(W) Crete	AAS			
AN54	BR	Base Ring. Base		?	AAS	Lo Schiavo *et al.* 1985, fig. 2:4		Room a
AN55	BR	Base Ring. Wishbone handle		?	AAS	Lo Schiavo *et al.* 1985, fig. 2:5		Tower c, layer 4, hearth
AN44	P	Pithos - herring bone		Local	PE-AAS	Ferrarese Ceruti *et al.* 1987, fig. 2.4:4		Room n, layer 2
AN48	P	Cypriot-type pithos		(S) Cyprus	PE-AAS	Ferrarese Ceruti *et al.* 1987, fig. 2.5		Room p, layer 7

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
AN49	P	Minoan-type pithos		(C) Crete	PE-AAS	Ferrarese Ceruti 1981, 608, m9		Room a
AN2	IM	Bowl/cup	IIIB2	Local	AAS		97711	
AN4	IM	Krater	IIIB-C	Local	AAS	Ferrarese Ceruti 1982a, tav. LXV:1	97717	Room a
AN7	IM	Bowl/cup	IIIB2	Local	AAS	Ferrarese Ceruti 1982a, tav. LXIV:2	97723	
AN8	IM	Krater?	IIIB2	Local	AAS	Ferrarese Ceruti *et al.* 1987, fig. 2.6:5	97724	Room a
AN11	IM	Closed vessel?	IIIB-C	Local	AAS		97740	
AN12	IM	Bowl/krater	IIIB-C	Local	AAS	Ferrarese Ceruti 1979, fig. 2:5	97747	
AN13	IM	Bowl/cup	IIIC	Local	AAS	Ferrarese Ceruti 1982a, tav. LXIV:9	97766	Cave o
AN14	IM	Deep bowl	IIIC	Local	AAS	Ferrarese Ceruti 1982a, tav. LXIV:1	97780	Room a
AN15	IM	Bowl	IIIC	Local	AAS	Ferrarese Ceruti 1982a, tav. LXIV:3	97783	Room a
AN16	IM	Closed vessel	IIIB-C	Local	PE-AAS		97800	
AN17	IM	Krater	IIIC	Local	AAS	Ferrarese Ceruti 1982a, tav. LXV:3	97806	Room a
AN20	IM			Local	AAS			
AN24	IM	Open vessel	IIIB-C	Local	PE-AAS	Ferrarese Ceruti 1986, fig. 4:4		Tower c, layer 4, hearth
AN25	IM	Open vessel	IIIB-C	Local	AAS	Ferrarese Ceruti 1986, fig. 4:2		Tower c, layer 3b
AN28	IM	Closed vessel	IIIB-C	Local	AAS	Ferrarese Ceruti 1986, fig. 7:2		Room p, layer 5
AN29	IM	Closed vessel	IIIB-C	Local	AAS	Ferrarese Ceruti 1986, fig. 7:6		Room p, layer 5
AN30	IM	Bowl	IIIB-C	Local	AAS	Ferrarese Ceruti 1986, fig. 7:4		Room p, layer 5
AN31	IM	Deep bowl?	IIIB-C	Local	AAS	Ferrarese Ceruti 1986, fig. 7:5		Room p, layer 5
AN33	IM	Krater	IIIB-C	Local	AAS	Ferrarese Ceruti 1986, fig. 8:1		Room q, layer 2
AN34	IM	Closed vessel	IIIB-C	Local	AAS	Ferrarese Ceruti 1986, fig. 8:3		Room q, layer 2
AN37	IM	Krater?	IIIB-C	Local	PE-AAS	Ferrarese Ceruti 1983, fig. 8:7		Tower f, room f, layer 9
AN38	IM	Open vessel	IIIB-C	Local	AAS	Ferrarese Ceruti 1983, fig. 8:4		Tower f, room f, layer 9
AN39	IM	Closed vessel	IIIB-C	Local	AAS	Ferrarese Ceruti 1983, fig. 8:8		Tower f, room f, layer 9
AN40	IM	Open vessel?	IIIB-C	Local	AAS	Ferrarese Ceruti 1983, fig. 8:2		Tower f, room f, layer 9
AN42	IM	Closed vessel?	IIIB-C	Local	AAS			
AN45	IM			Local	PE-AAS			
AN46	IM	Closed vessel?		Local	PE-AAS			Room a

Sample	Ware	Description	Date	Suggested origin	Analysis	Publication	Inv. N.	Context
AN56	IM			Local	AAS			
AN59	IM			Local	PE-AAS			
AN60	IM	Bowl/cup		Local	PE-AAS	Vagnetti, Jones 1988, Fig. 3:4		Room a
NURAGHE DOMU S'ORKU (99)								
DO1	M	Closed vessel (jar/ amphora?)	IIIB-C	Central Crete	PE-AAS	Ferrarese Ceruti 1982, tav. LXIV:11	f	Courtyard, trench D, layer 3
DO2	M	Closed vessel	IIIB-C	Central Crete	AAS	Ferrarese Ceruti 1982, tav. LXIV:12	f	Courtyard, trench D, layer 3
DO3	IM	Closed vessel	IIIB-C	Local	PE-AAS	Ferrarese Ceruti 1982, tav. LXIV:10	e	Courtyard, trench A, layer 4
DO4	IM	Wheel made		Local	AAS			Courtyard, trench B, layer 4
DO5	IM	Wheel made		Local	AAS			Courtyard, trench A, layer 4

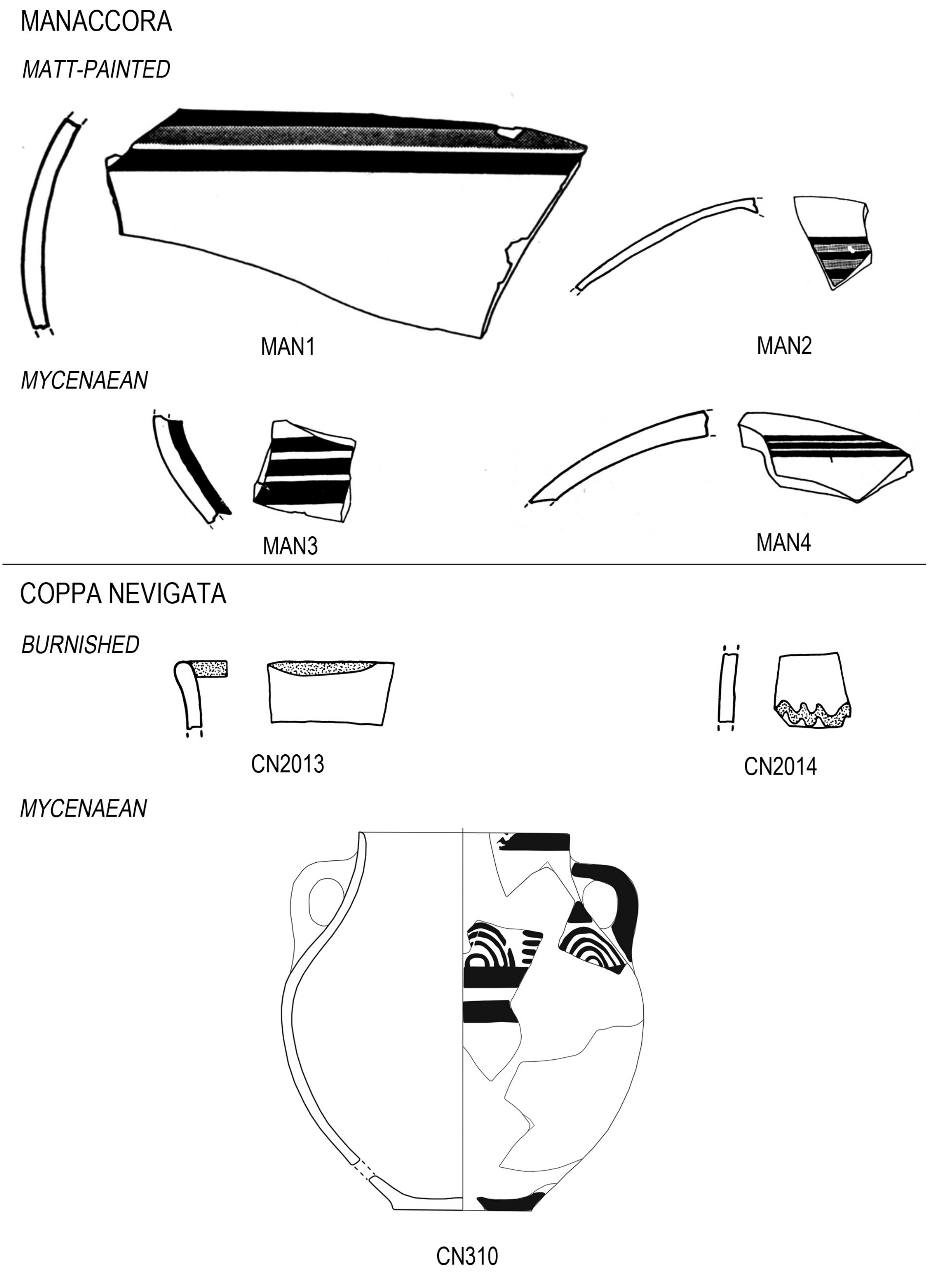


Fig. 4.43. MAN1-4, CN2013-2014 (1:2); CN310 (1:3).

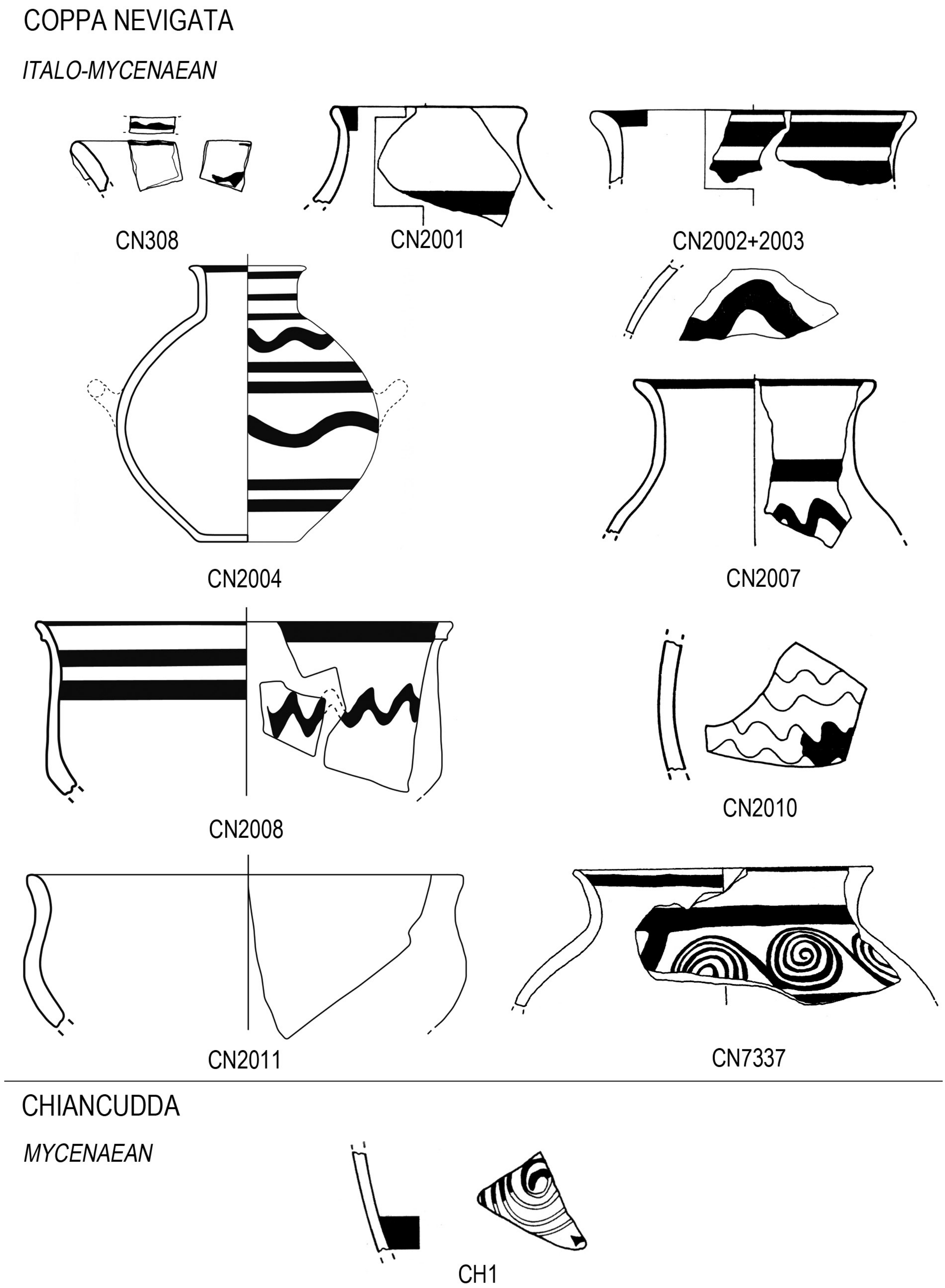


Fig. 4.44. CN308, 2001, 2007-2011, CH1 (1:2); CN2002-2004, 7337 (1:3).

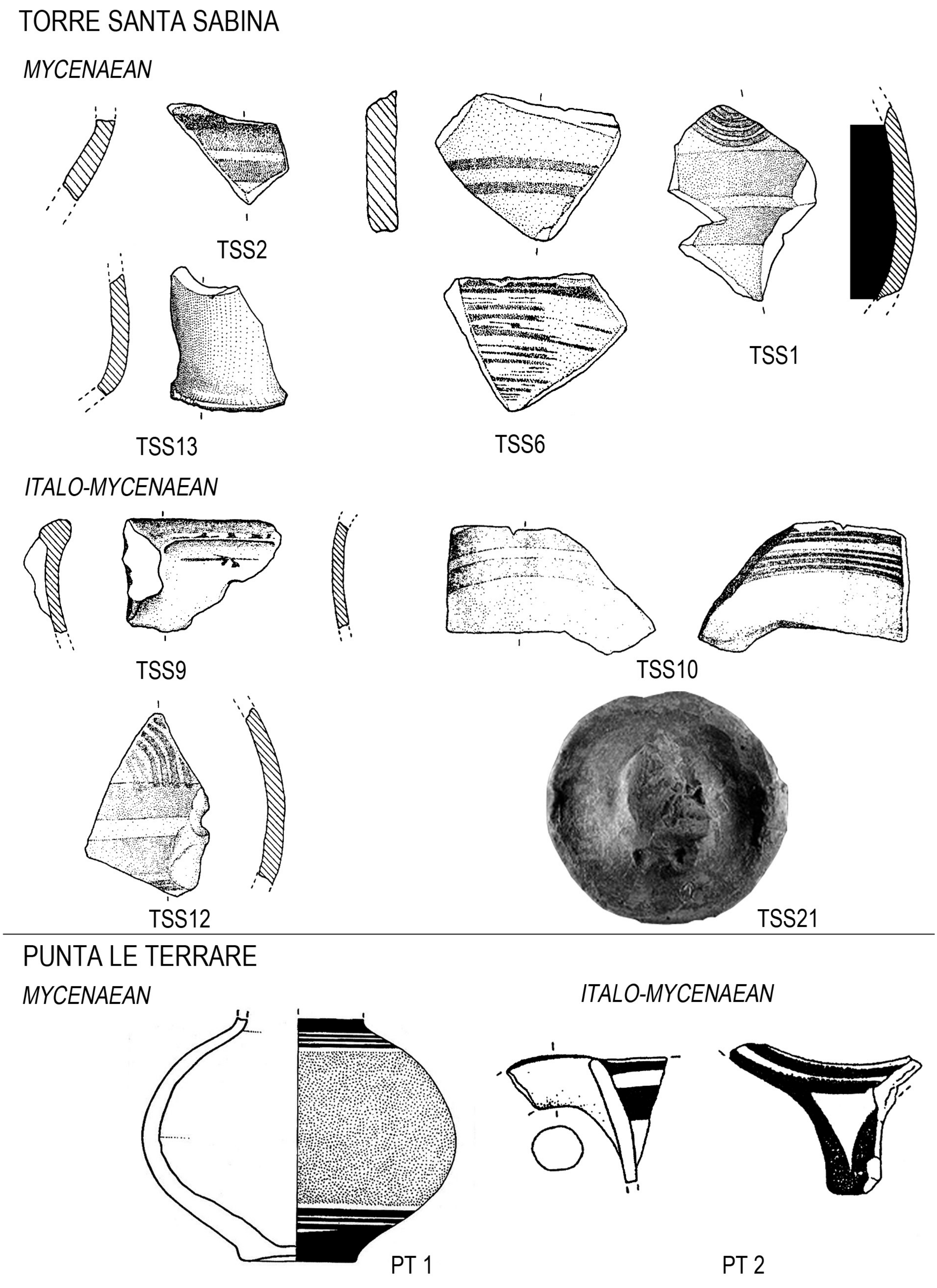


Fig. 4.45.TSS2-12, PT1-2 (1:2); TSS21 not to scale.

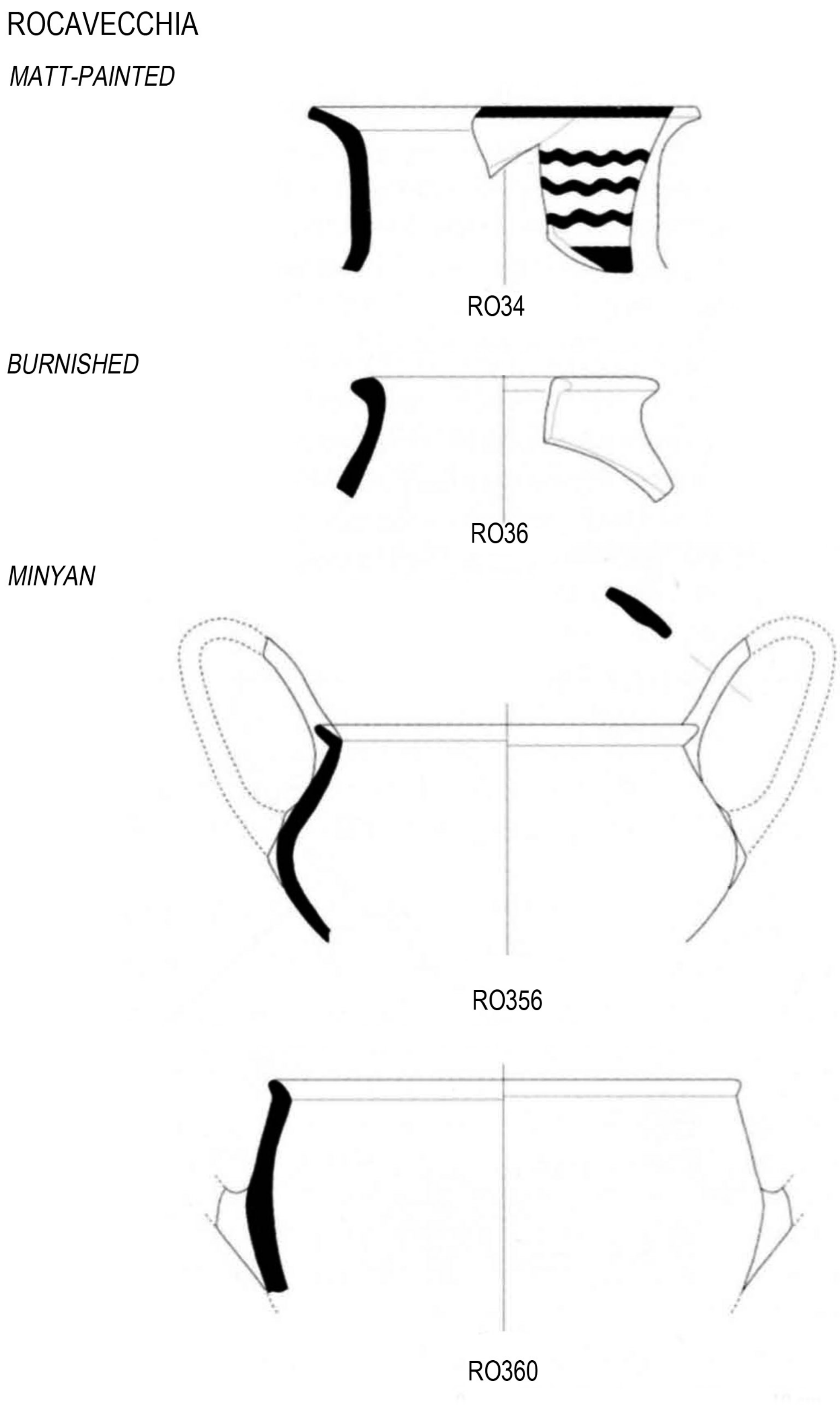


Fig. 4.46. RO34-360 (1:2).

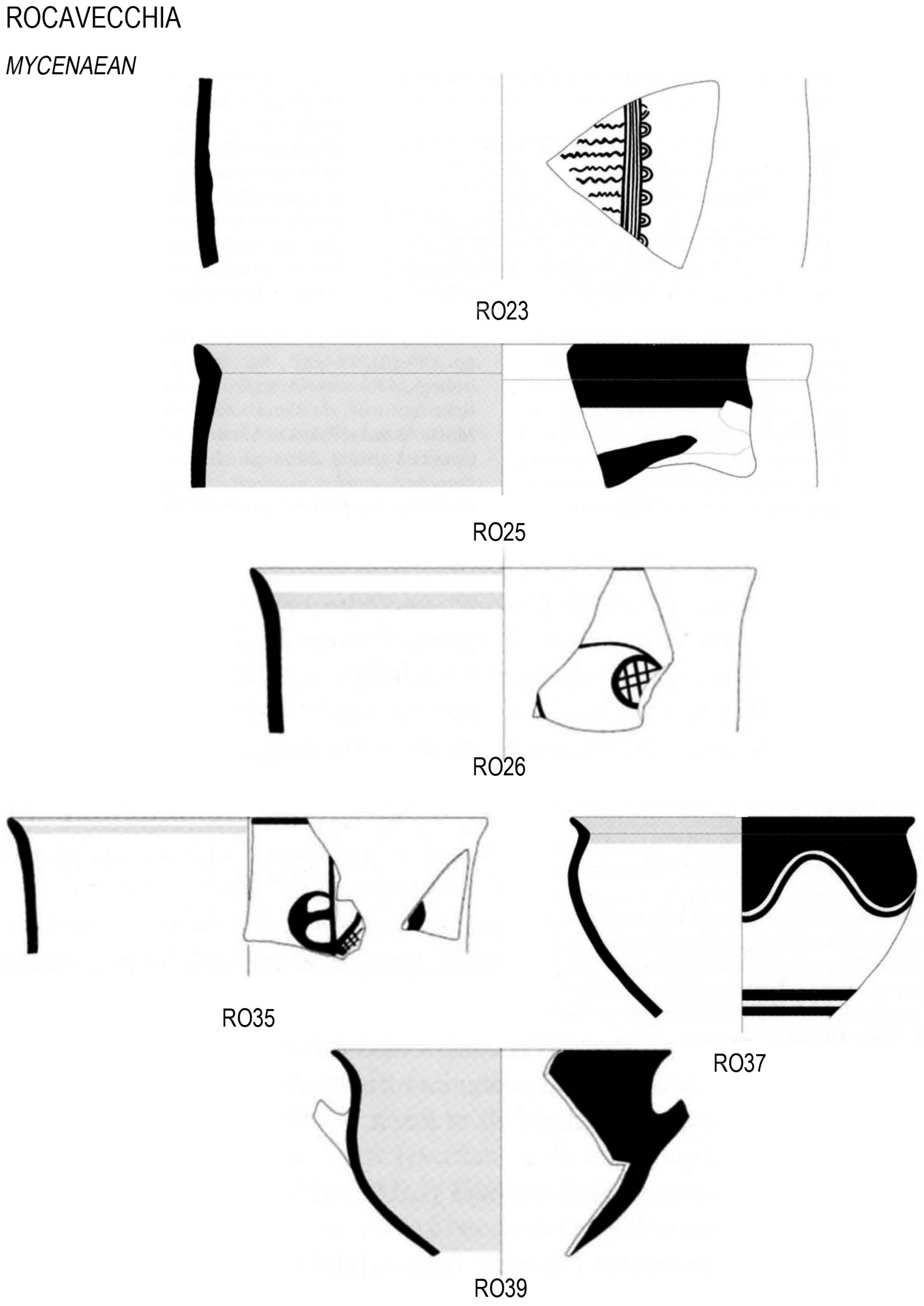


Fig. 4.47. RO12, 26, 35, 39 (1:2); RO23, 25, 37 (1:3).

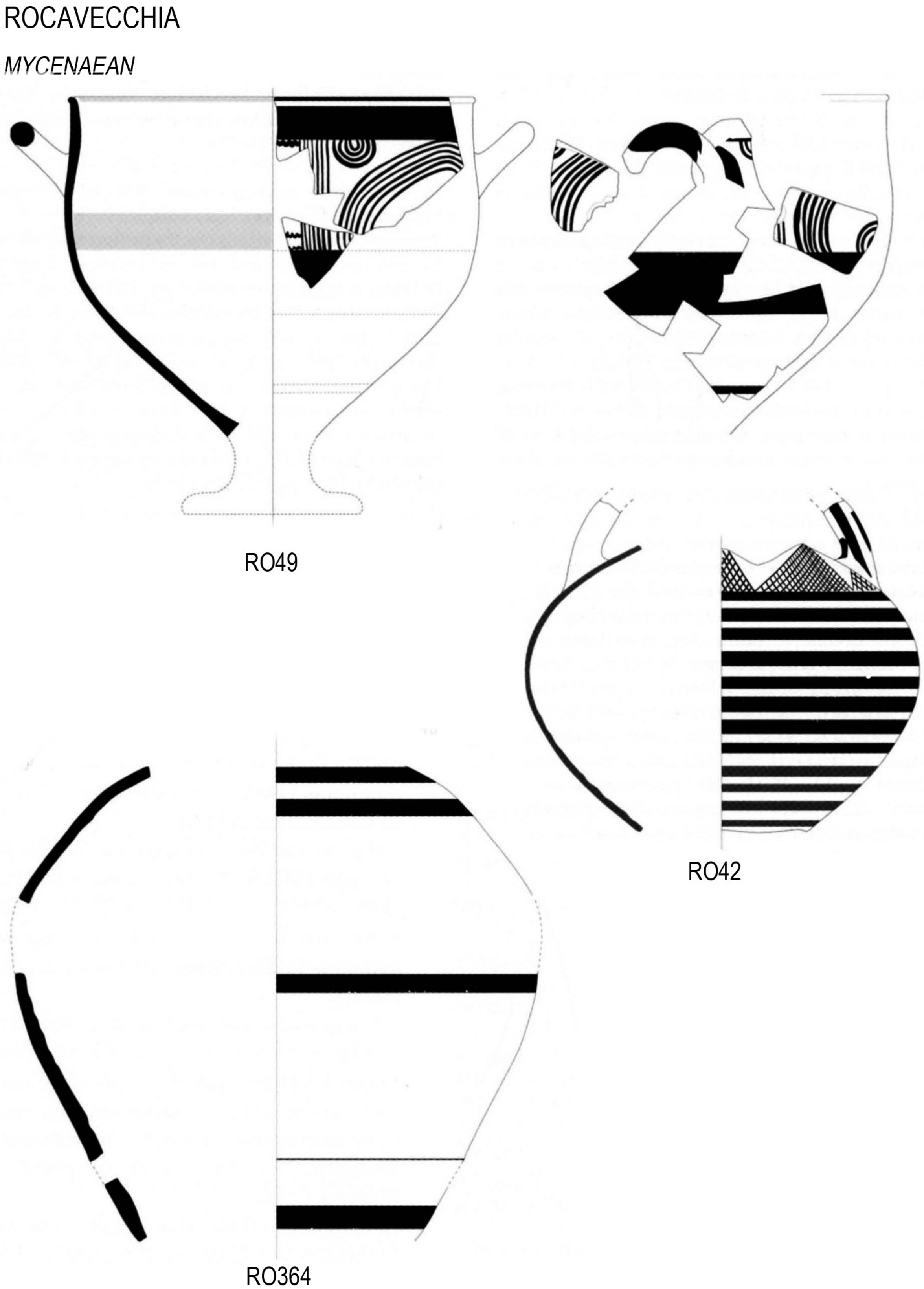


Fig. 4.48. RO49-364 (1:3).

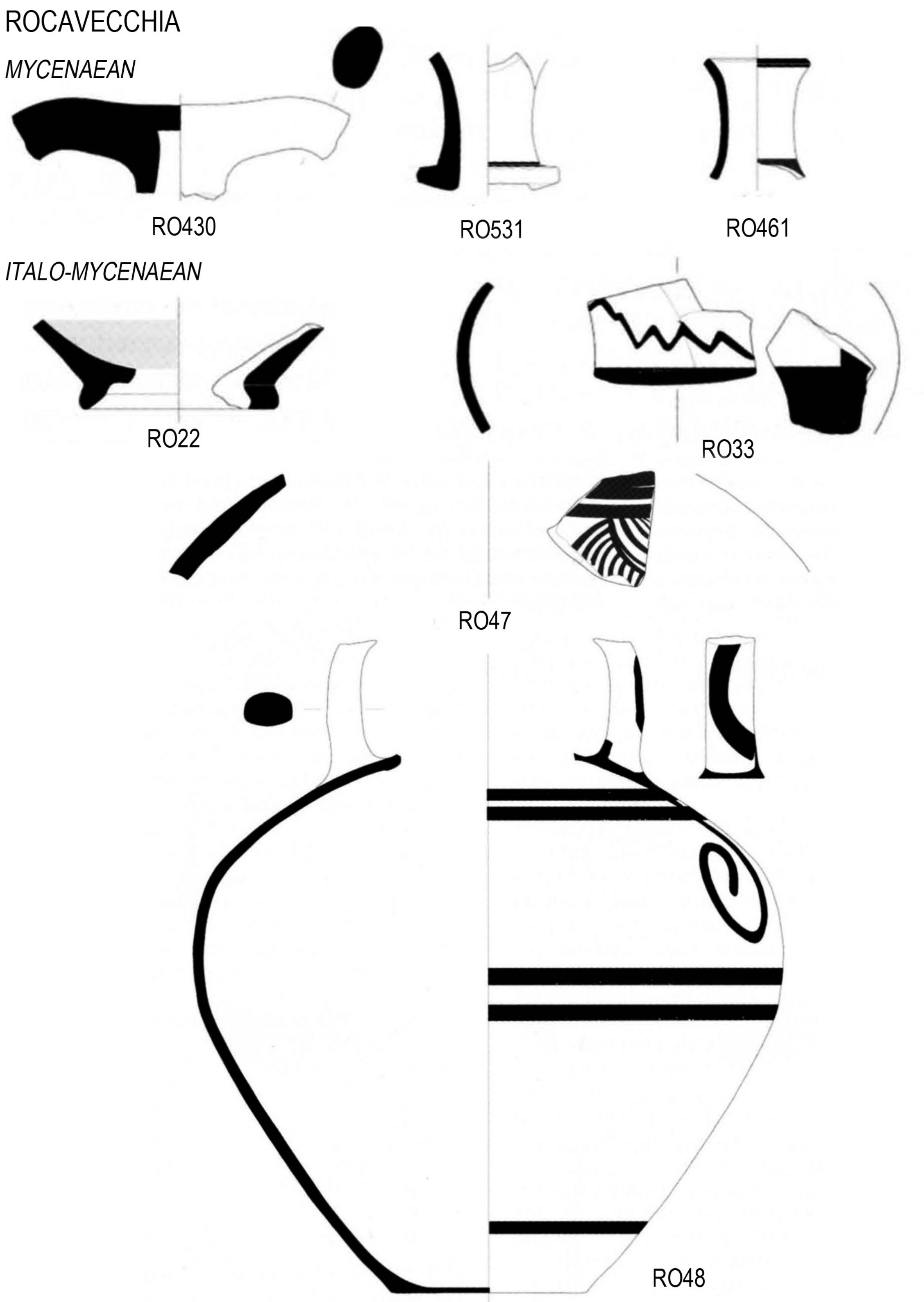


Fig. 4.49. RO22, 33, 430, 461, 531 (1:2); RO47-48 (1:3).

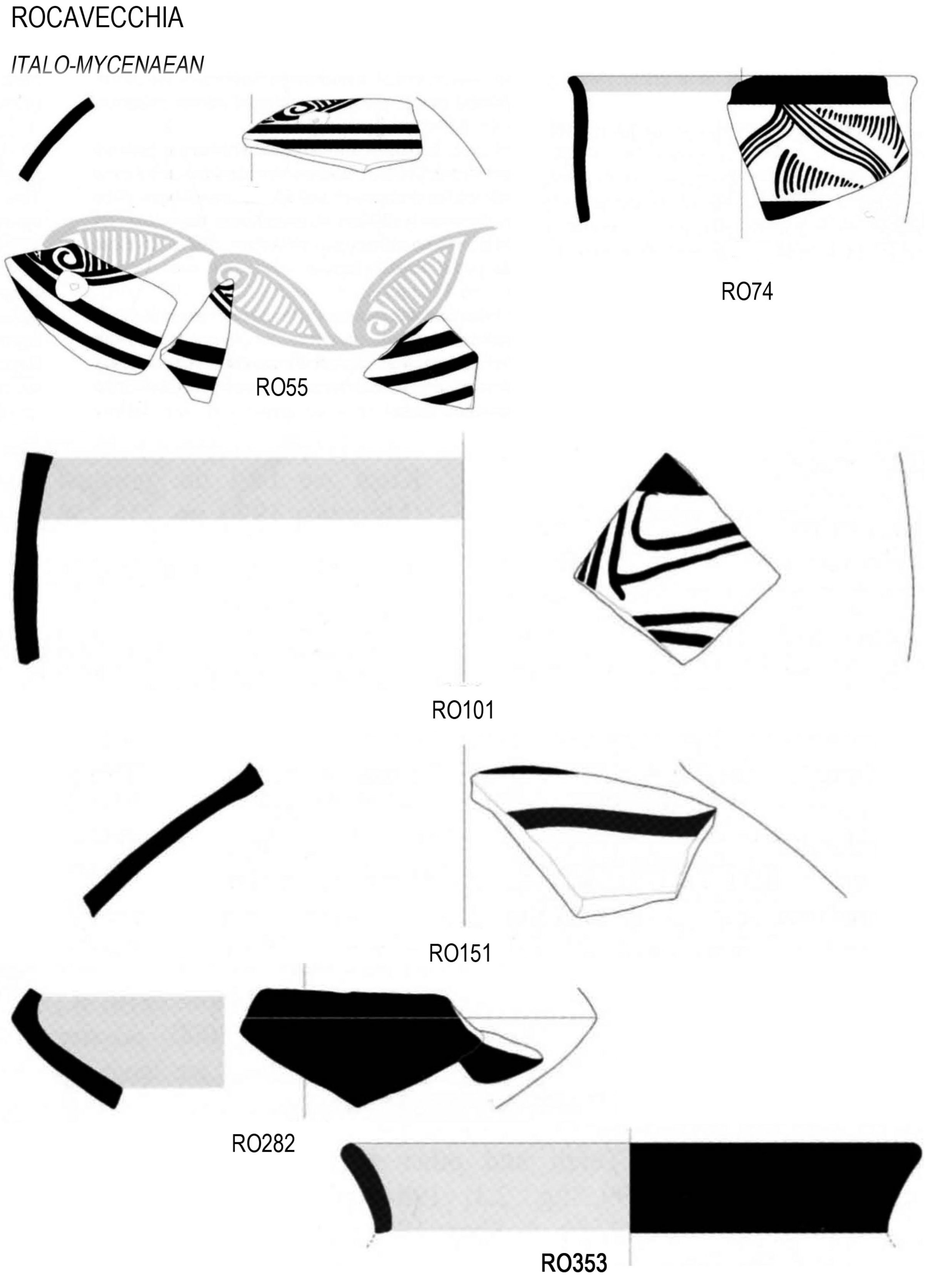


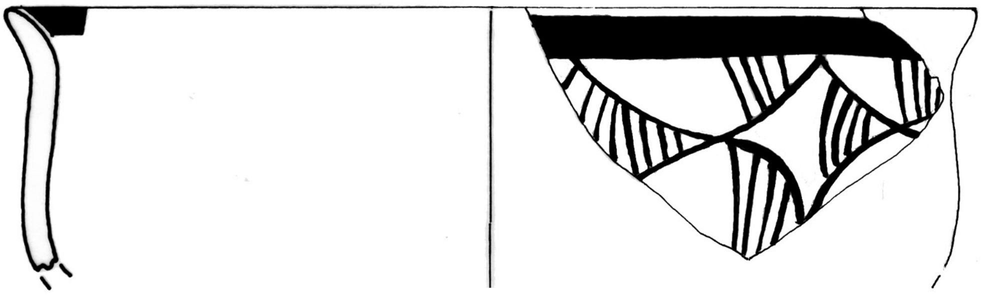
Fig. 4.50. RO101, 151, 282, 353 (1:2); RO55, 74 (1:3).

TORRE CASTELLUCCIA

MYCENAEAN

TCA1

ITALO-MYCENAEAN



TCA22

PORTO PERONE

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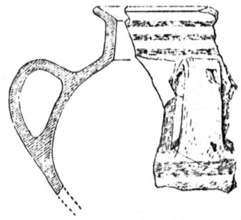
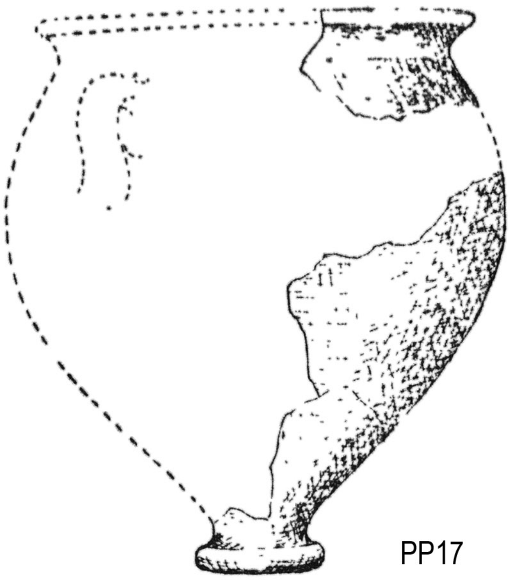


PP16

PITHOI

PP23



PP17

Fig. 4.51. TCA1, 22 (1:2); PP16 (1:4); PP17, 23 (1:8).

PORTO PERONE

ITALO-MYCENAEAN

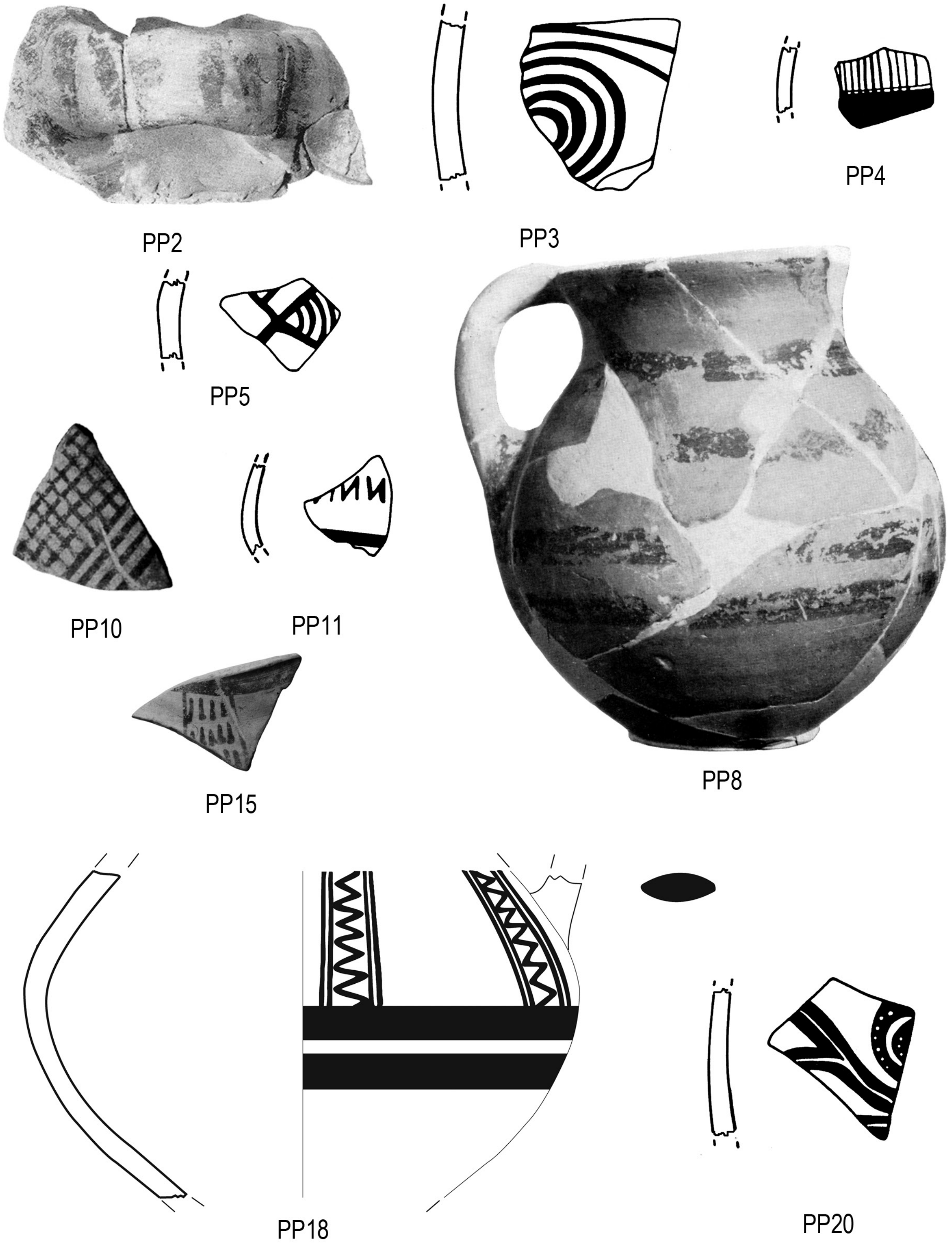


Fig. 4.52. PP2-5,8, 10-11, 15, 20 (1:2); PP18 (1:3).

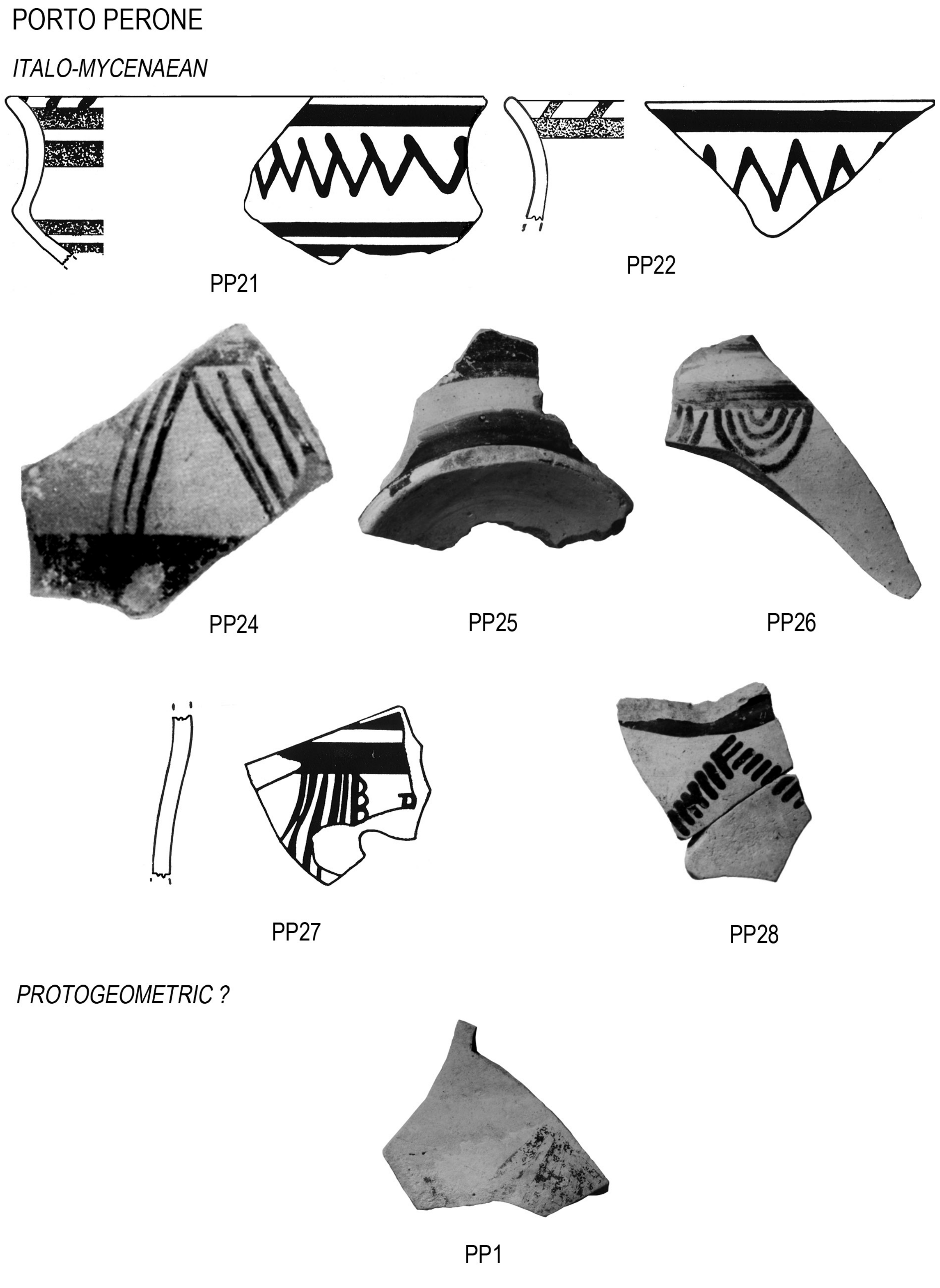


Fig. 4.53. PP21-28, PP1 (1:2).

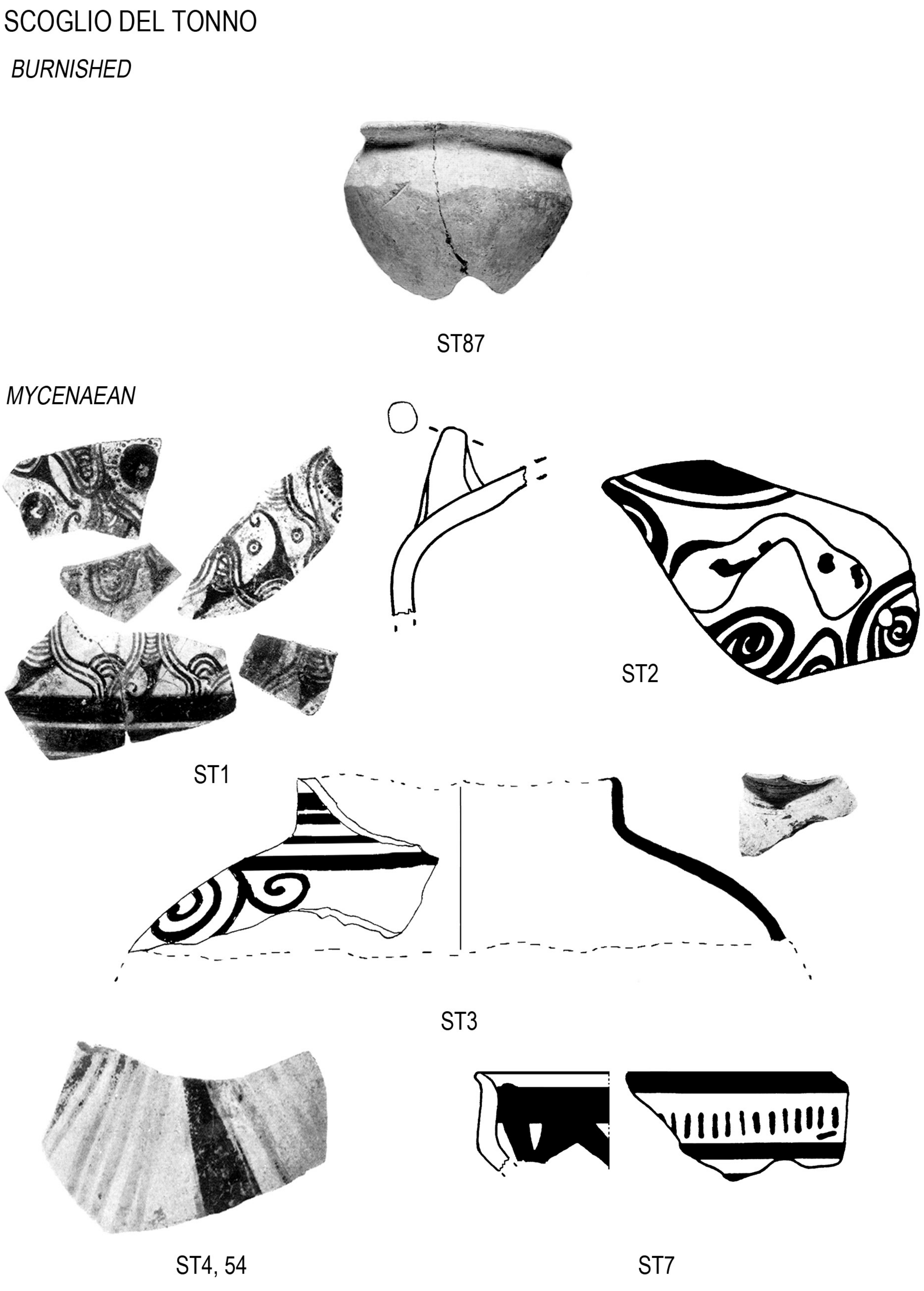


Fig. 4.54. ST1-4, 7, 87 (1:2).

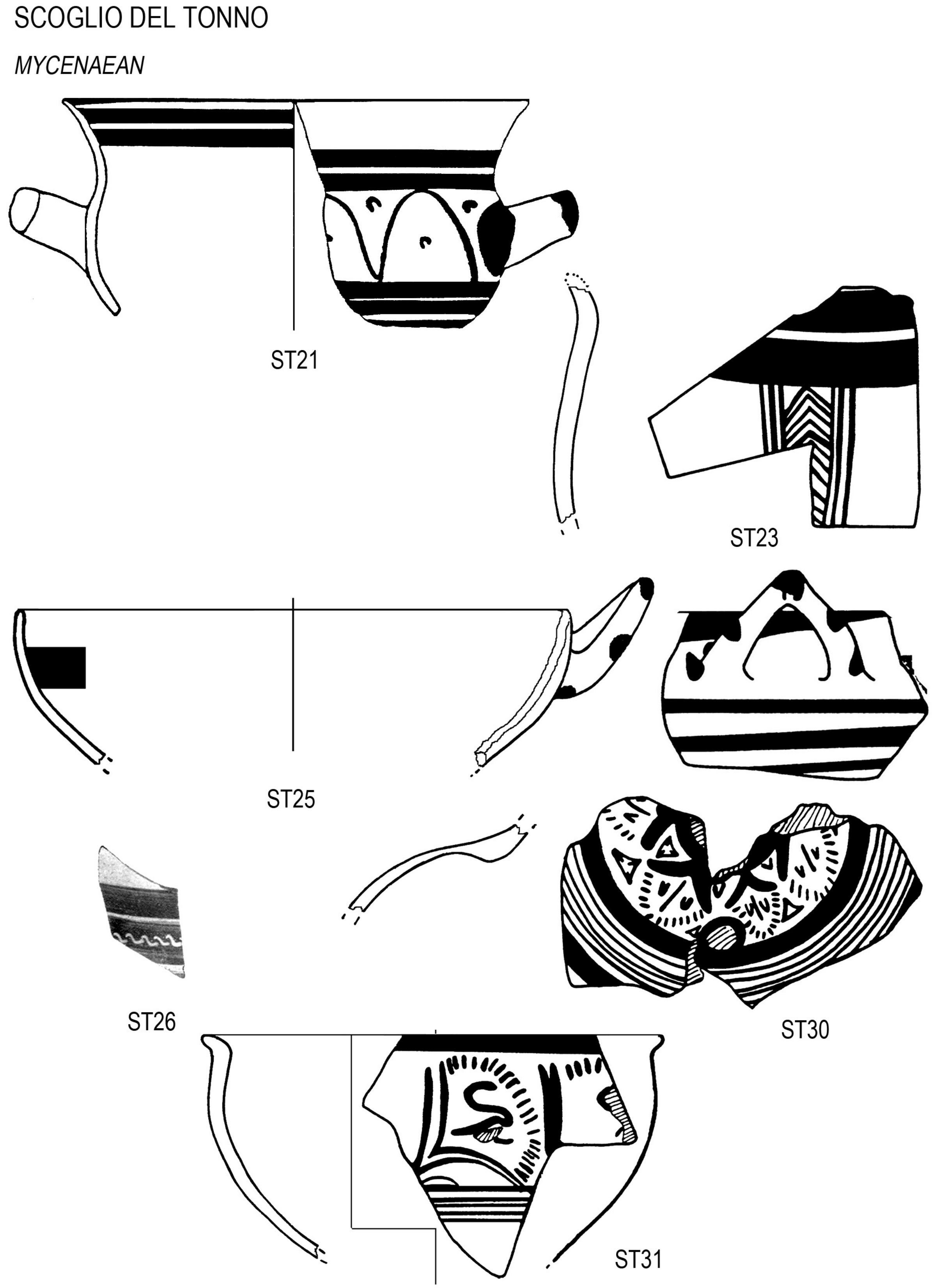


Fig. 4.55. ST 21-25, 30-31 (1:2); ST26 not to scale.

SCOGLIO DEL TONNO

MYCENAEAN

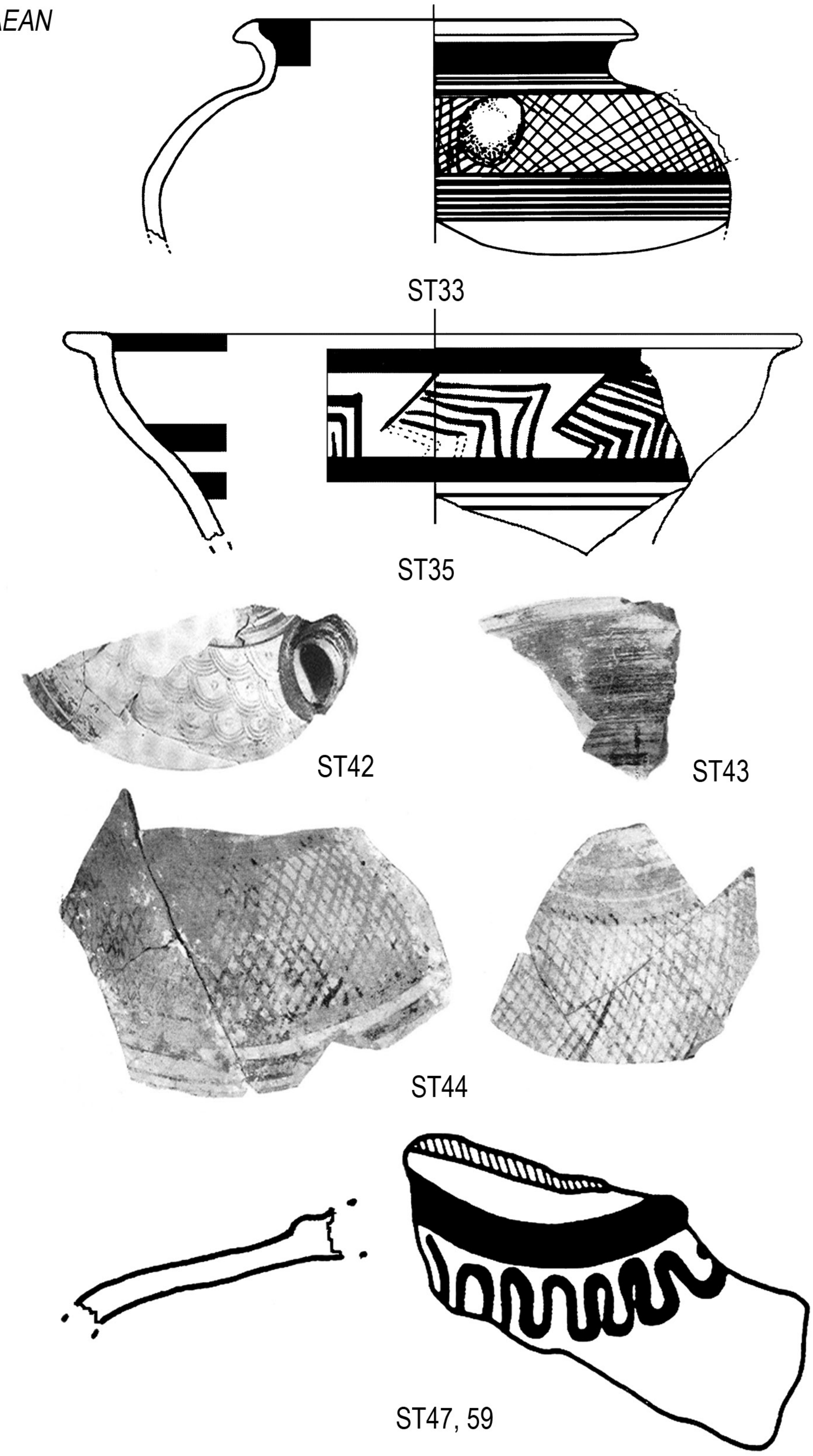


Fig. 4.56. ST33-35, ST47,59 (1:2); ST42-44 not to scale.

SCOGLIO DEL TONNO

MYCENAEAN

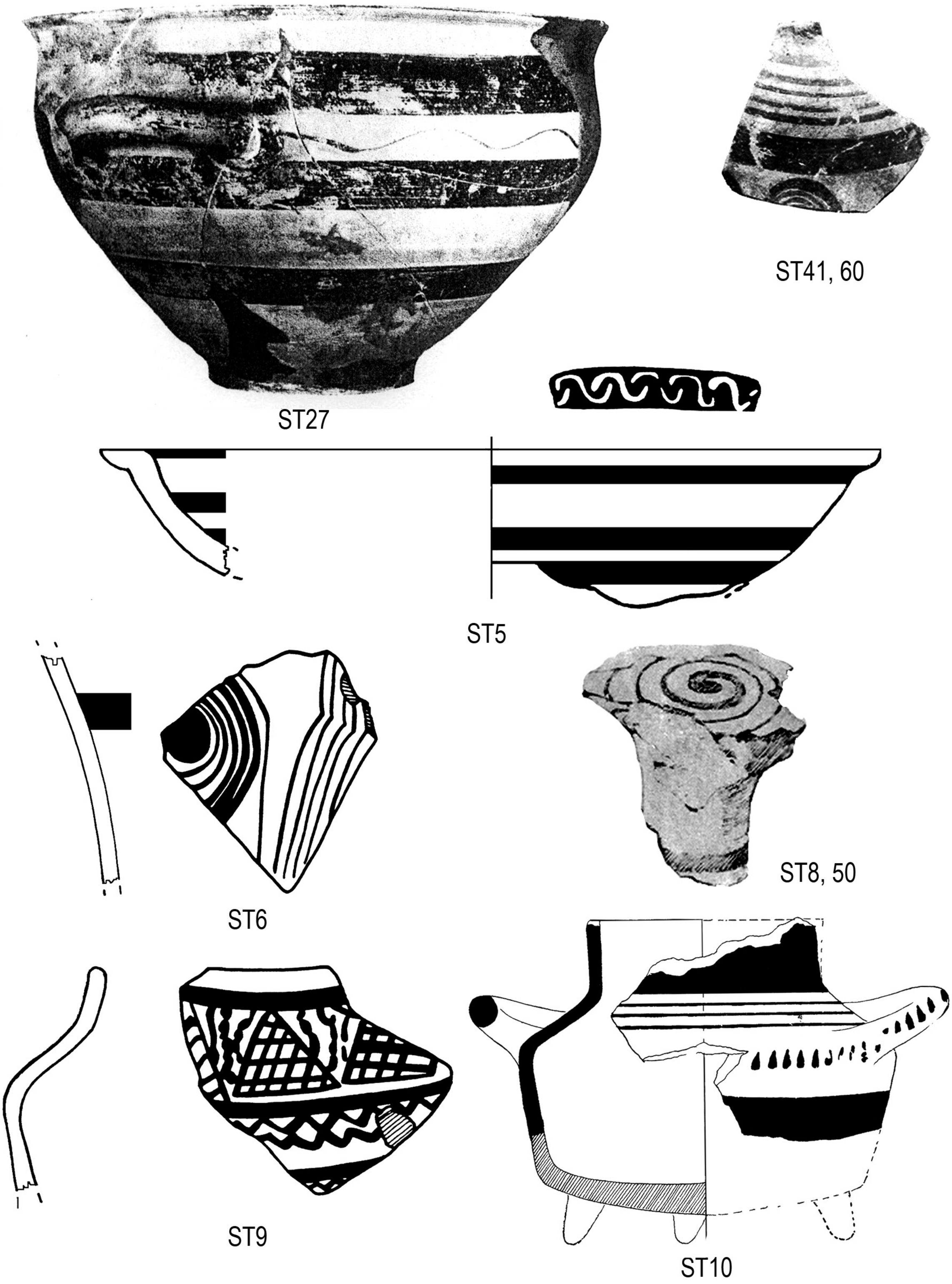
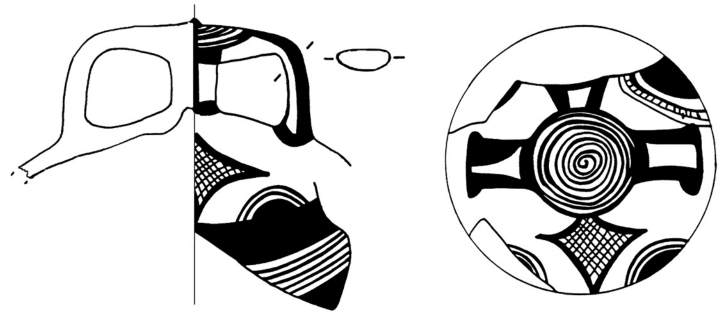


Fig. 4.57. ST27, 5-6, 9-10 (1:2); ST41, 60, ST8, 50 not to scale.

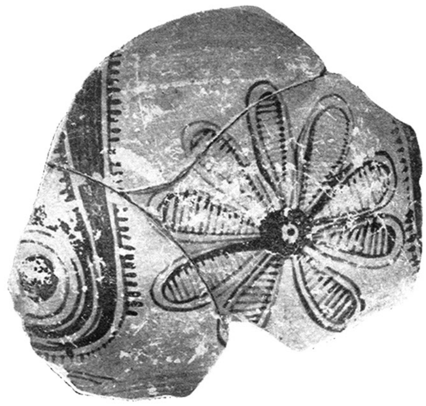
SCOGLIO DEL TONNO

MYCENAEAN

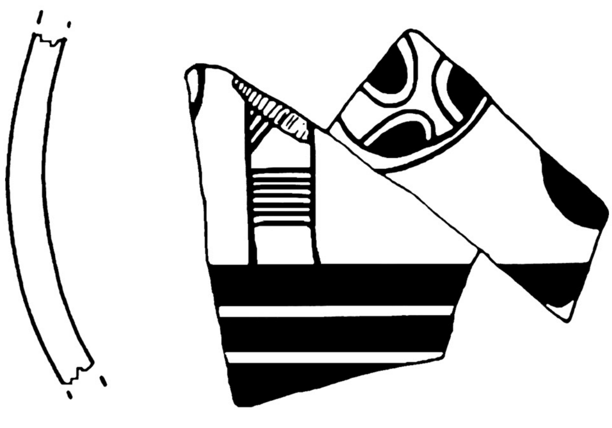


ST32, 63

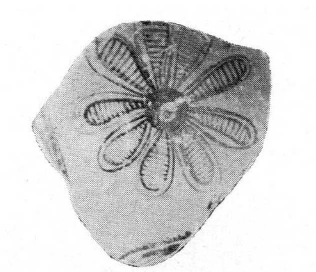
ST43, 58, 64



ST36



ST52, 65



ST57

Fig. 4.58. ST32, 52 (1:2); ST36, 43, 57 not to scale.

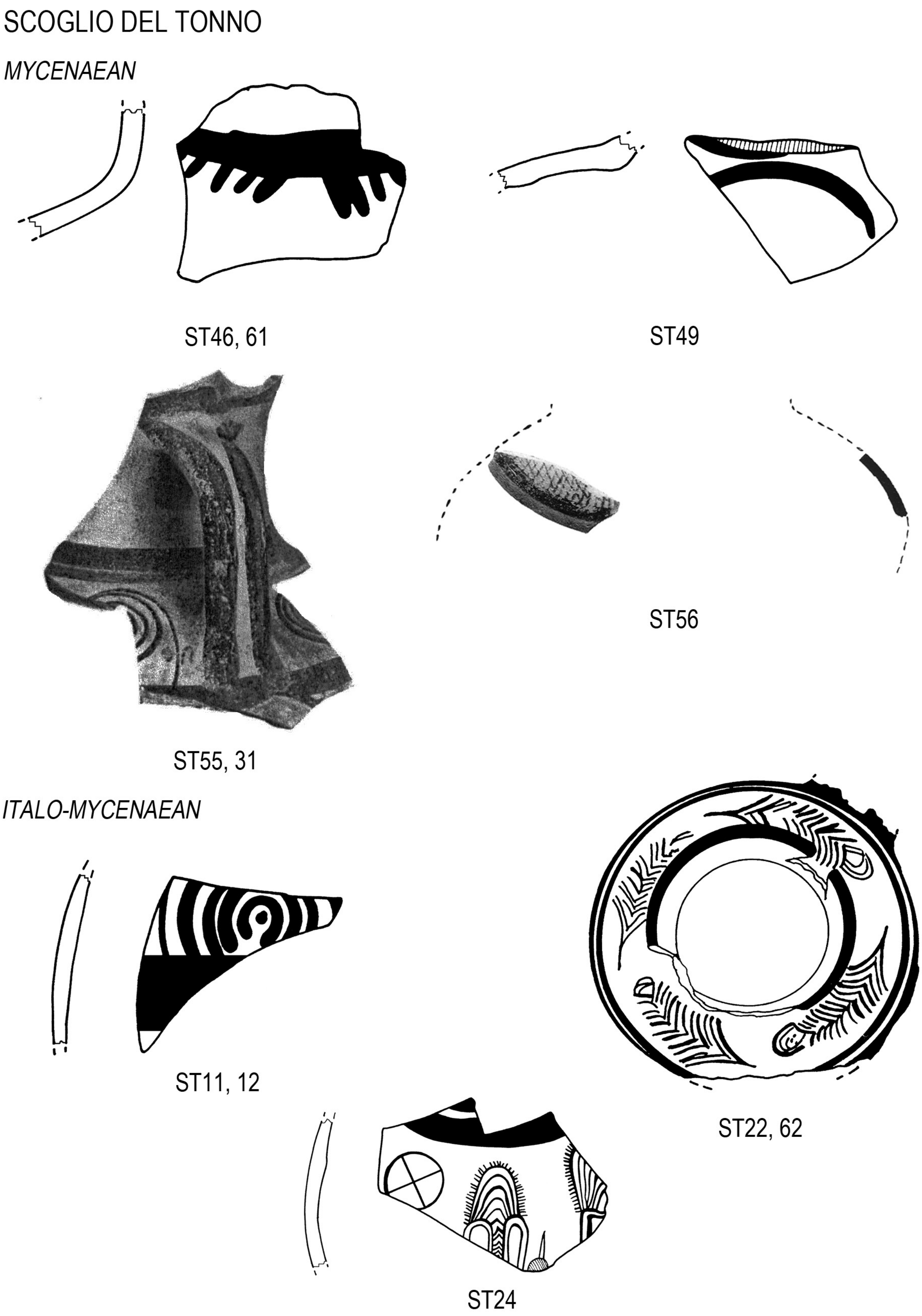


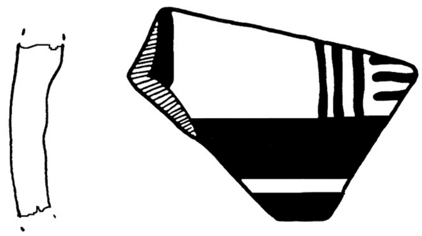
Fig. 4.59. ST11, 22, 24, 46, 49 (1:2); ST55, 56 not to scale.

SCOGLIO DEL TONNO

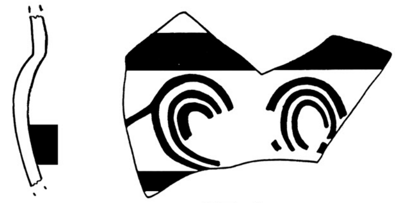
ITALO-MYCENAEAN

ST37

ST28



ST45



ST51

COARSE WARE

ST84

ST85

ST83

ST86

Fig. 4.60. ST37, 45 (1:2); ST51 (1:4); ST28, 83-86 not to scale.

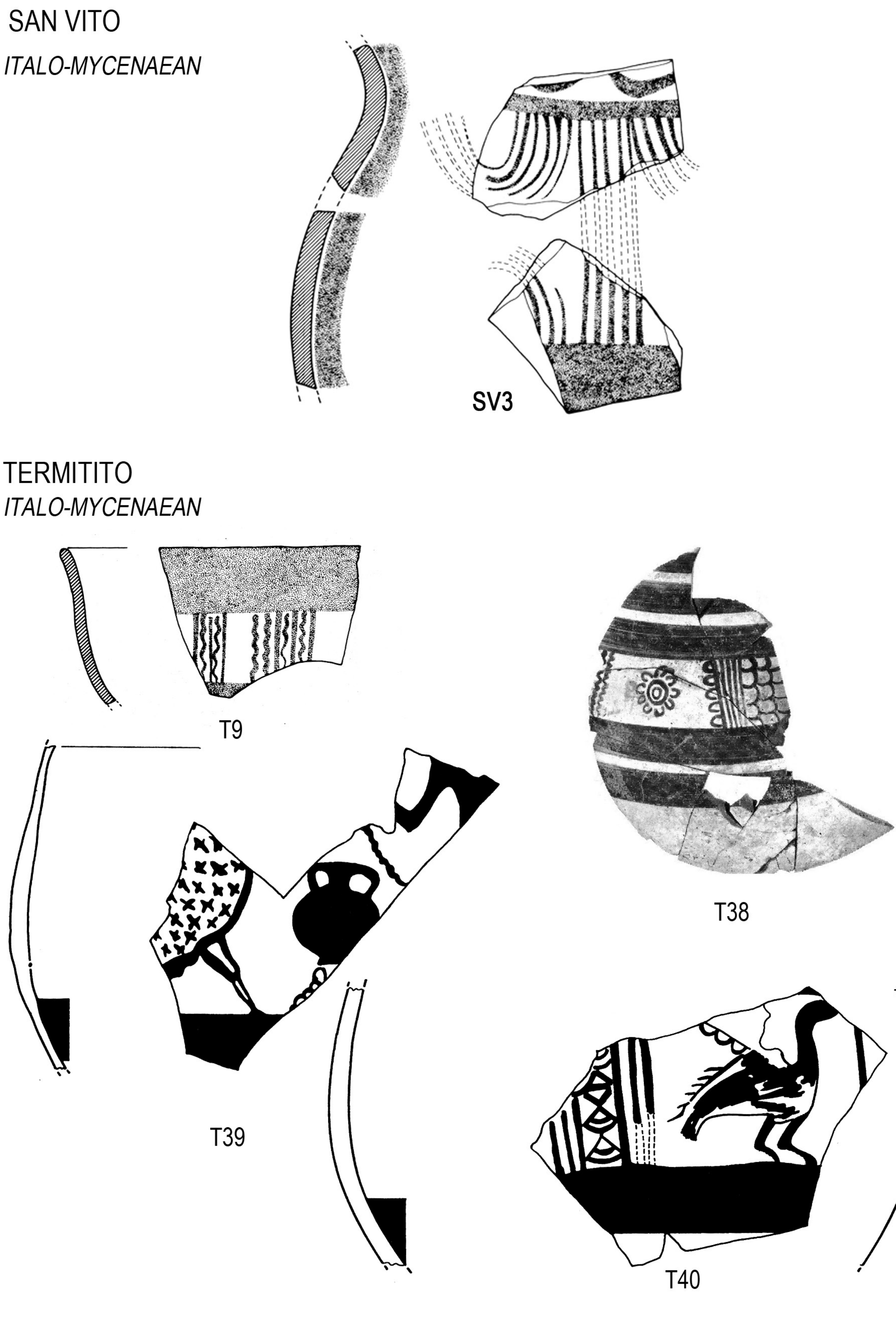
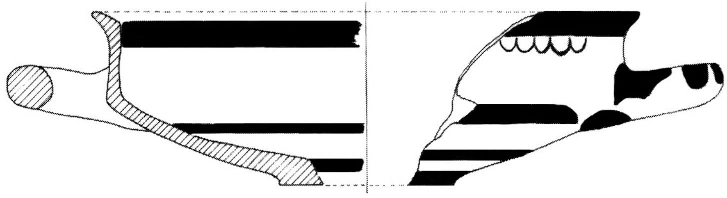


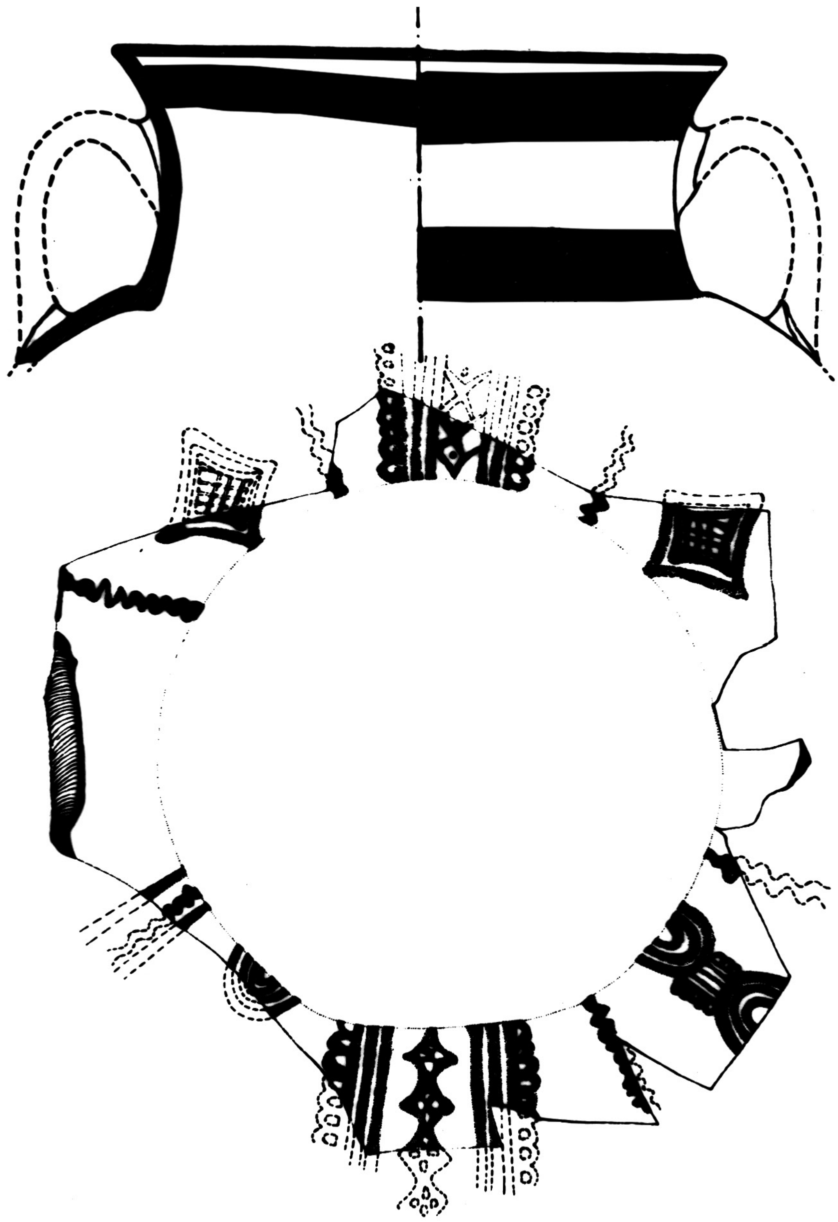
Fig. 4.61. SV3, T9 (1:2); T39-40 (1:3); T38 not to scale.

TERMITITO

ITALO-MYCENAEAN



T41



T33

Fig. 4.62. T41, 43 (1:3).

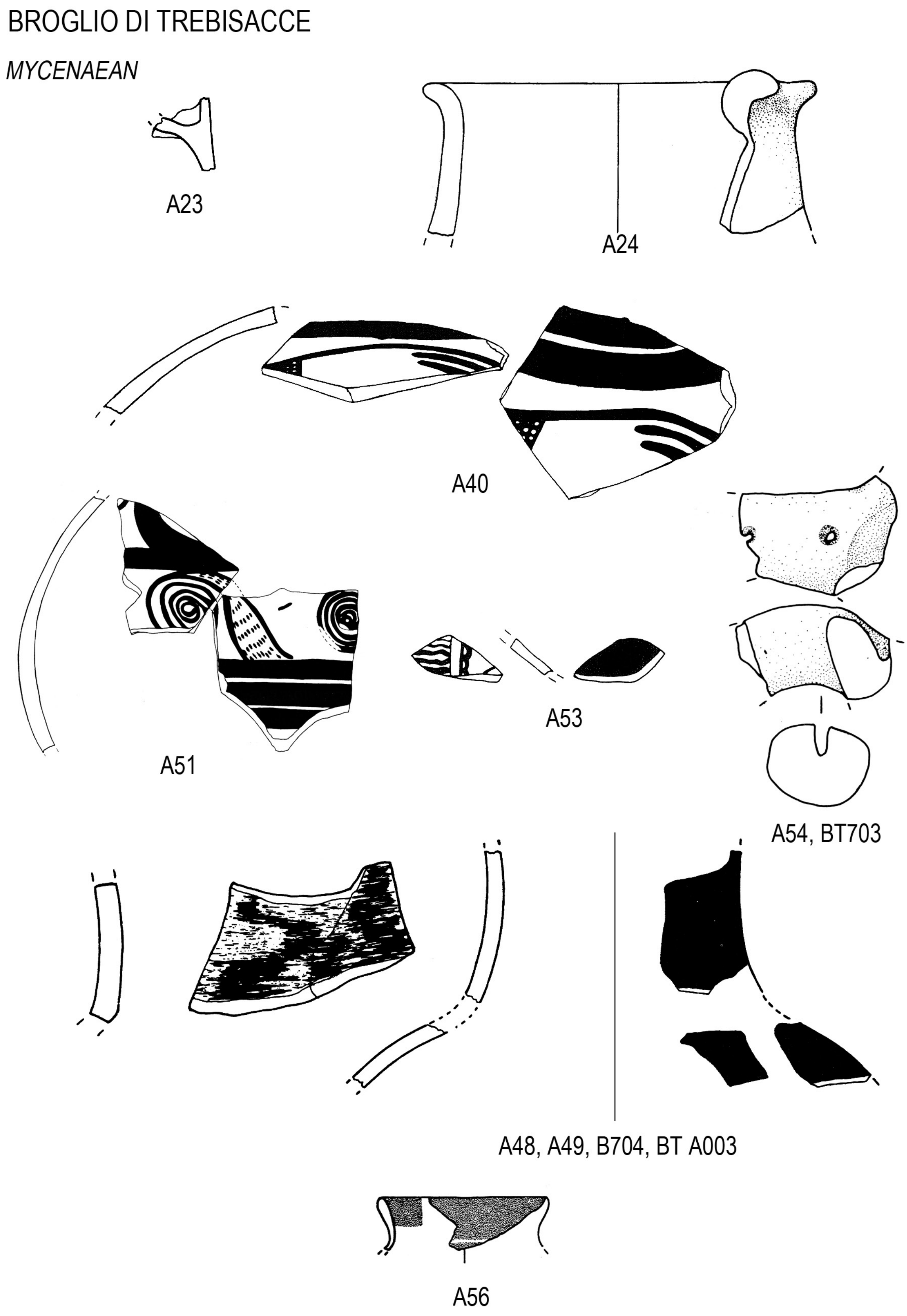


Fig. 4.63. A23-24, 40, 48/BT003, 54, 56 (1:2); A51 (1:3).

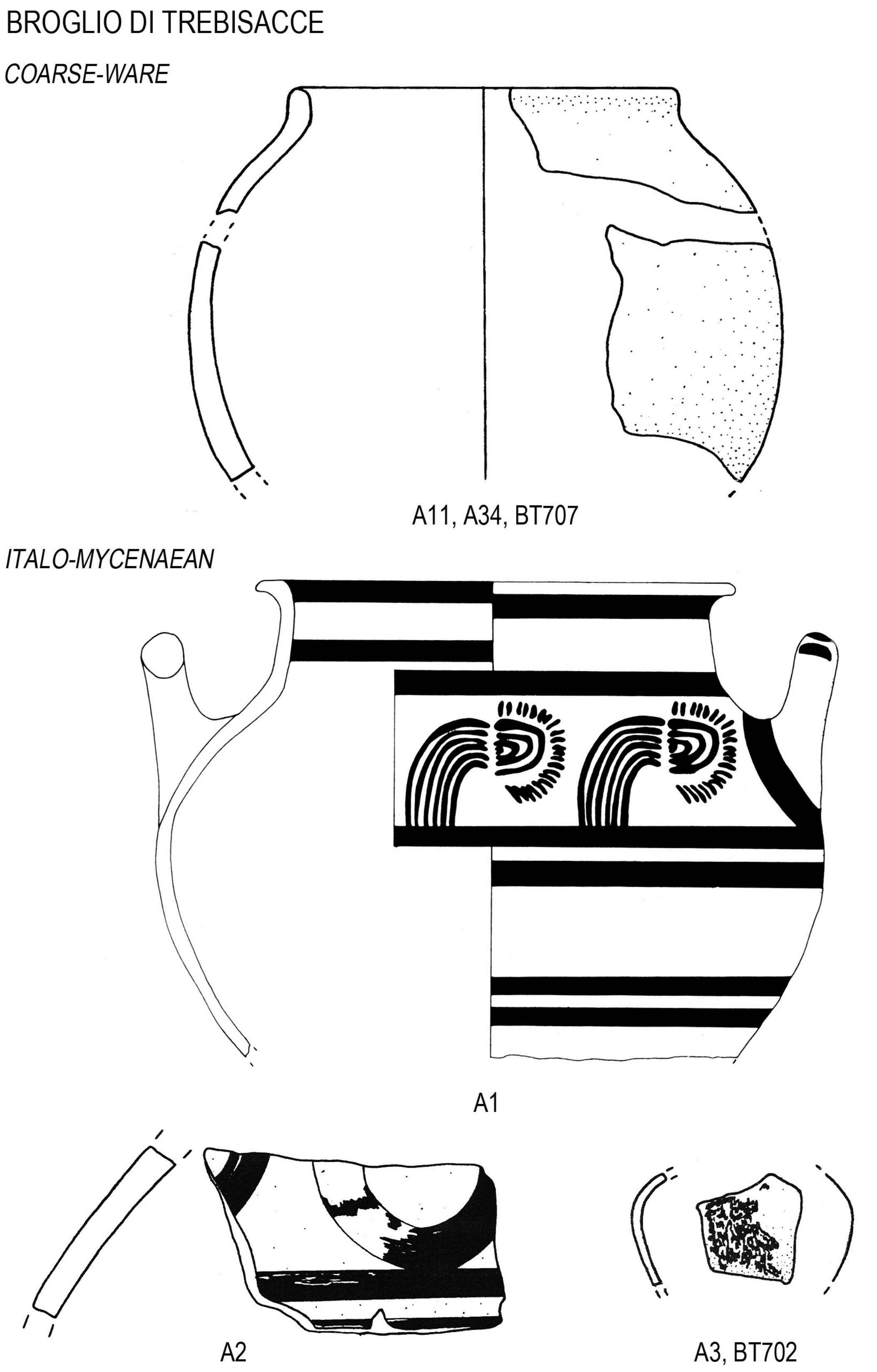


Fig. 4.64. A1-3 (1:2); A11 (1:3).

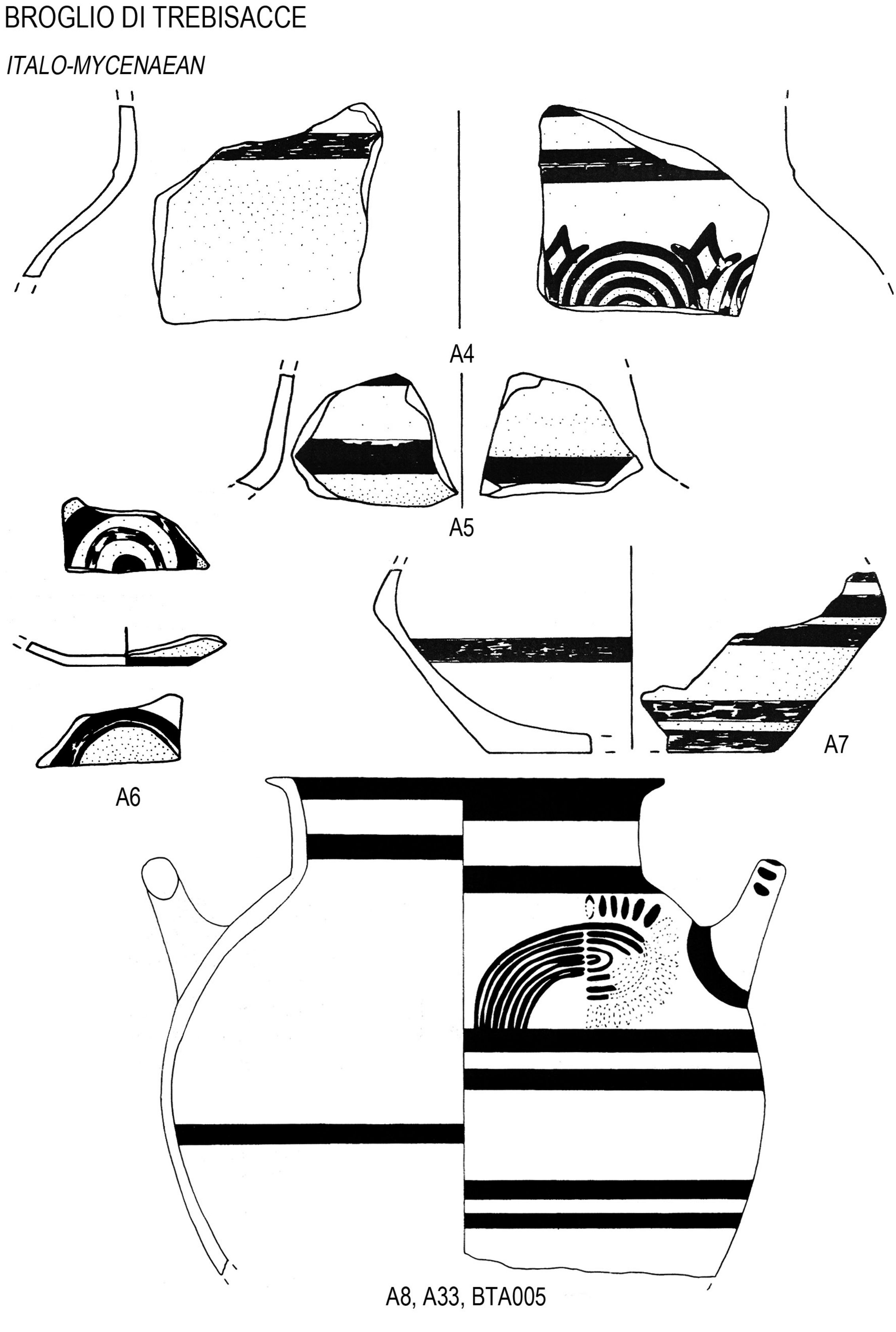


Fig. 4.65. A4-7 (1:2); A8 (1:3).

BROGLIO DI TREBISACCE

ITALO-MYCENAEAN

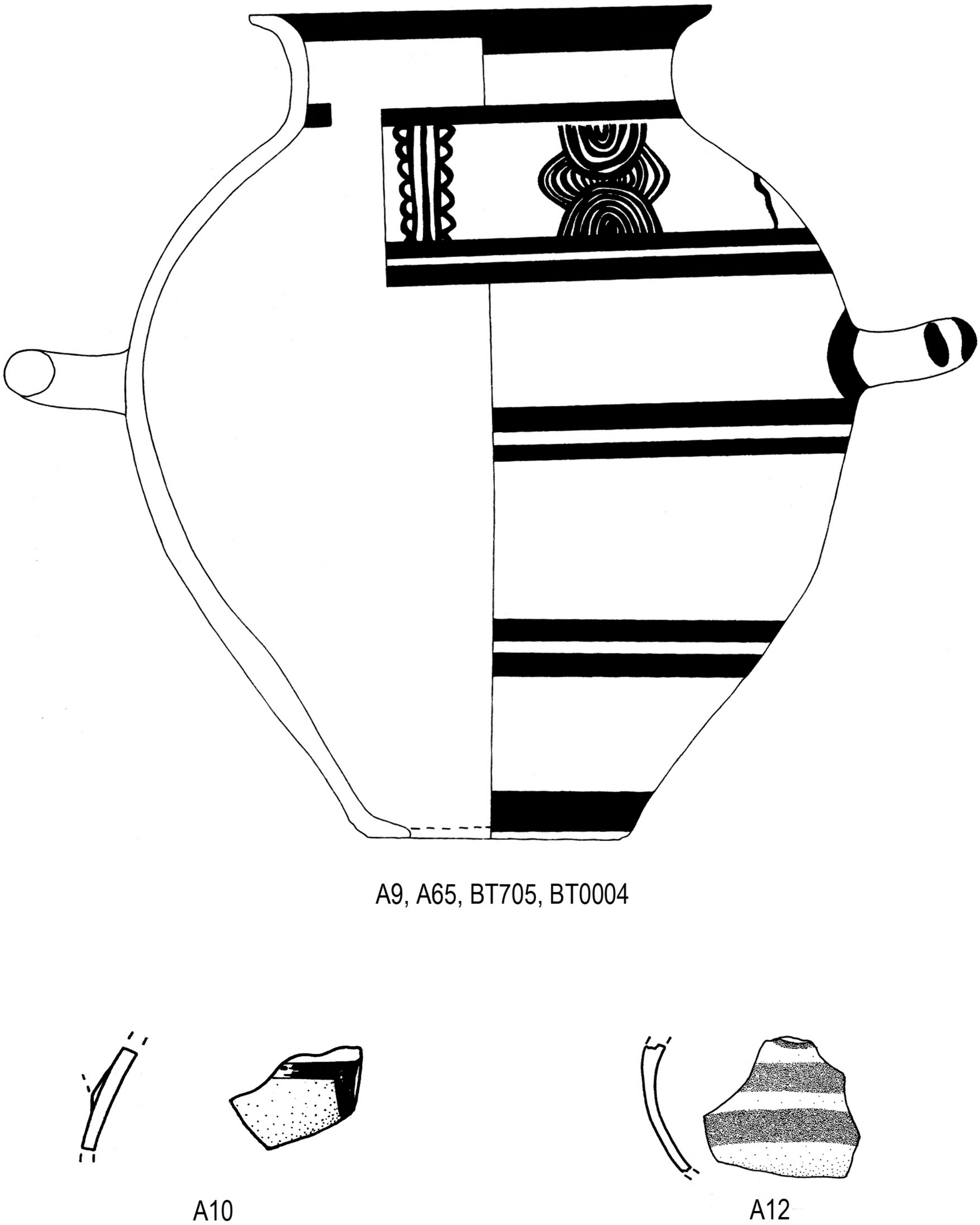


Fig. 4.66. A10, 12 (1:2); A9 (1:3).

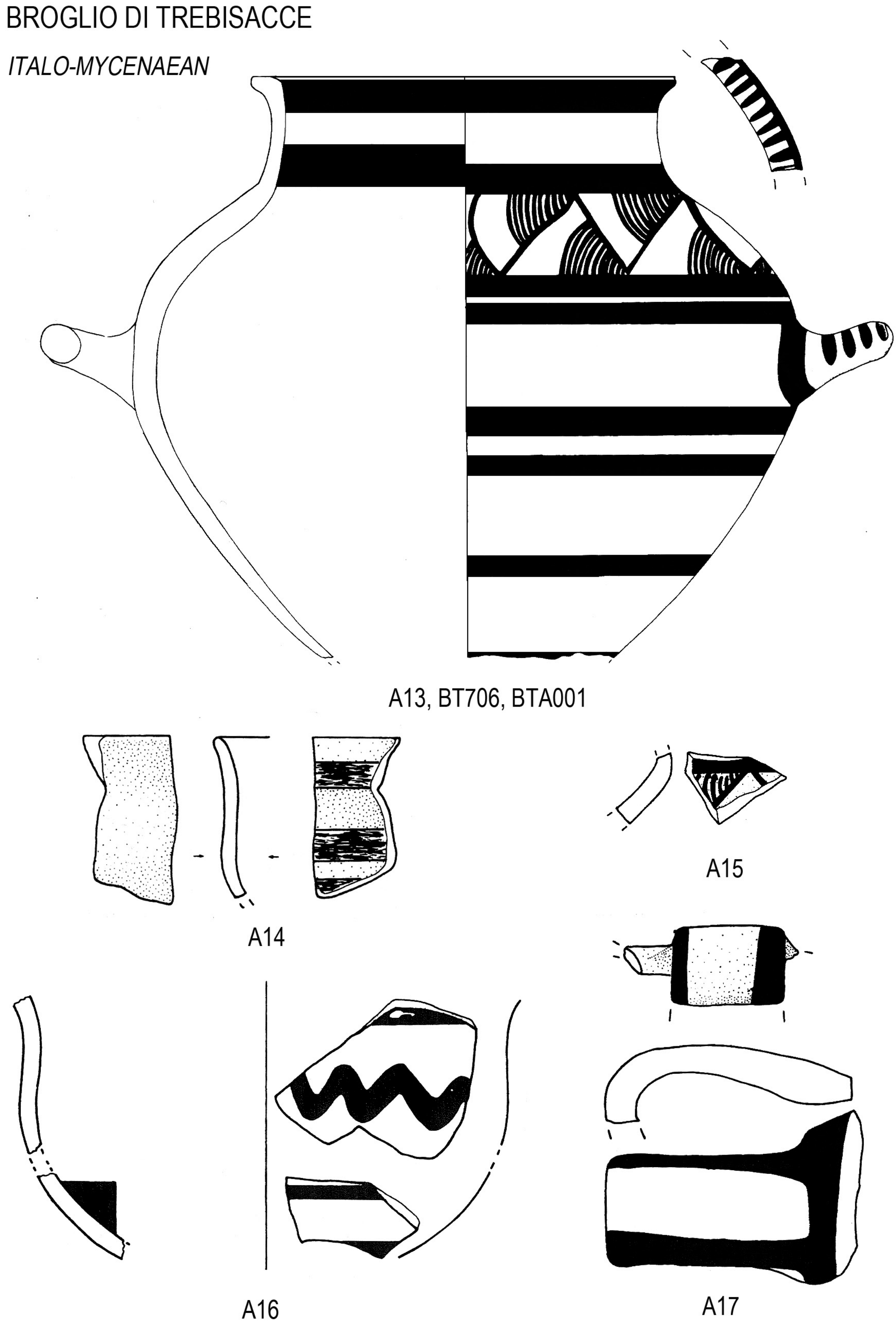


Fig. 4.67. A14-17 (1:2); A13 (1:3).

BROGLIO DI TREBISACCE

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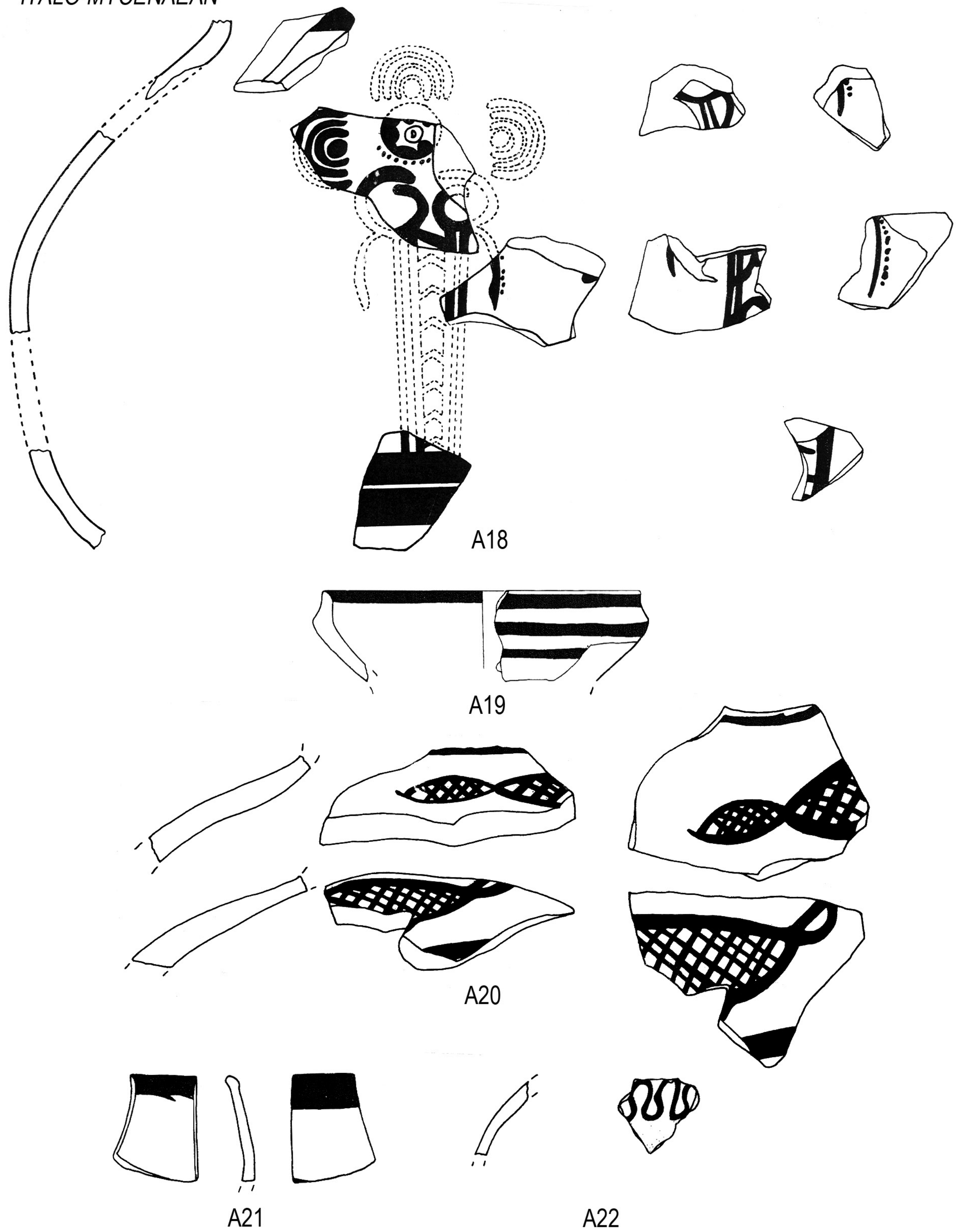

Fig. 4.68. A18-22 (1:2).

BROGLIO DI TREBISACCE

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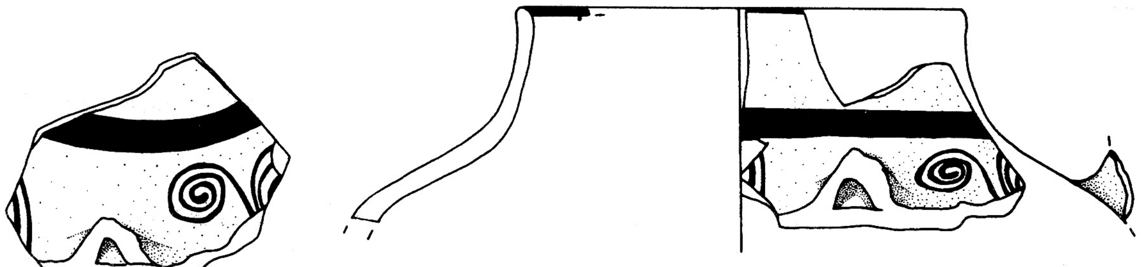
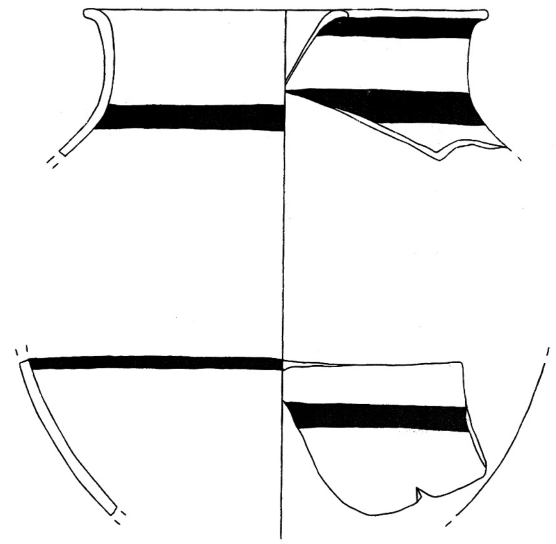
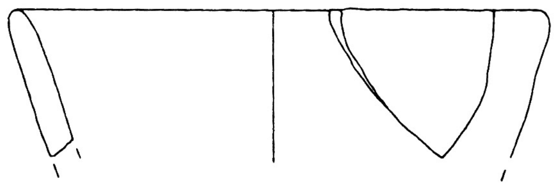


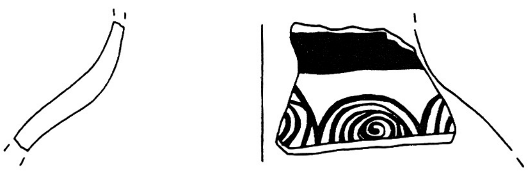
A25



A27



A28

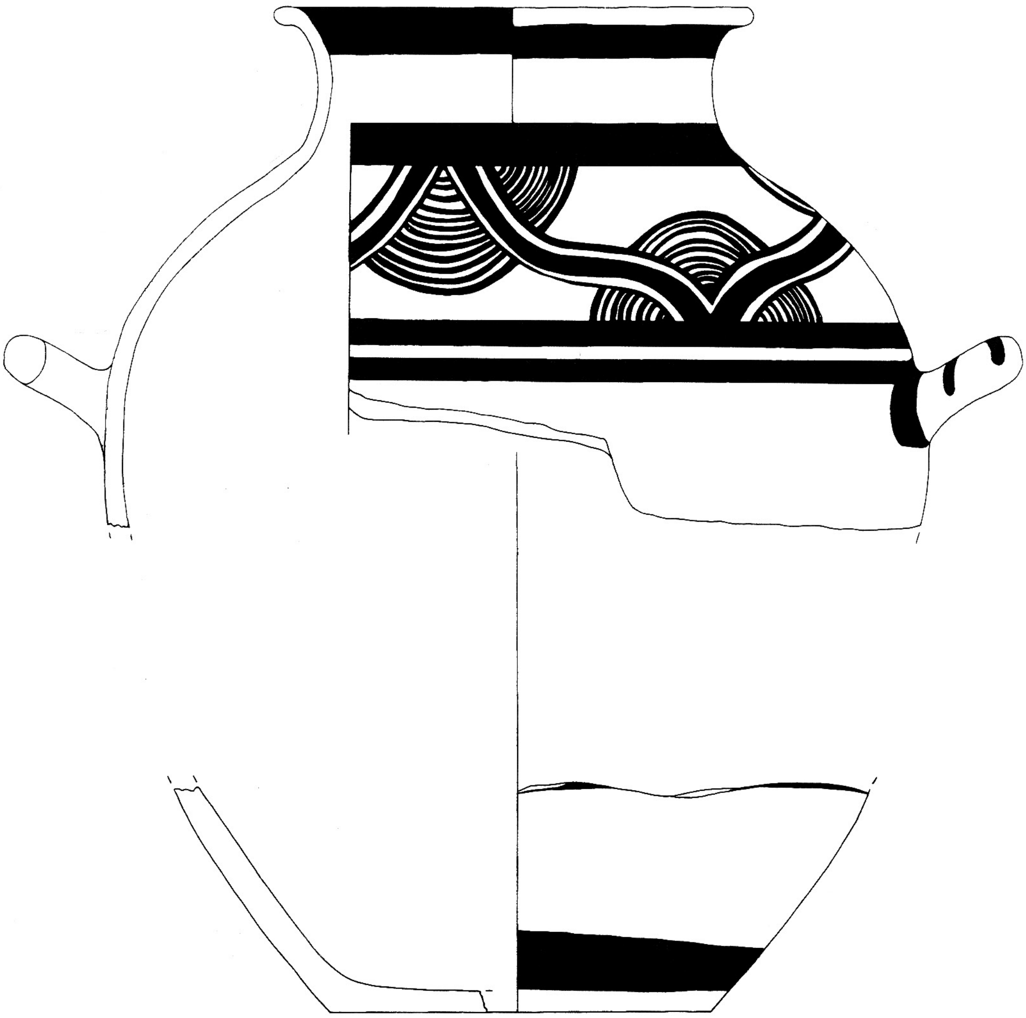


A29

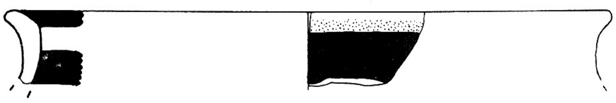
Fig. 4.69. A25, 28-29 (1:2); A27 (1:3).

BROGLIO DI TREBISACCE

ITALO-MYCENAEAN



A30



A31

Fig. 4.70. A31 (1:2); A30 (1:3).

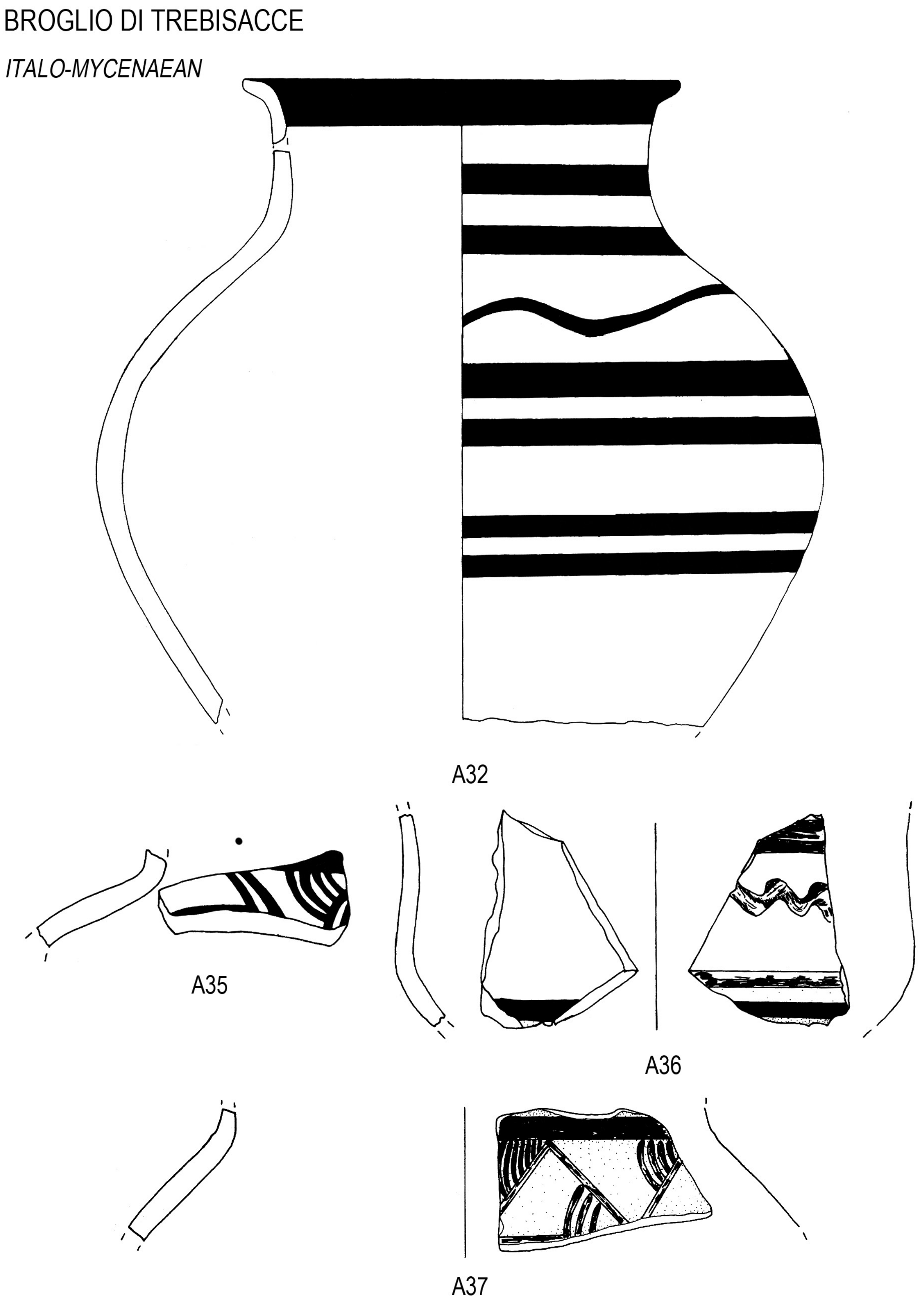


Fig. 4.71. A 35-36 (1:2); A32, 37 (1:3).

BROGLIO DI TREBISACCE

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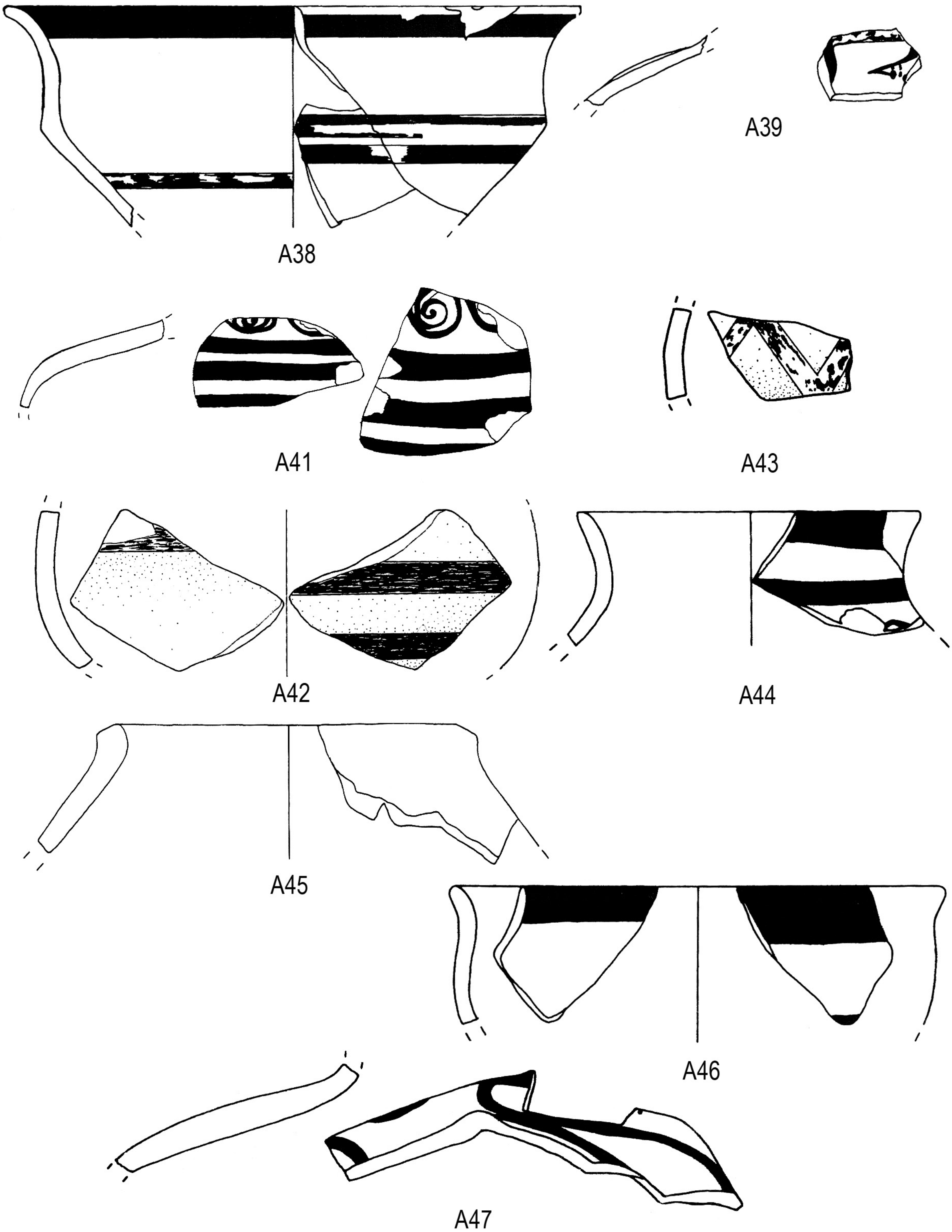

Fig. 4.72. A38-47 (1:2).

BROGLIO DI TREBISACCE

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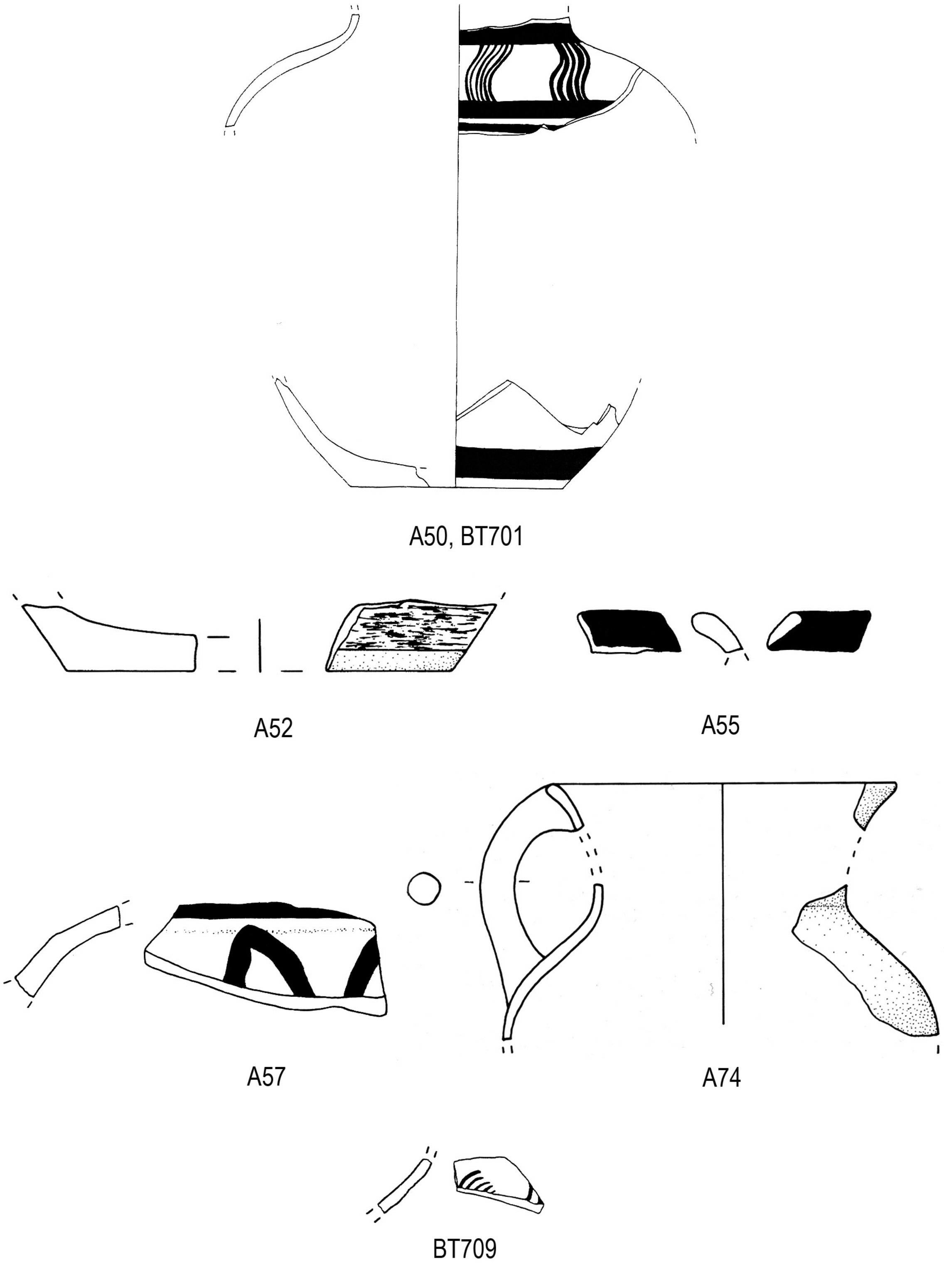
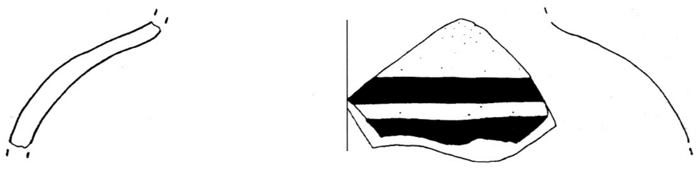


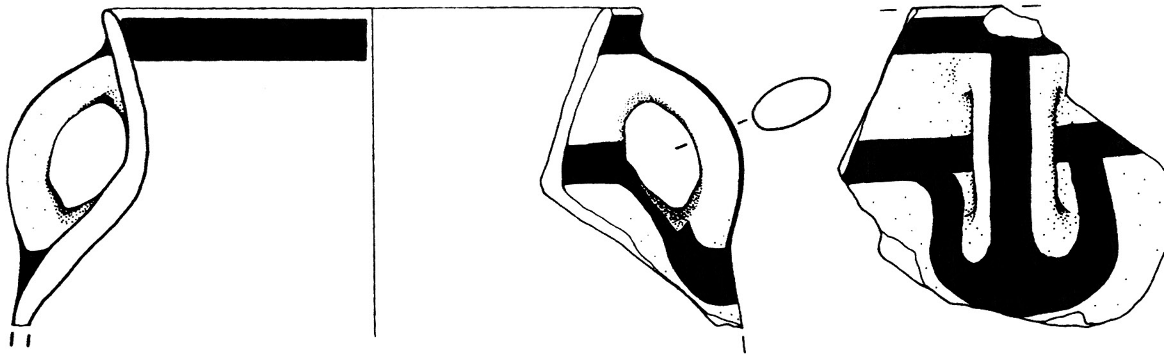
Fig. 4.73. A52, 56-57, 74, BT709 (1:2); A50 (1:3).

BROGLIO DI TREBISACCE

ITALO-MYCENAEAN

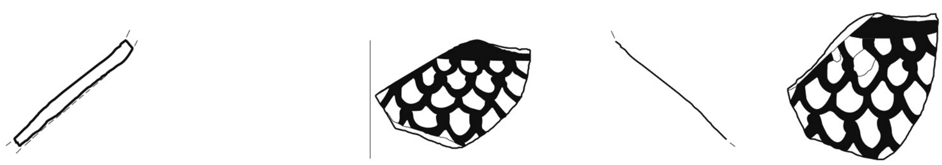


BT710



BT711

BT713



BT714

Fig. 4.74. BT710-711 (1:2); BT713-714 (1:3).

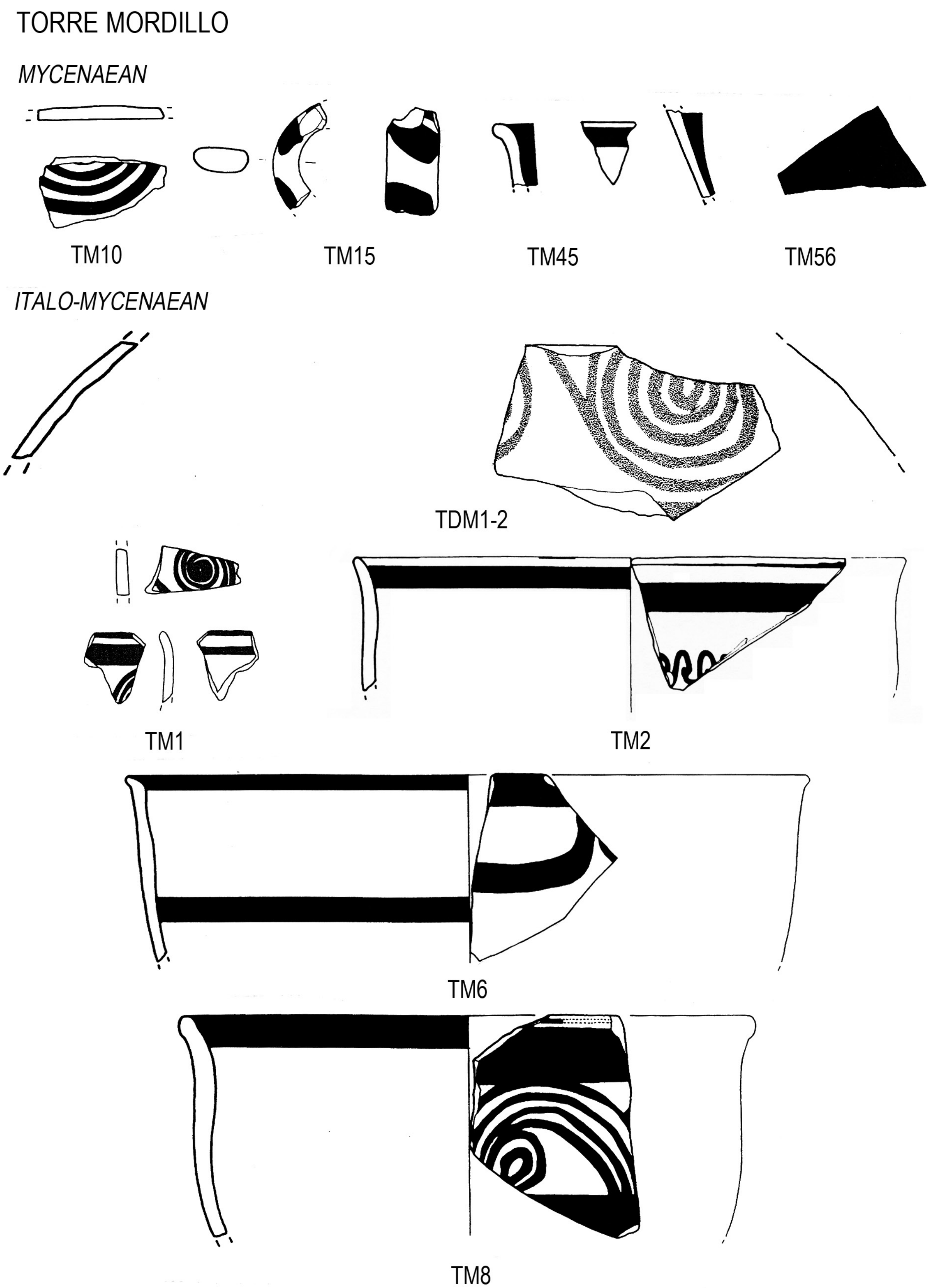


Fig. 4.75. TDM1-2, TM1-56 (1:2).

TORRE MORDILLO

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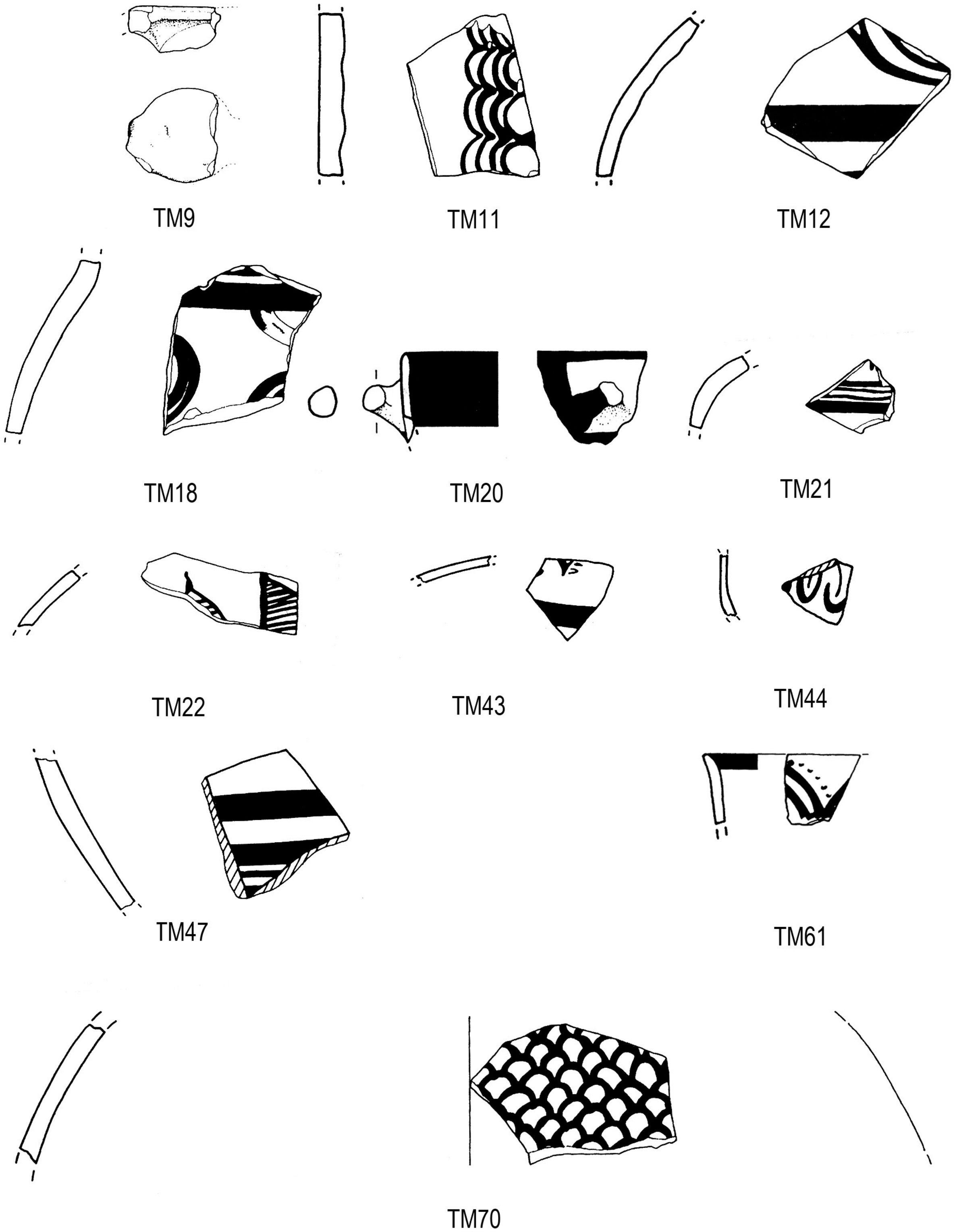

Fig. 4.76. TM9-70 (1:2).

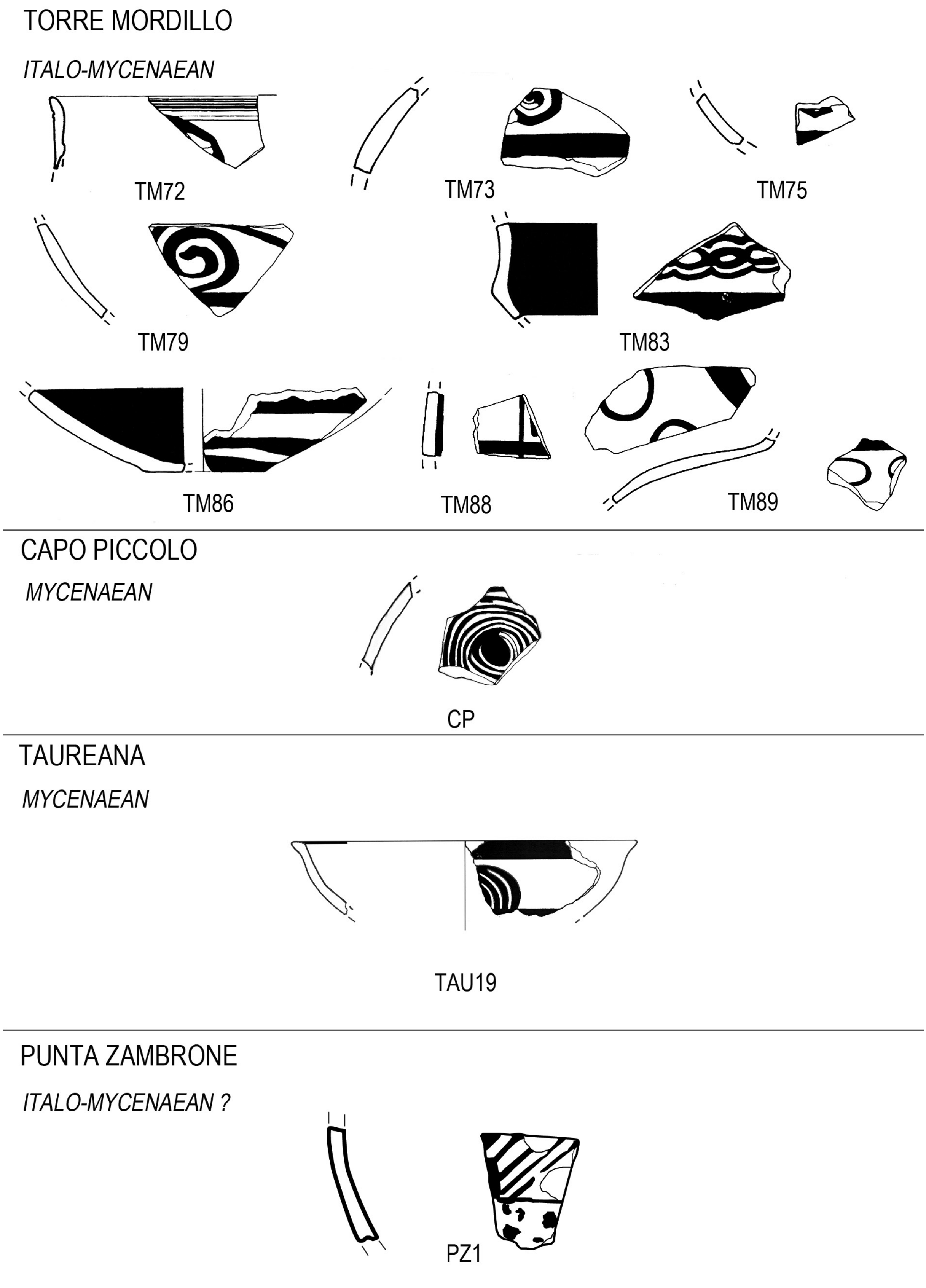

Fig. 4.77. TM72-89; CP, TAU19 (1:2); PZ1 (1:1).

GROTTA DEL PINO

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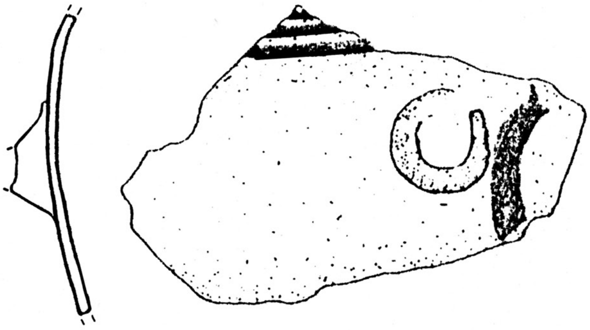
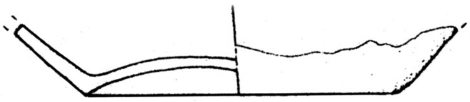
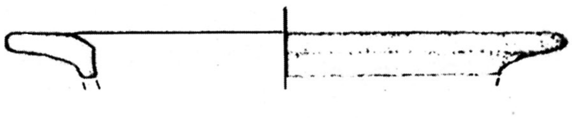


GSA1



GSA2

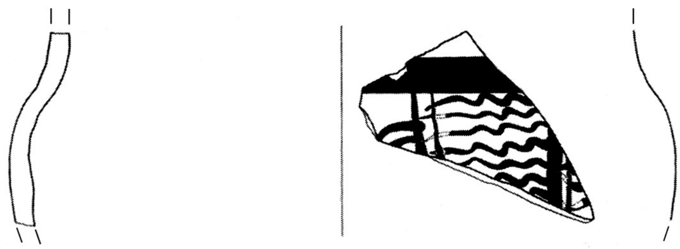
GSA3



GSA4

PONTECAGNANO

ITALO-MYCENAEAN



PON1

Fig. 4.78. GSA1-4 8 (1:2); PON1 (1:3).

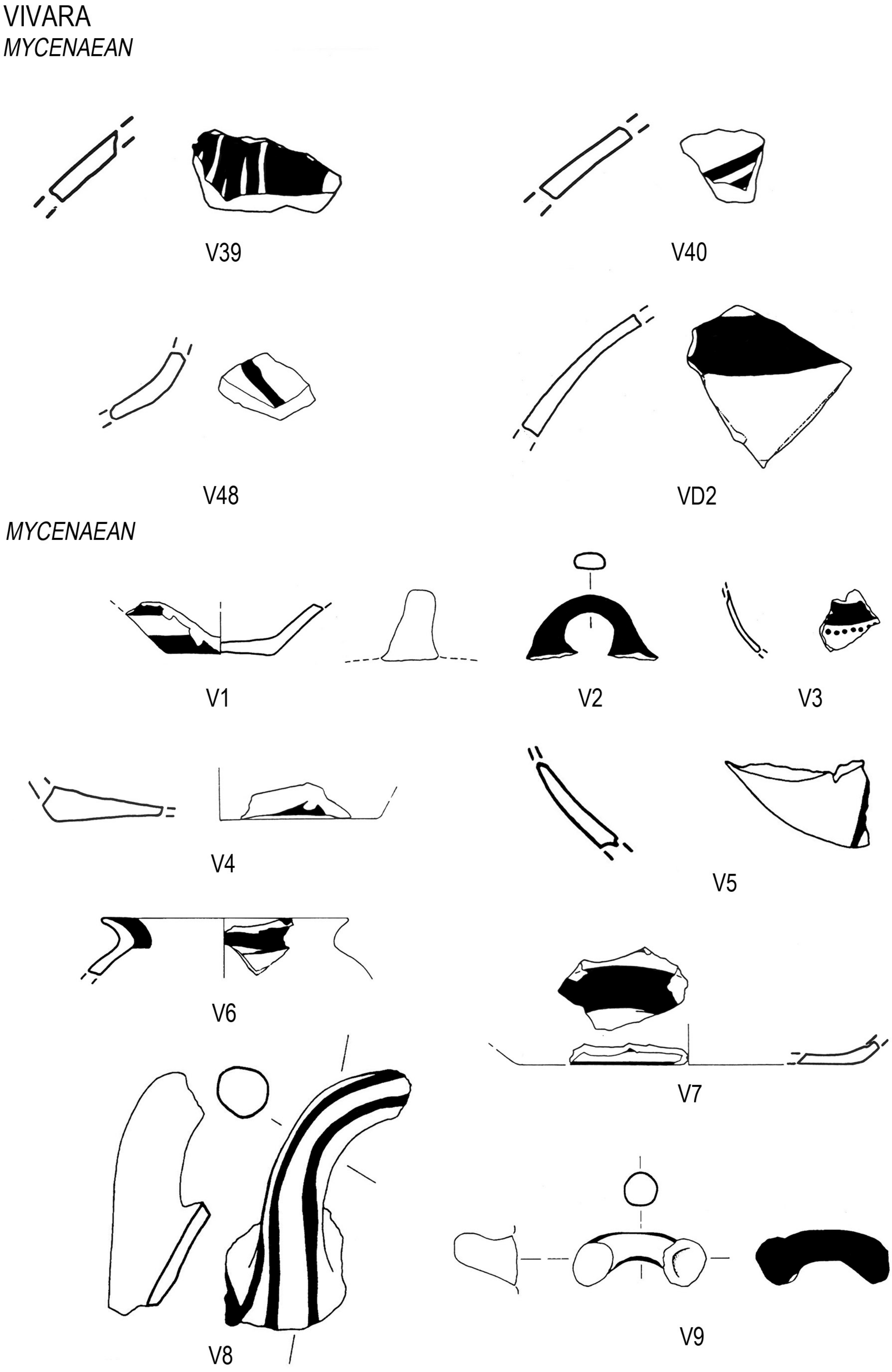


Fig. 4.79. V1-9, 39-40,48, VD2 (1:2).

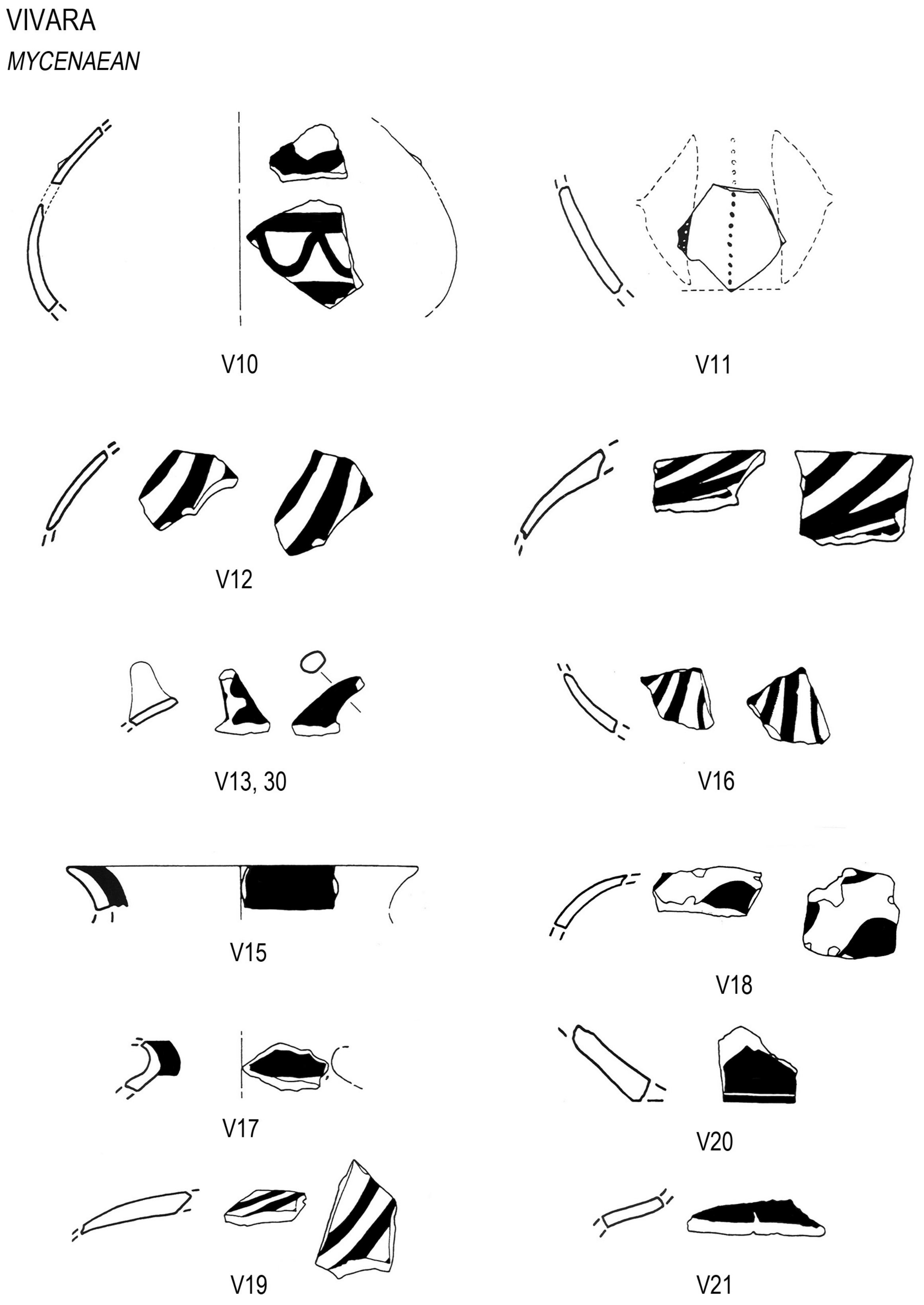


Fig. 4.80. V10-21 (1:2).

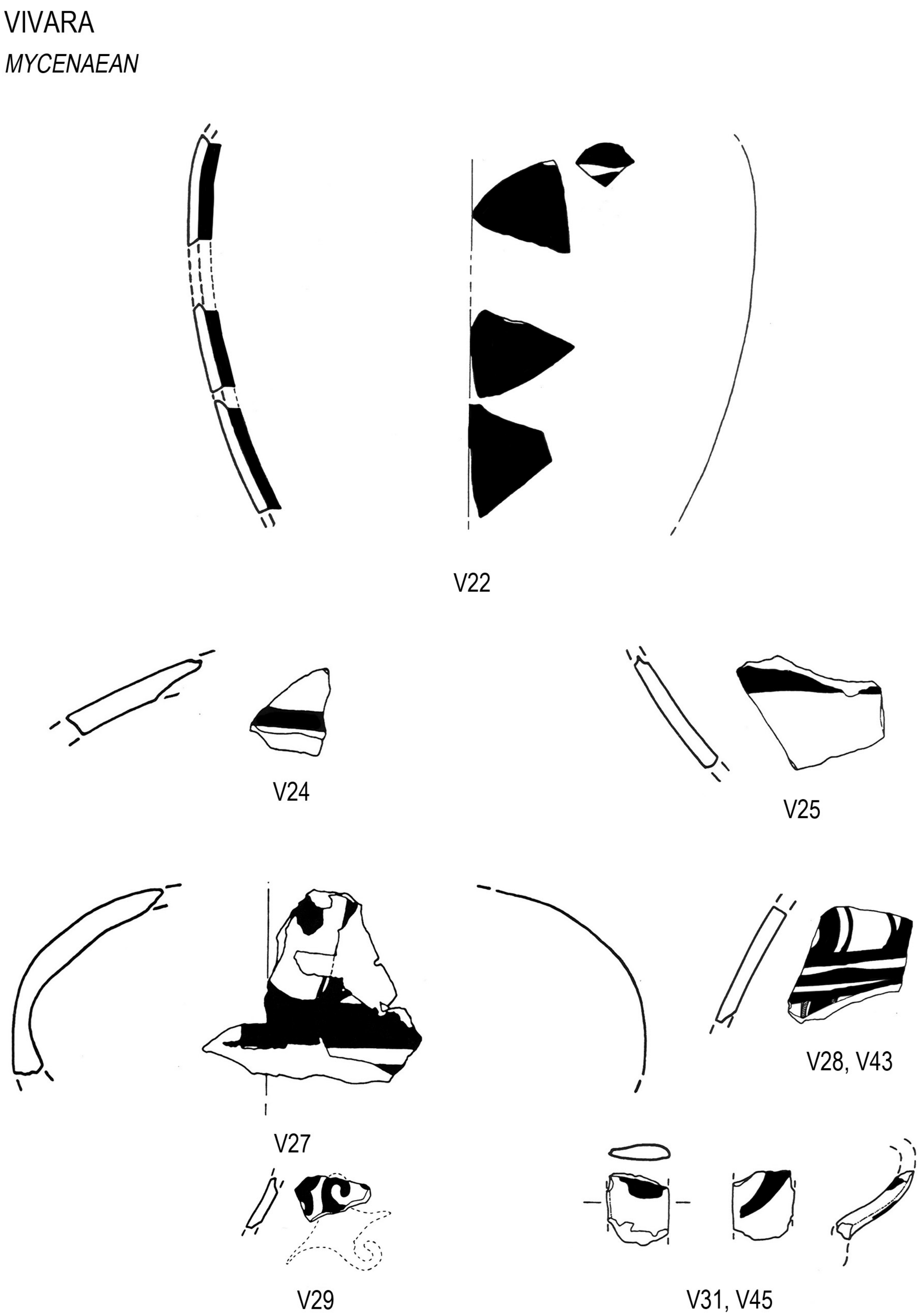
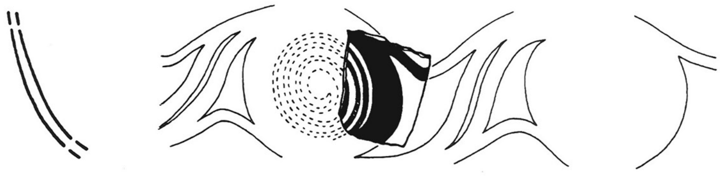


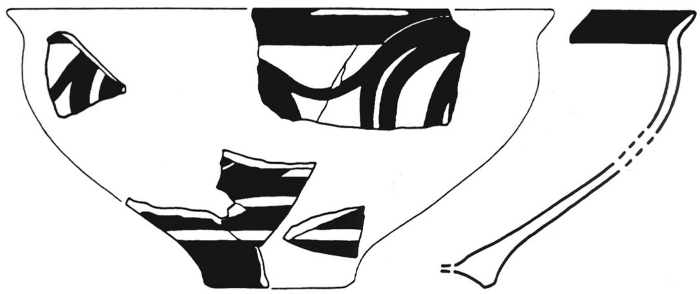
Fig. 4.81. V22-31 (1:2).

VIVARA

MYCENAEAN



V32



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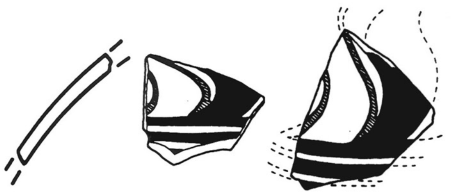

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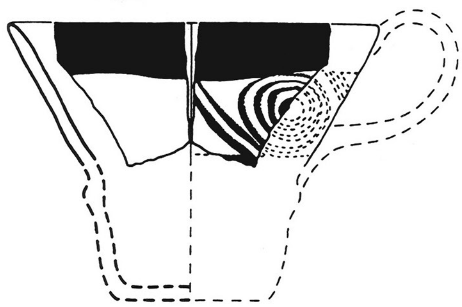

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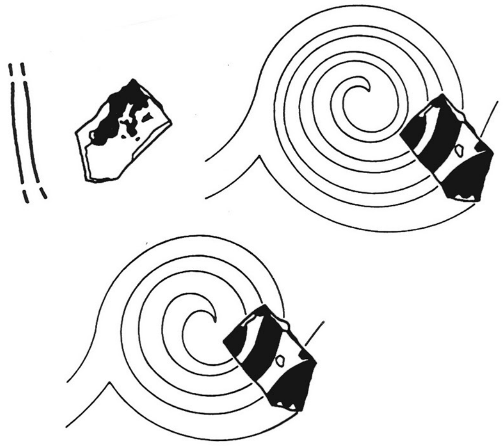
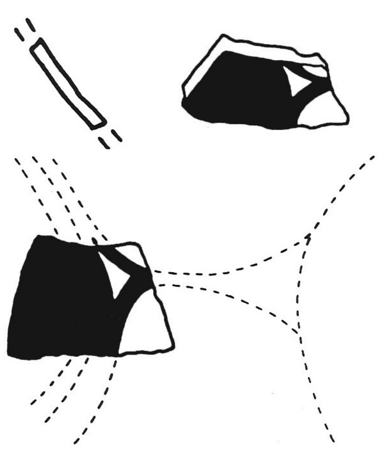


V36



V37

Fig. 4.82. V32-37 (1:2).

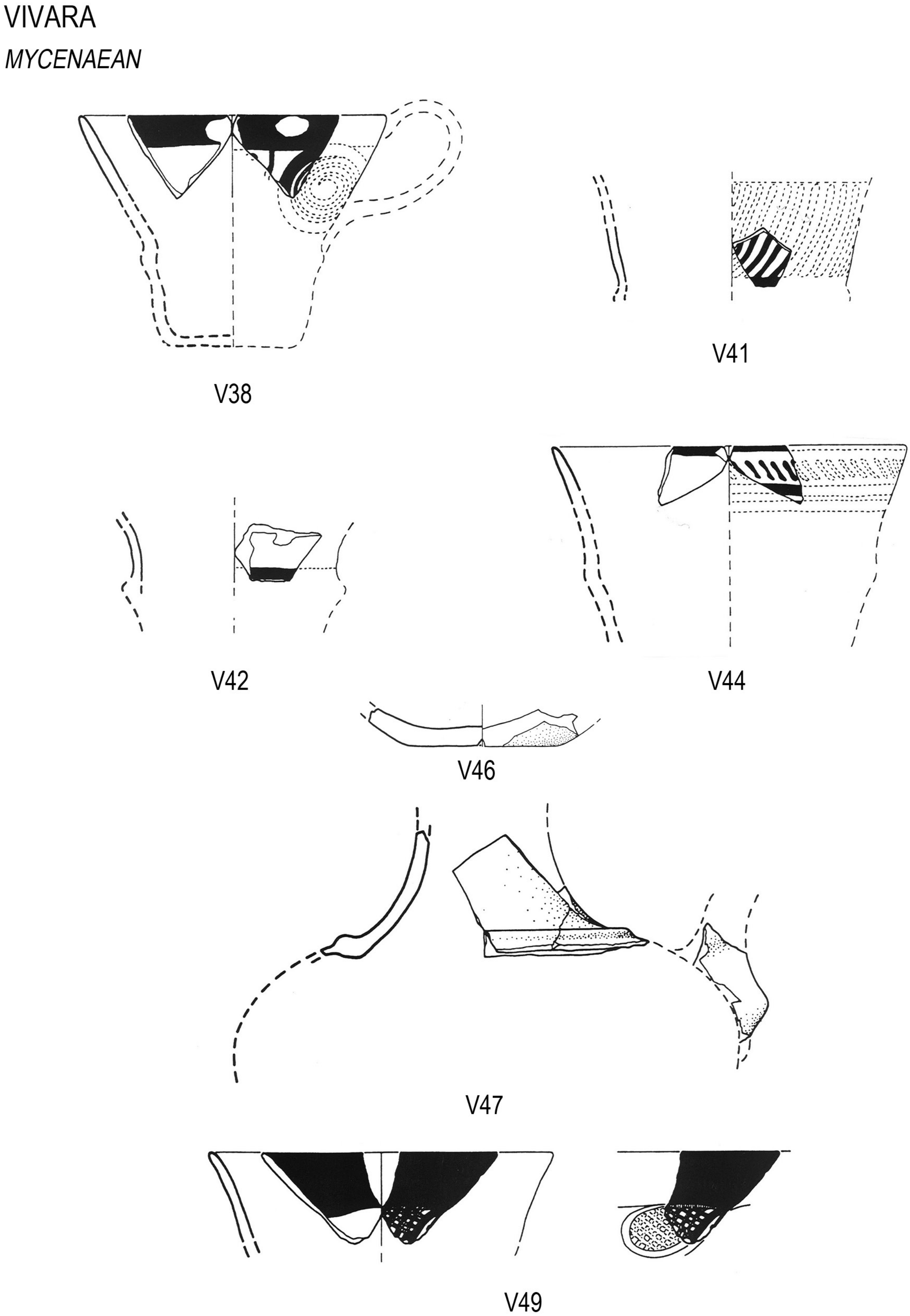
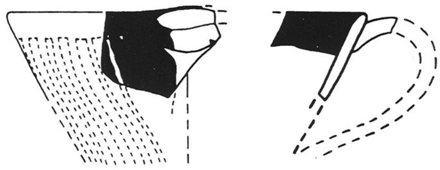


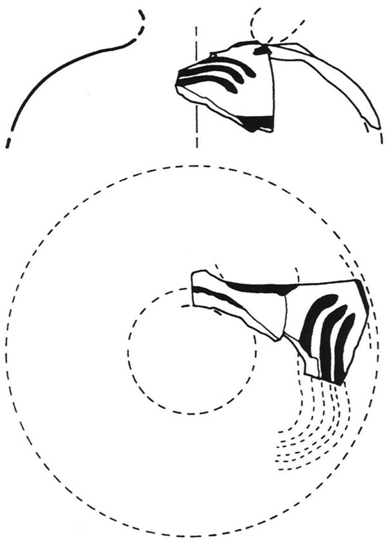
Fig. 4.83. V28-49 (1:2).

VIVARA

MYCENAEAN

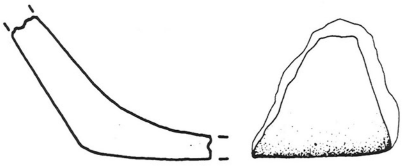


V53

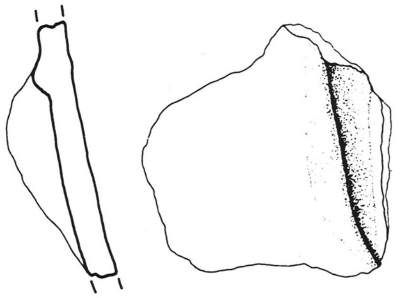


V51

COARSE WARE



VD3

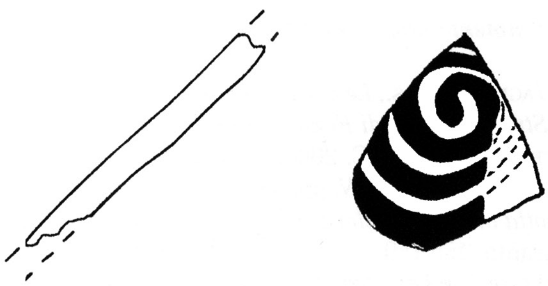


VD4

VD9

MONTERODUNI

ITALO-MYCENAEAN



ROD1

Fig. 4.84. V51, 53, VD3-4 (1:2); VD9 not to scale; ROD1 (1:1).

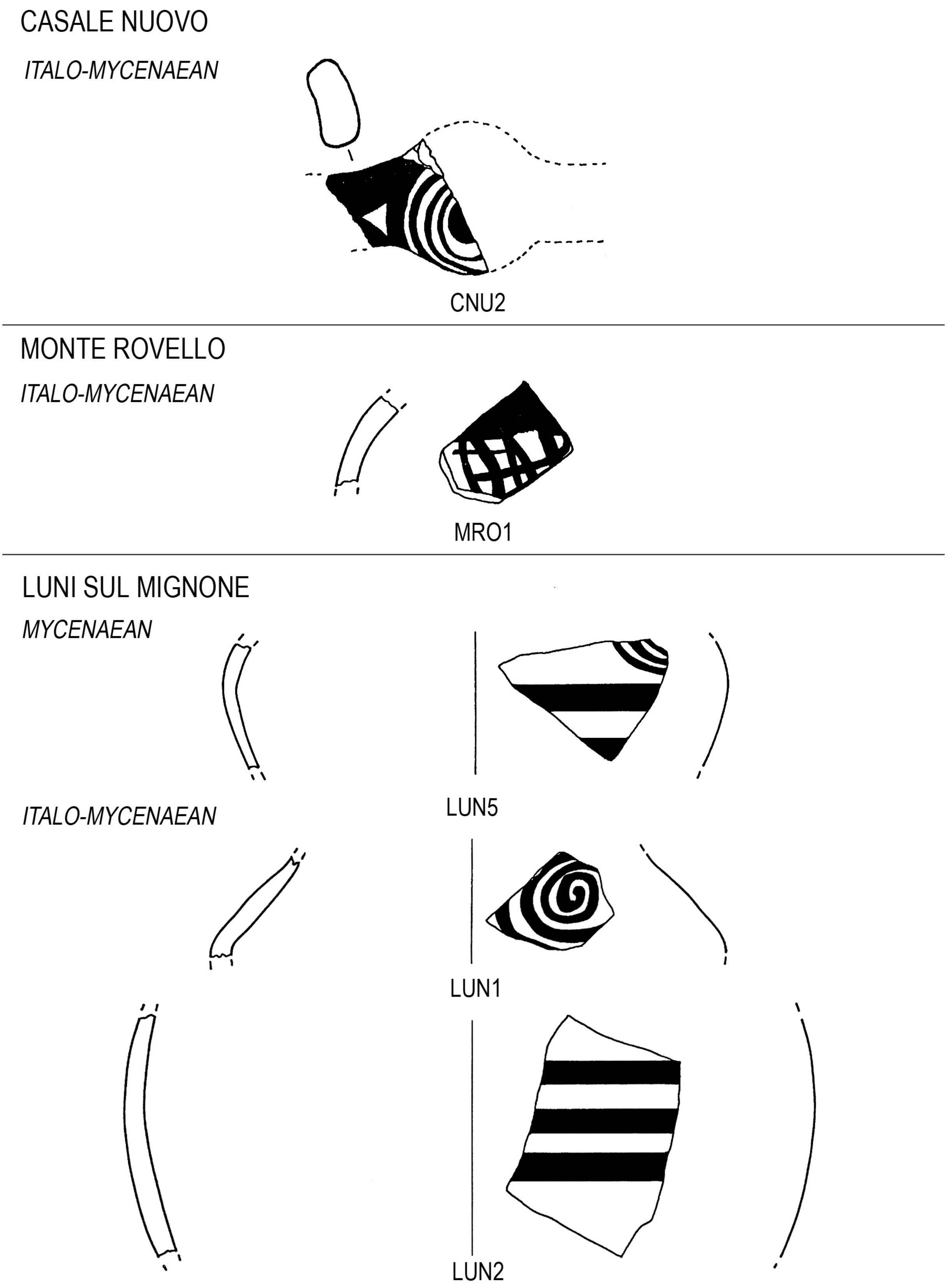


Fig. 4.85.CNU2, MRO1; LUN1-2, 5 (1:2).

Fig. 4.86. LUN3-4, SGI1, TRE1, TOL1, 3 (1:2); TOL2 not to scale.

CISTERNA DI TOLENTINO

ITALO-MYCENAEAN

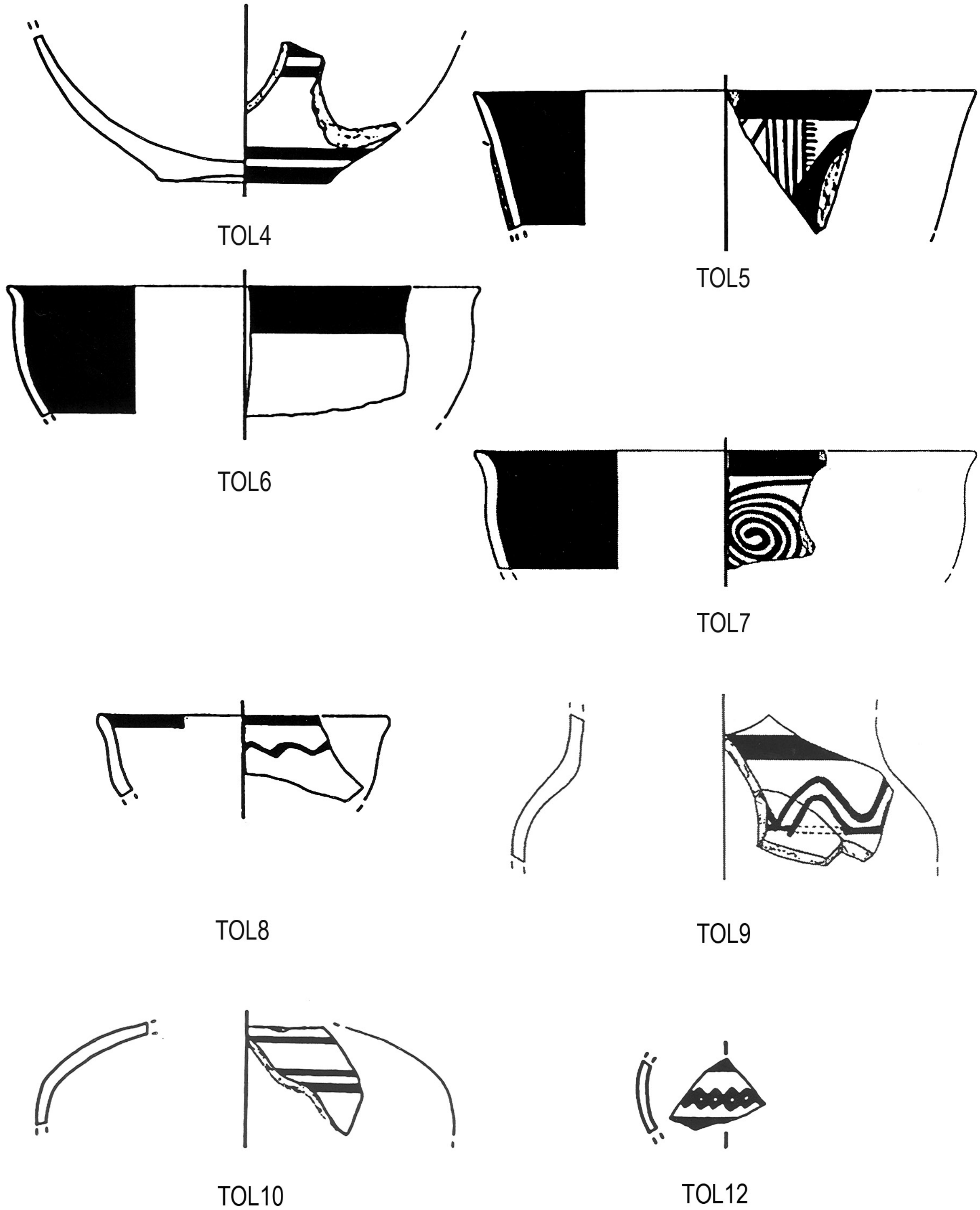


Fig. 4.87. TOL4-12 (1:2).

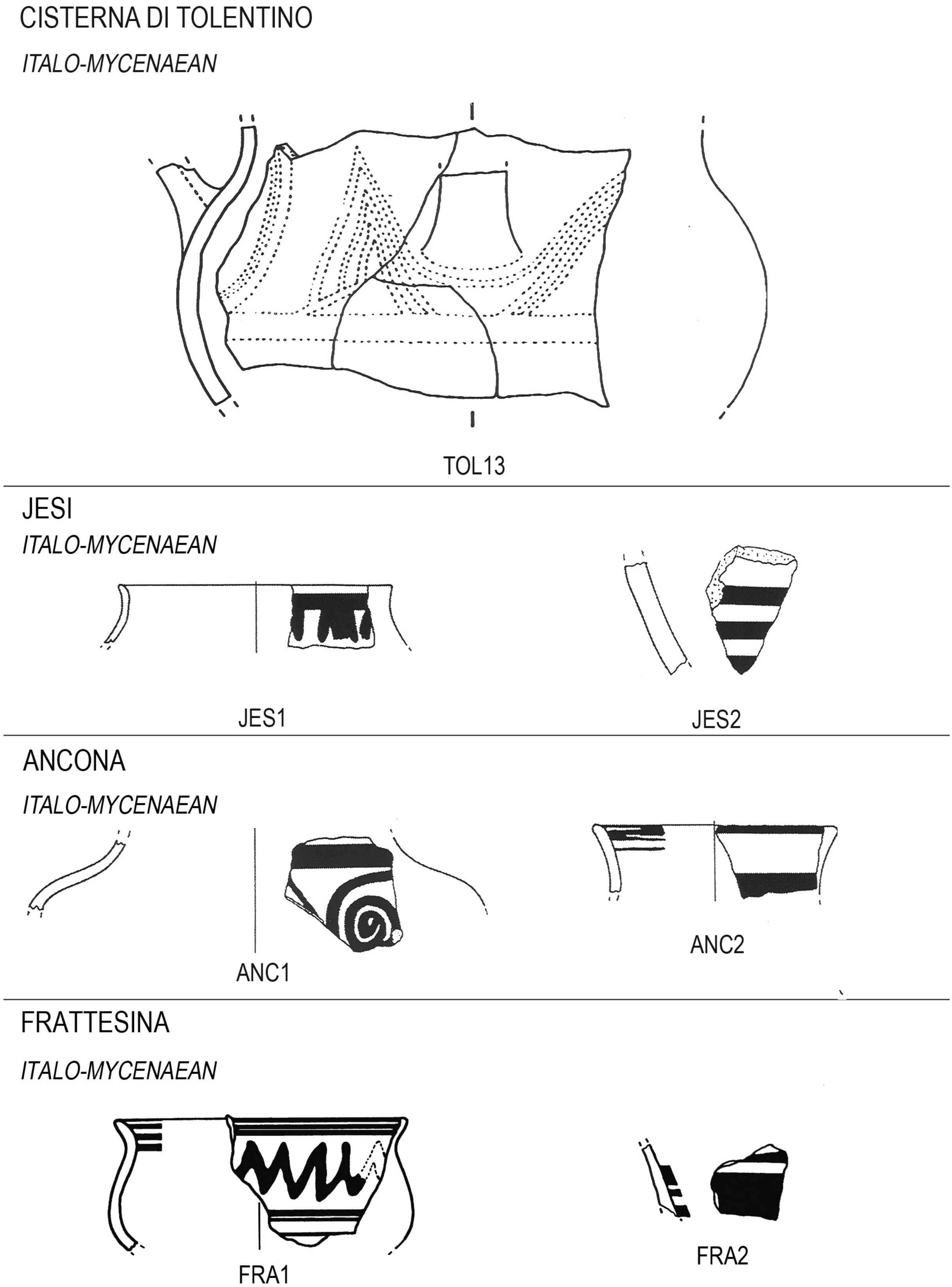


Fig. 4.88. TOL13, JES1-2, ANC1-2, FRA1-2 (1:2).

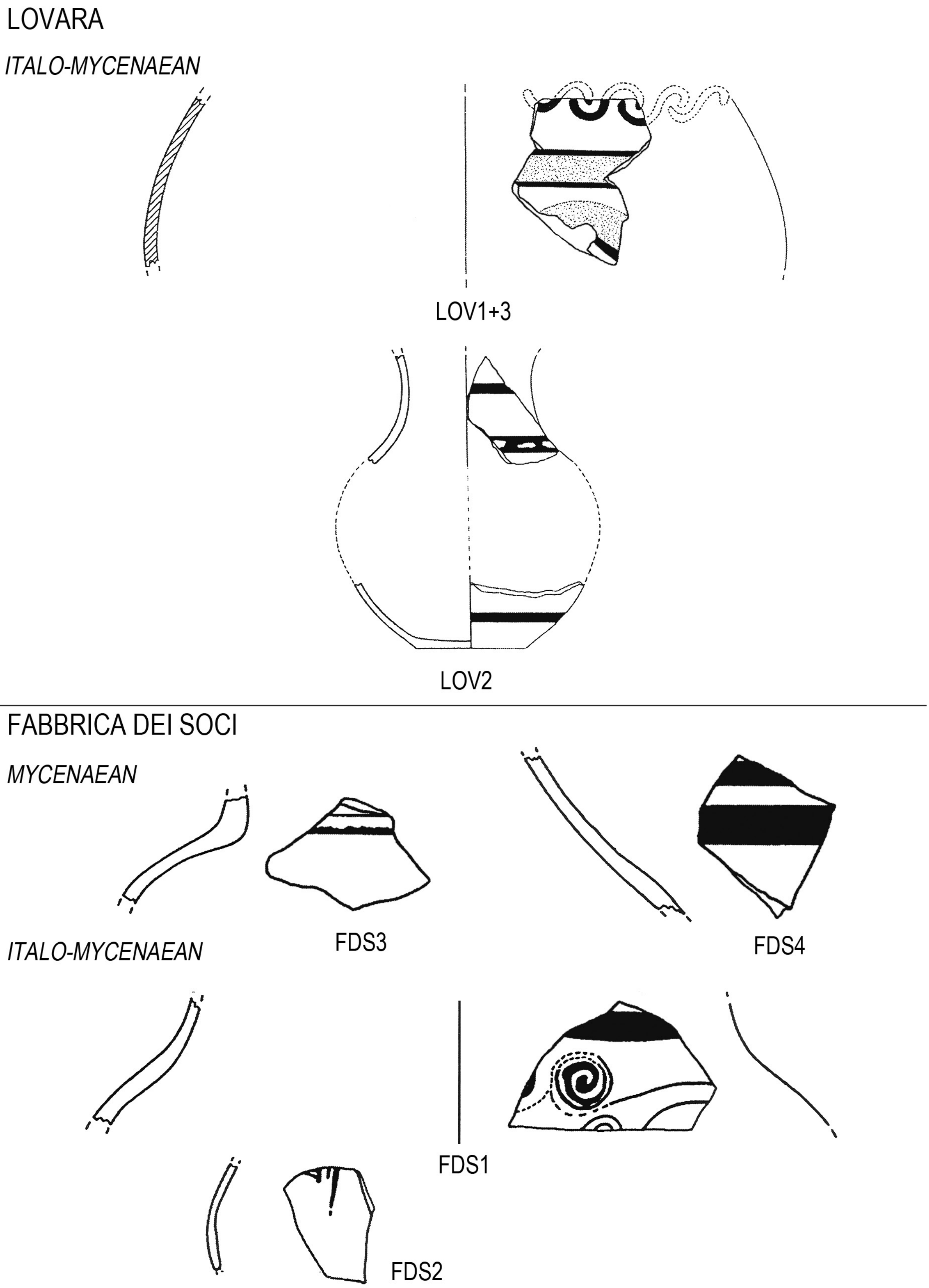


Fig. 4.89. LOV1-3, FDS 1-4 (1:2).

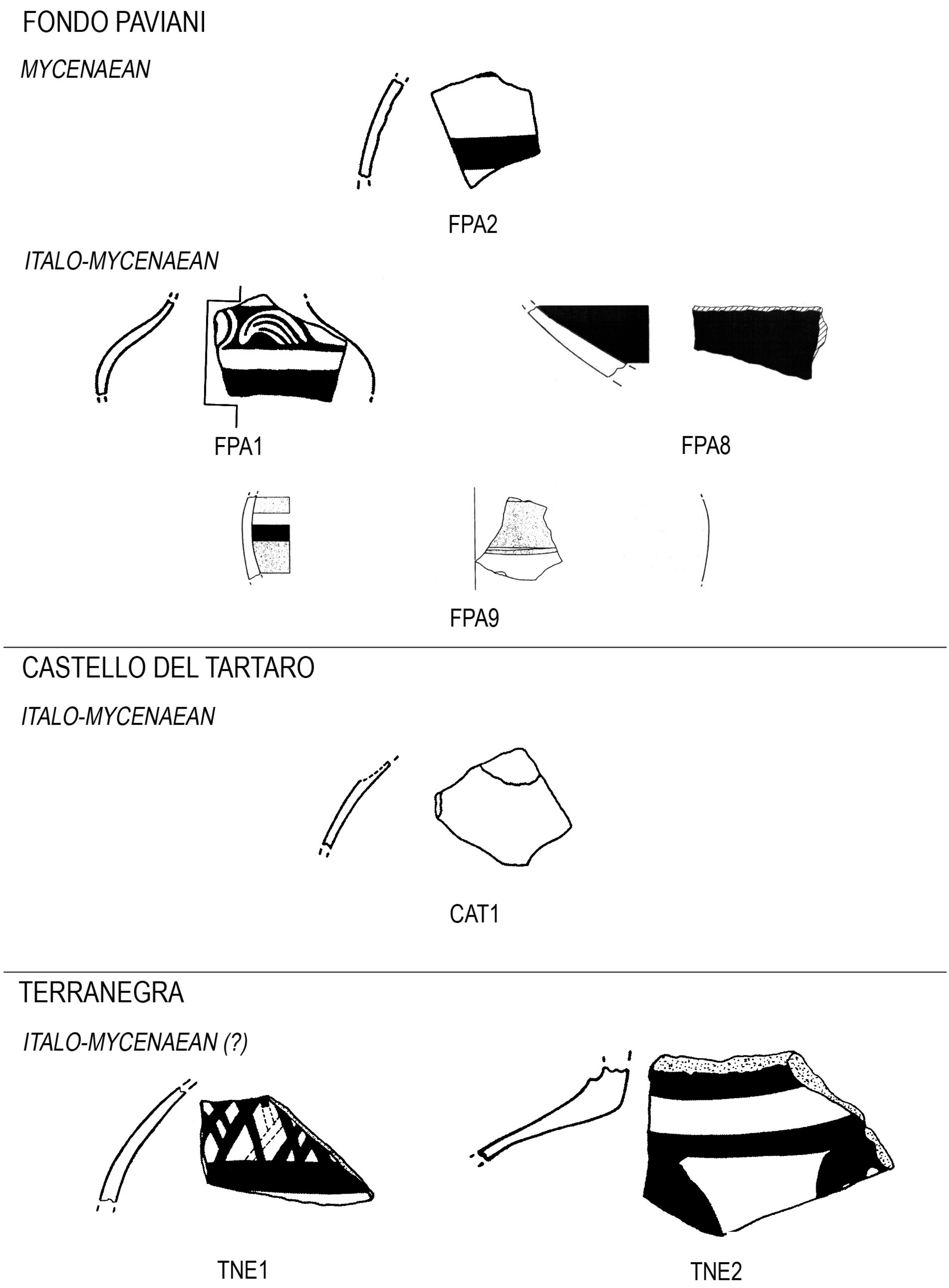


Fig. 4.90. FPA1-2, 8, CAT1, TNE1-2 (1:2); FPA9 (1:4).

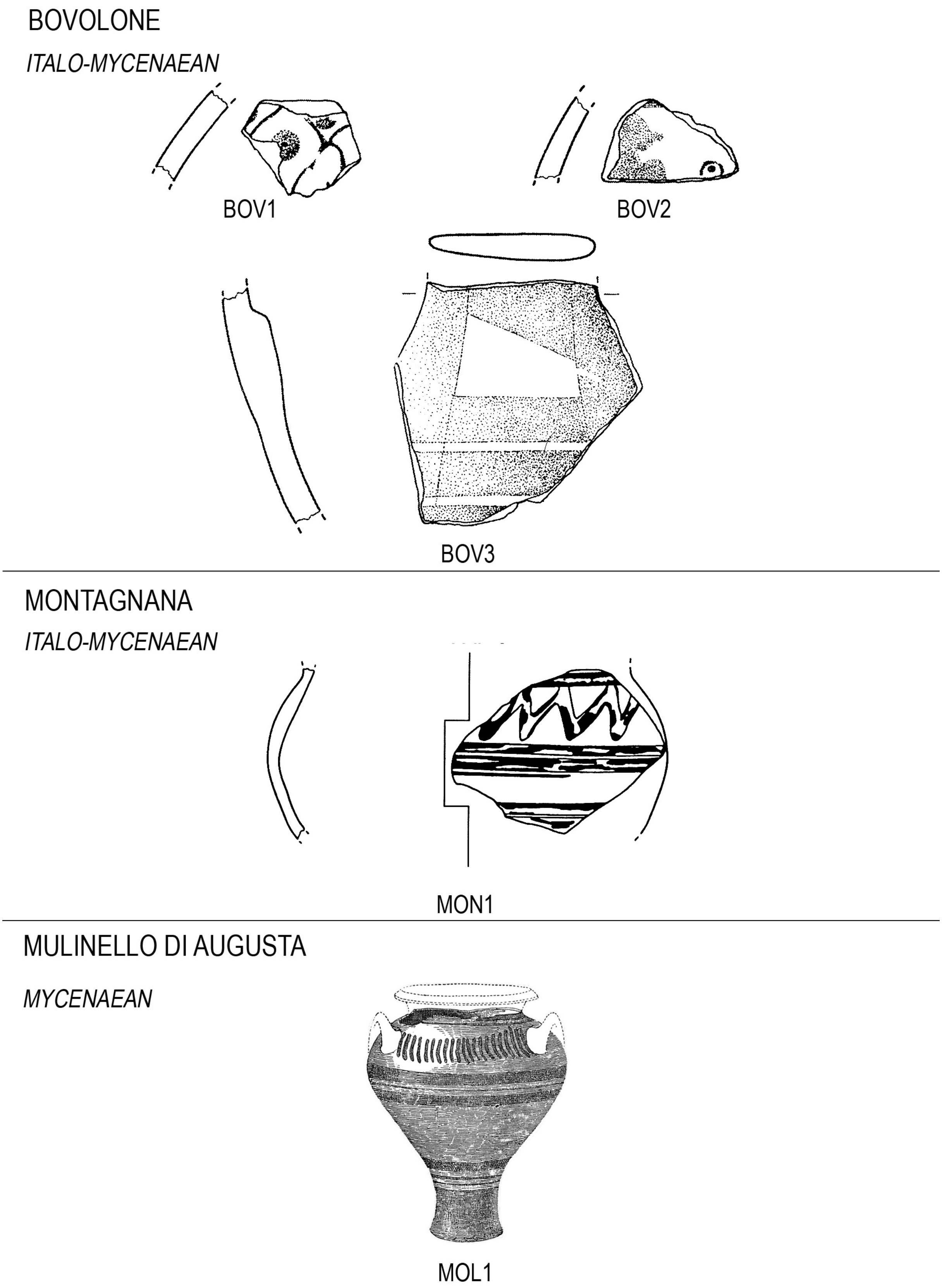


Fig. 4.91. BOV1-3, MON1 (1:2); MOL1. Not to scale.

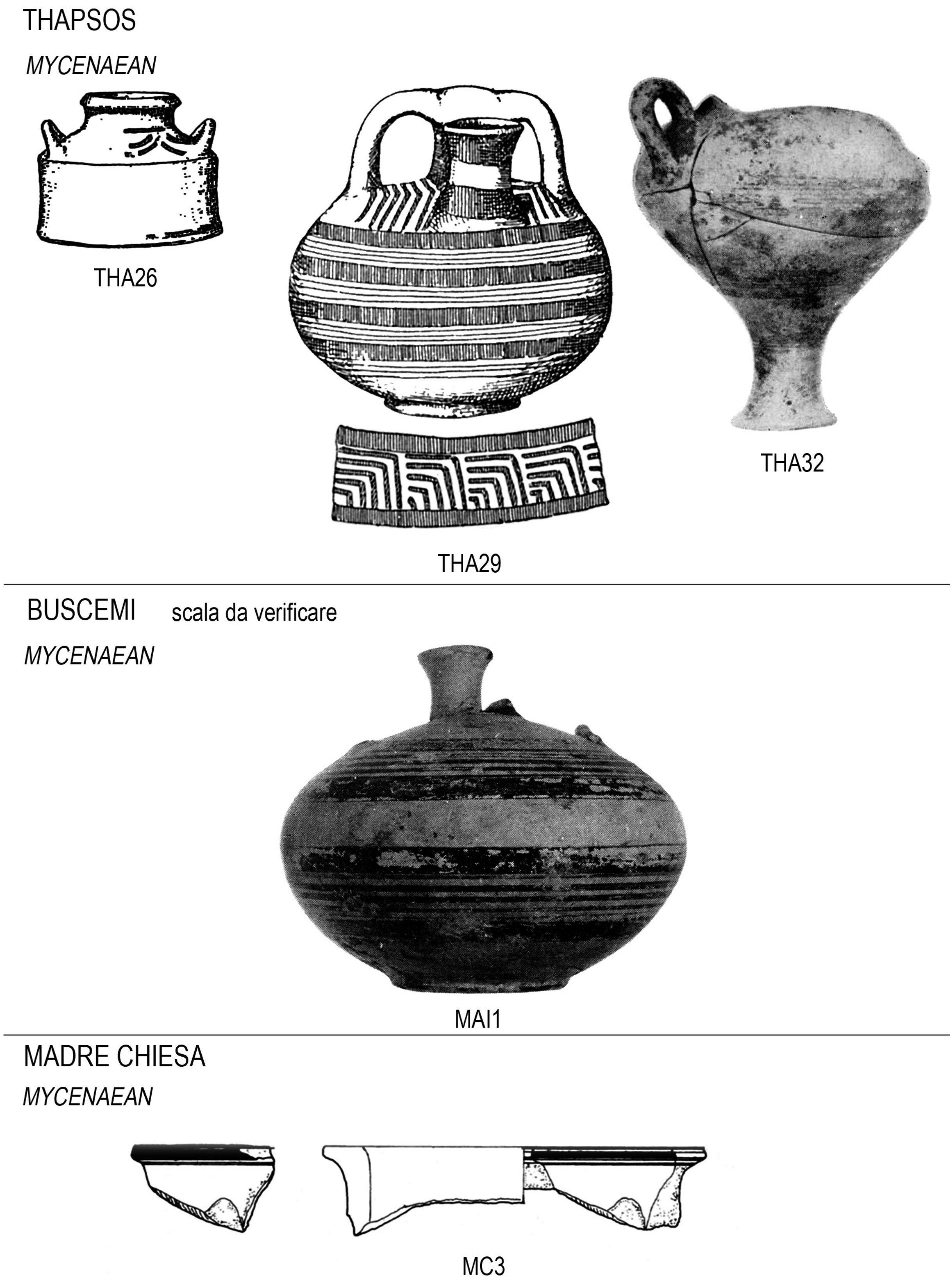


Fig. 4.92. THA29, 32, MC3 (1:2); TH26, MAI1. Not to scale.

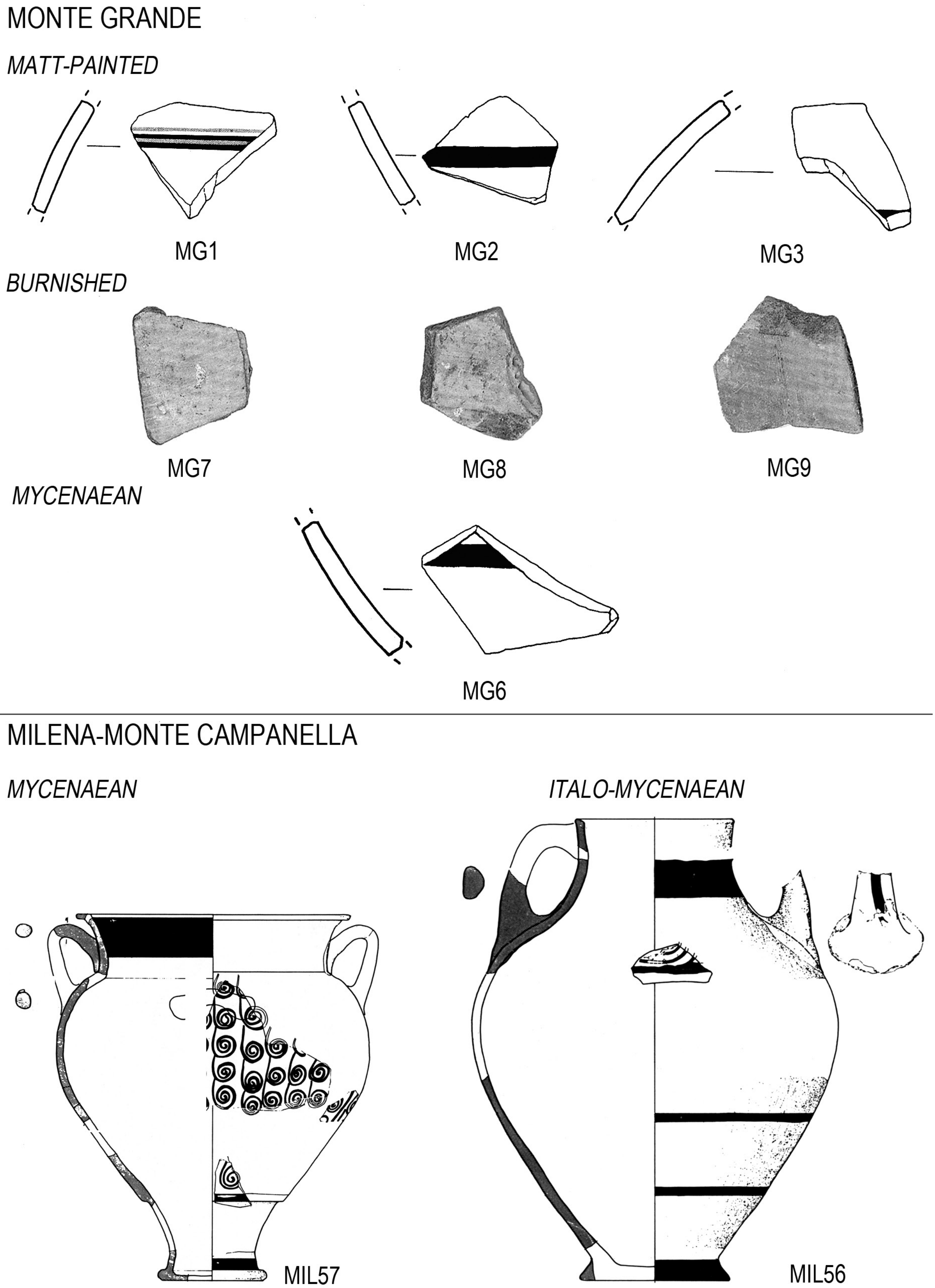


Fig. 4.93. MG1-9 (1:2); MIL56-57 (1:8).

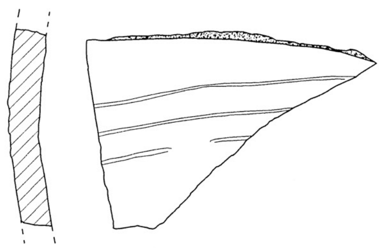
MARINA DI AGRIGENTO

MYCENAEAN

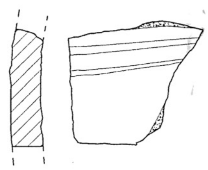
AGR1

SALINA - PORTELLA

PITHOI



POR1



POR3

Fig. 4.94. AGR1 (1:2); POR1, 3 (1:4).

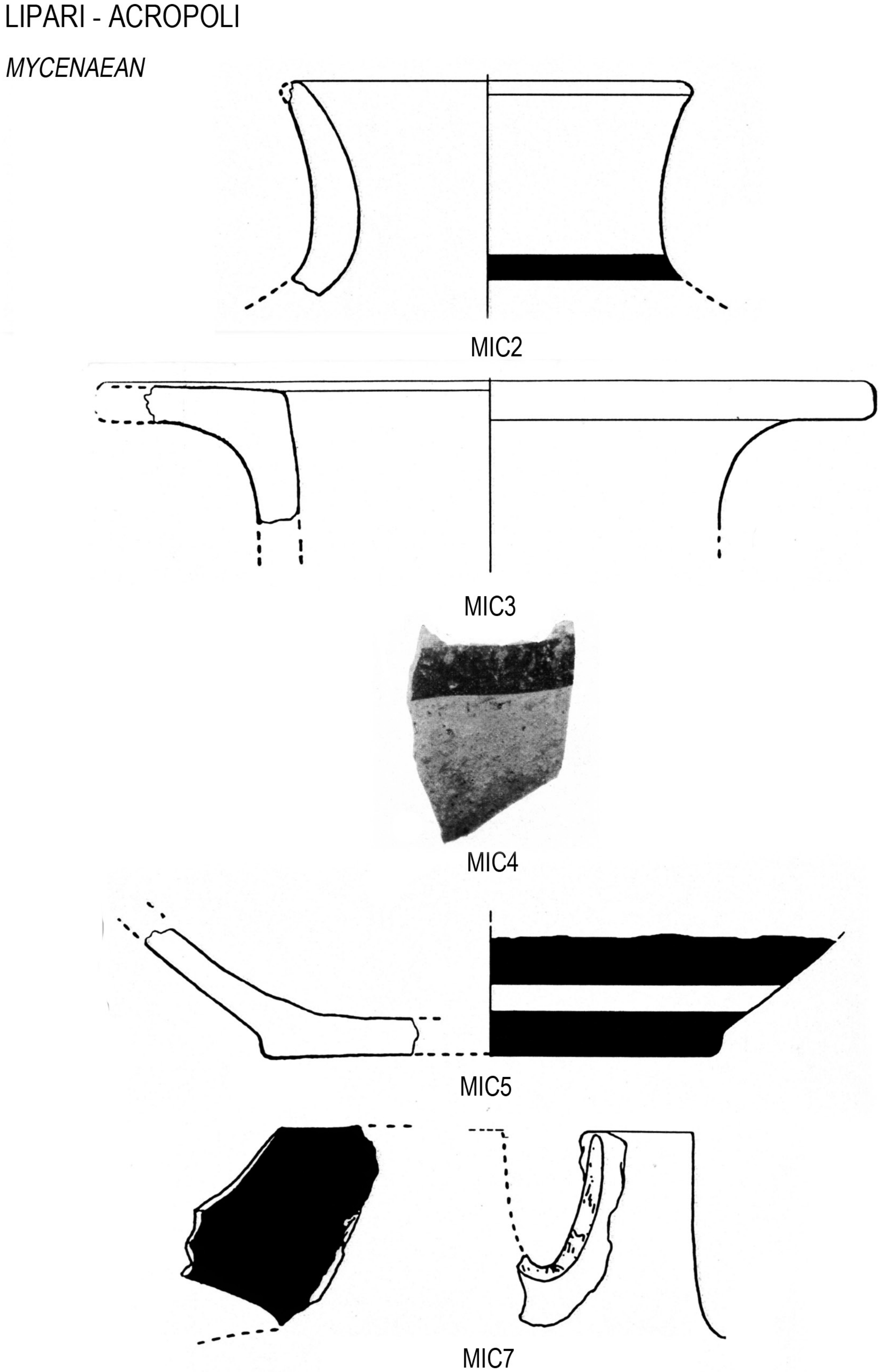
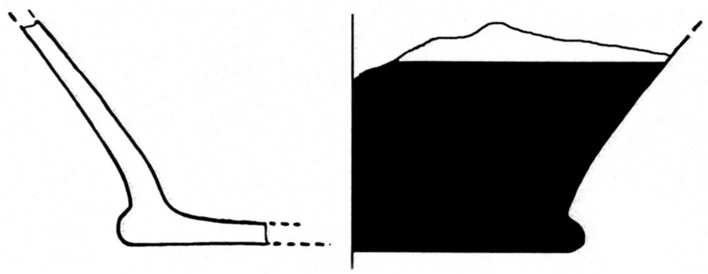


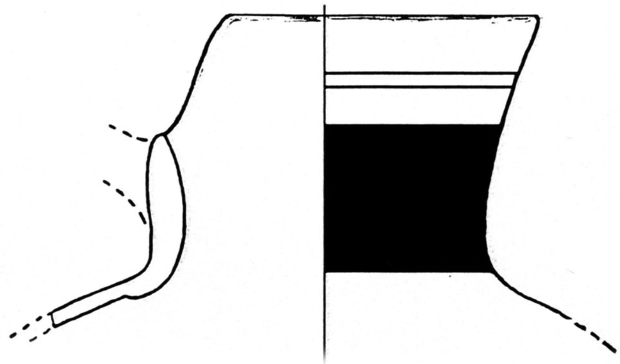
Fig. 4.95. MIC2-7 not to scale.

LIPARI - ACROPOLI

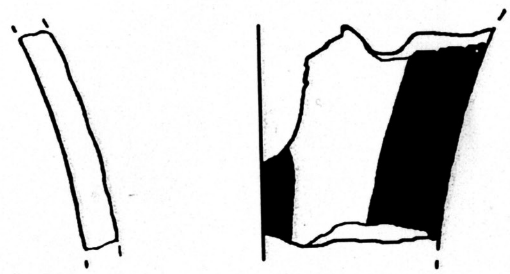
MYCENAEAN



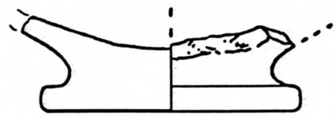
MIC8



MIC9

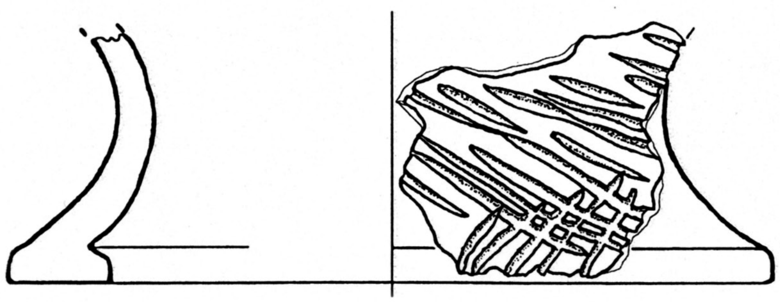


MIC10



MIC1

PITHOI



MIC6

Fig. 4.96. MC 1, 6, 8-10 not to scale.

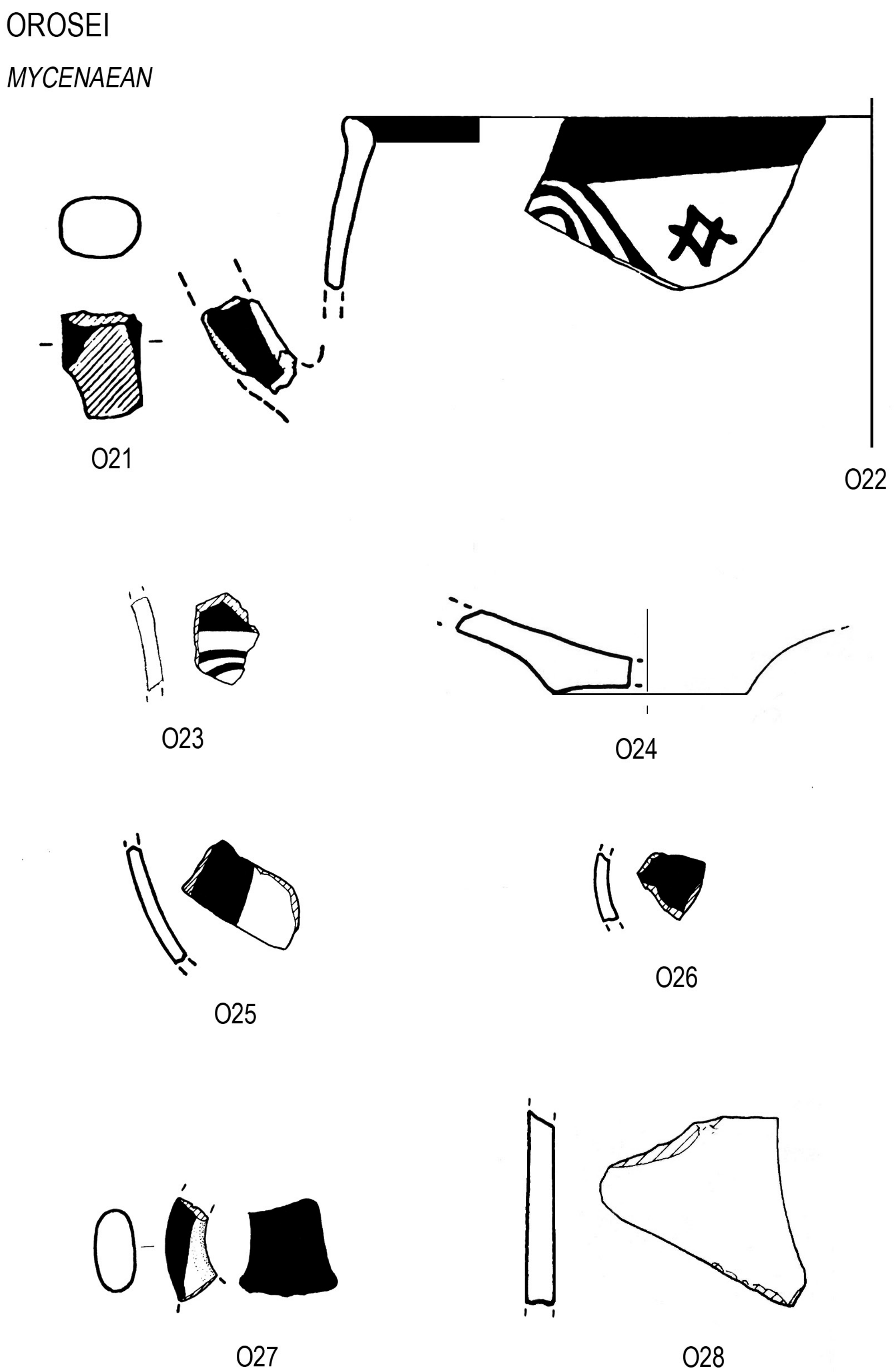


Fig. 4.97. O21-23, 25-27 (1:2); O24, 28 not to scale.

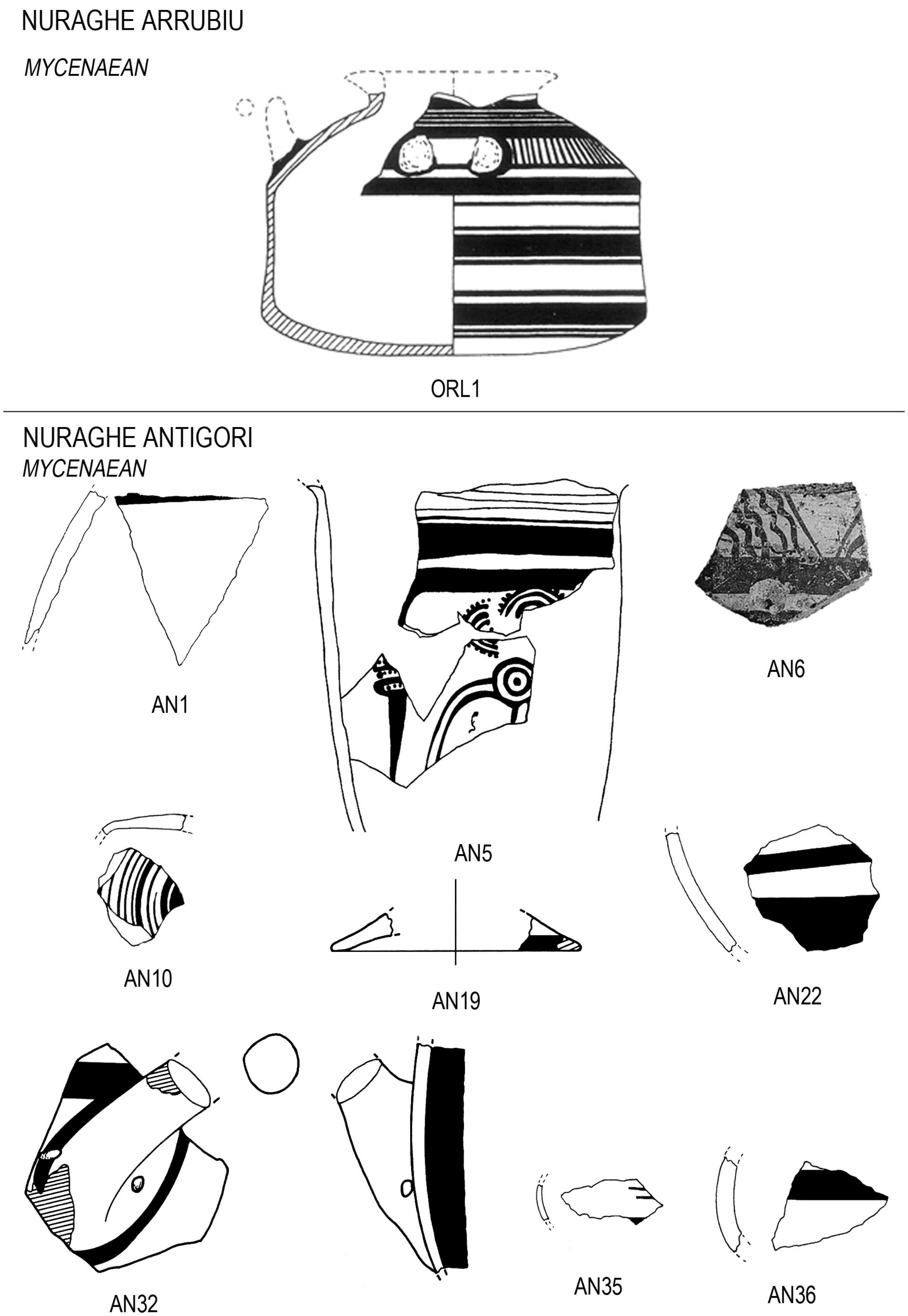


Fig. 4.98. ORL1, AN1,5, 10-36 (1:2); AN6 not to scale.

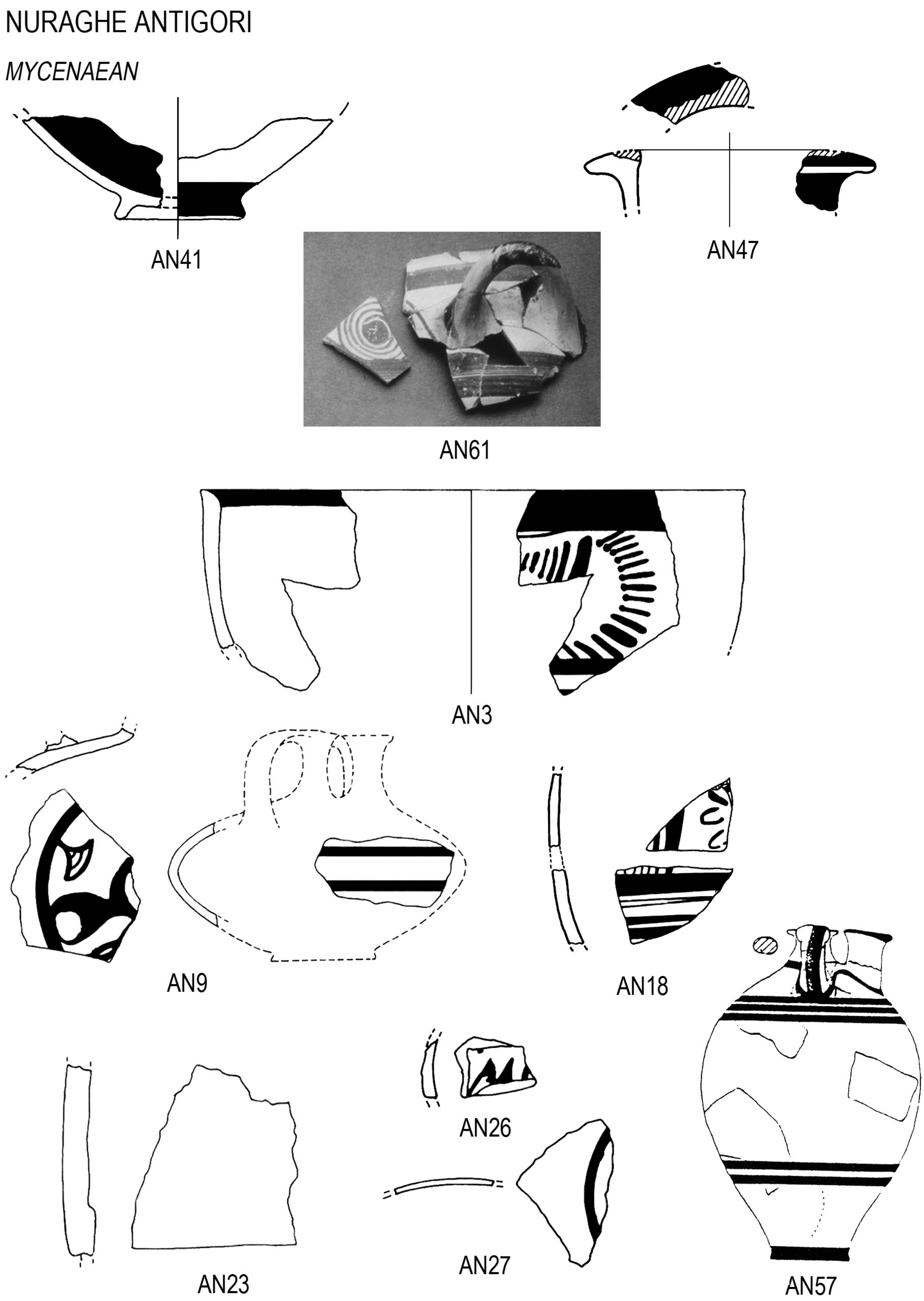


Fig. 4.99. AN3-47 (1:2); AN57, 61 not to scale.

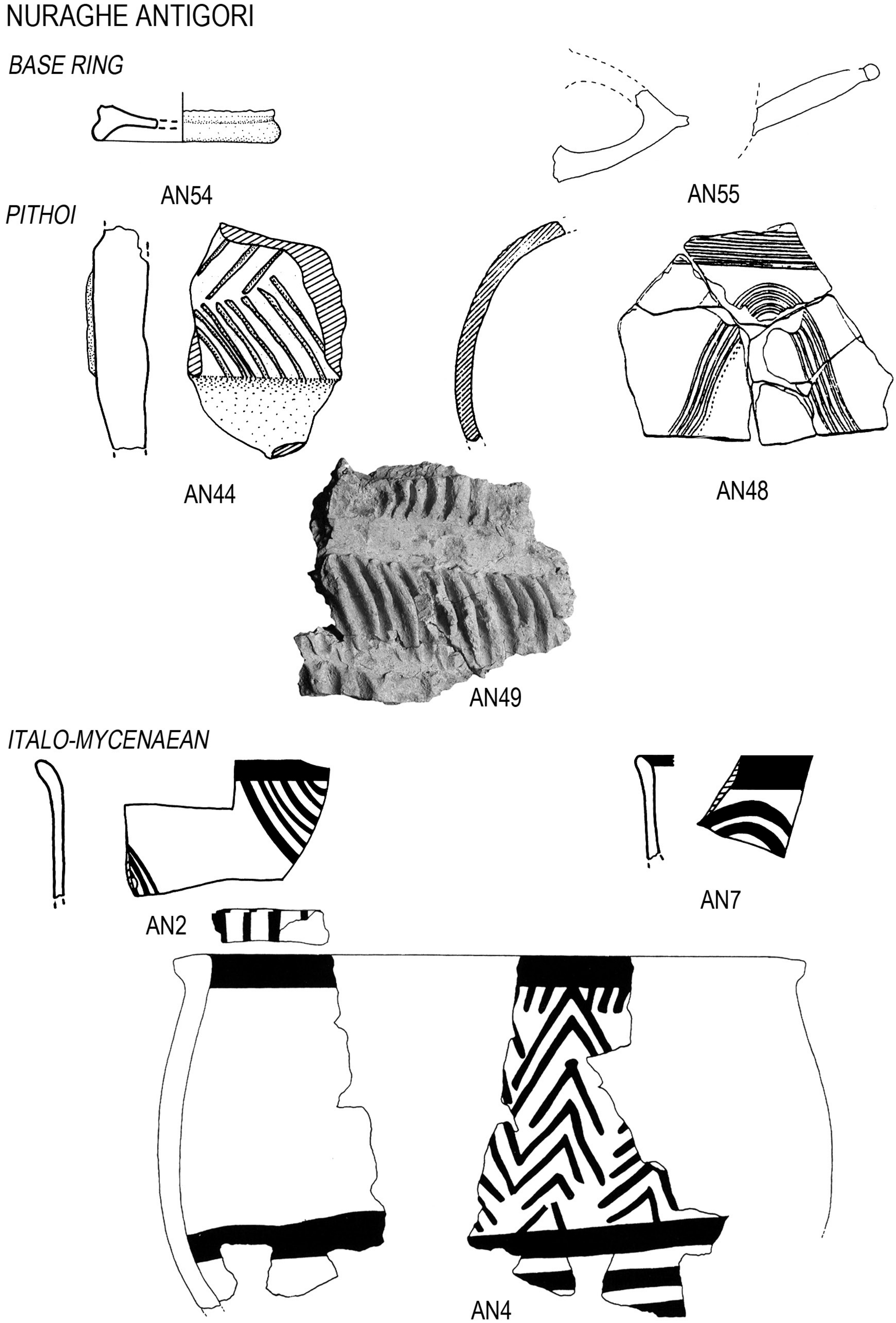


Fig. 4.100. AN2, 4, 7, 44, 54-55 (1:2); AN48-49 not to scale.

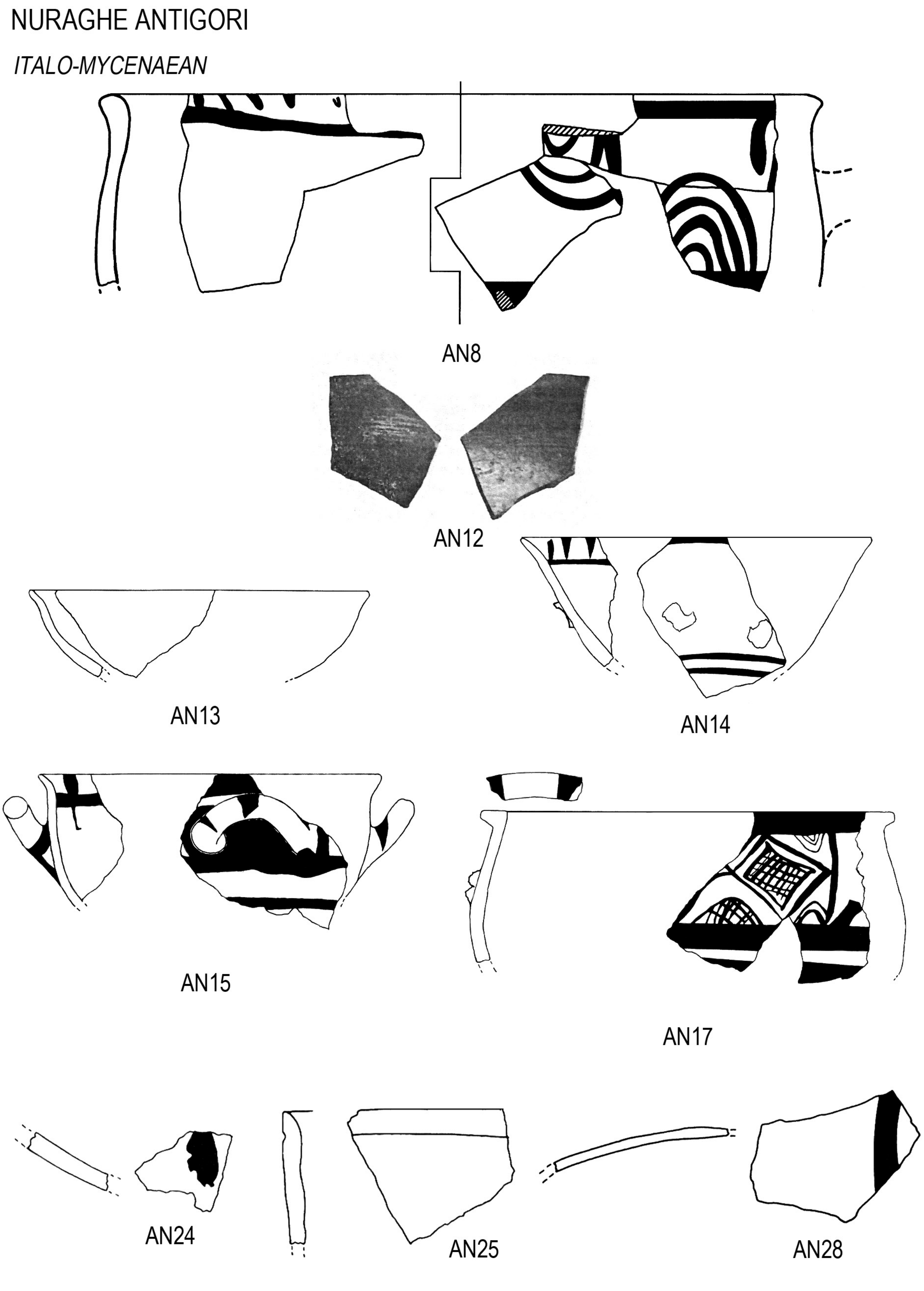


Fig. 4.101. AN8, 13-28 (1:2); AN12 not to scale.

NURAGHE ANTIGORI

ITALO-MYCENAEAN

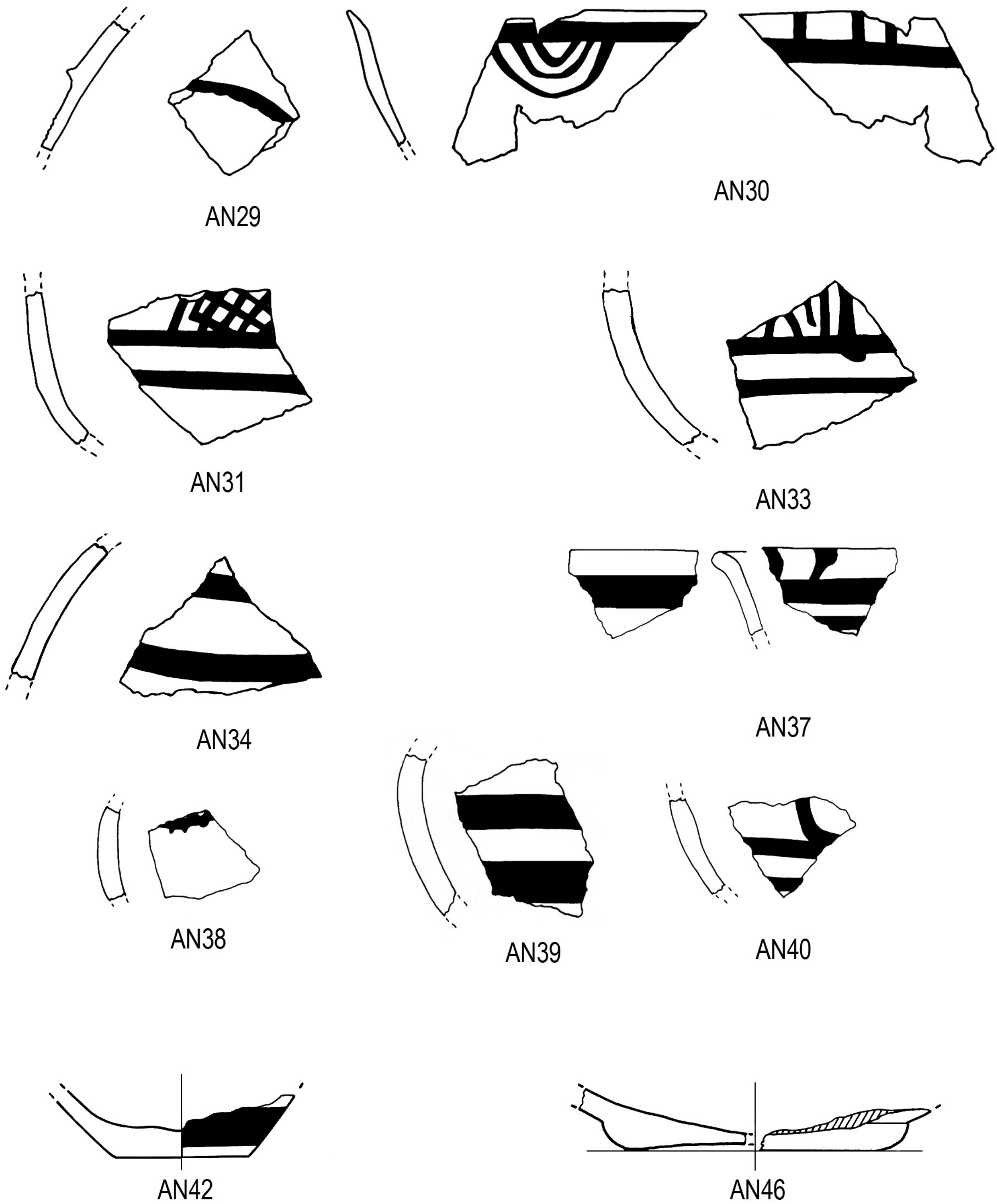
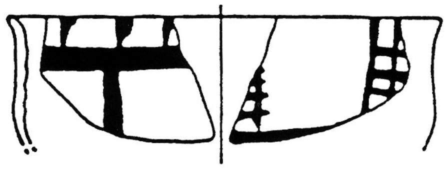


Fig. 4.102. AN29-46 (1:2).

NURAGHE ANTIGORI

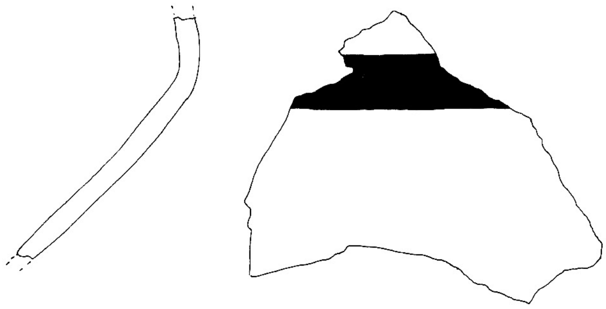
ITALO-MYCENAEAN



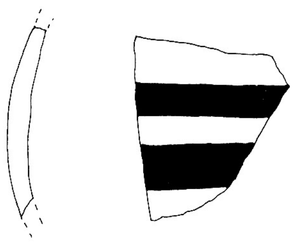
AN60

NURAGHE DOMU S'ORKU

MYCENAEAN

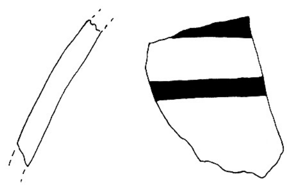


DO1



DO2

ITALO-MYCENAEAN



DO3

Fig. 4.103. DO1-3 81:2); AN60 not to scale.

CHAPTER 5

TECHNOLOGICAL INVESTIGATIONS

Sara T. Levi, Richard Jones

(with contributions by V. Cannavò, E. Photos-Jones, C. Moffa, A. Vanzetti et al.*)*

The appearance of Aegean-derived or inspired pottery in Italy during the Late Bronze Age brings to the fore several important technological issues, in essence the dichotomy between the indigenous and Aegean traditions of pottery manufacture. This dichotomy may of course be viewed at different levels, contrasting separately the making, decorating and firing of pottery associated with the two traditions. The main technological attributes of *impasto* pottery, on the one hand, and decorated and other Aegean-inspired pottery on the other have been outlined by many researchers on the basis of *macroscopic* observations, and this information is supplemented by the wealth of more objectively-derived data obtained from scientific examination. Chapter 4 presents such data on the physico-chemical characterisation of fabrics within the context of assessing the relationship between different local fabrics and particularly identifying imports. The important point is that the same data may be scrutinised from a more technological angle, and indeed a number of studies presented in Chapter 4 were originally designed with specifically technological aims in mind. There is therefore a measure of overlap between parts of this chapter and the content of Chapter 4. The present chapter encompasses several related but identifiably distinct topics: Manufacturing techniques, which are deliberately introduced with comparable evidence drawn from the Aegean and beyond; Decoration and firing temperature determinations; Experiments carried out at, and inspired by the finds from, Broglio di Trebisacce; and Firing structures. Leading on from a brief discussion of particular topics arising from the archaeological and ethnographic records in the Aegean, the discussion presents some possible scenarios outlining the process of technology transfer.

Whereas the accounts of manufacturing techniques, pigments and firing temperatures are based on new or recently obtained science-based data sets, the section on firing structures based on the work of Moffa (2002), draws on the archaeological and experimental records. Conventional though this chapter's structure and content may be, it is written in the spirit and acknowledgement of the significant changes in emphasis that have taken place in technological investigations worldwide over the last few decades. Technological studies of pottery making as well as other crafts are no longer solely focused on describing the *chaînes opératoires* strictly in technical terms, but are increasingly combined with viewing technology in a wider, socially-based context. That Italy during much of the second millennium BC is a fertile ground for such an approach is beginning to be acknowledged, if not always explicitly, in the studies reported in this chapter. Looking beyond Italy to the Aegean, a necessary counterpoint for our present purposes, the trend towards a more balanced approach to technological issues is already evident as the summary of recent studies presented in Table 5.1 explains.

The five sections of this chapter are:

- 5.1 Manufacturing process
- 5.2 Decoration and Firing temperature ranges
- 5.3 Firing structures
- 5.4 The Broglio experiment in reproducing of Aegean-derived pottery
- 5.5 Discussion

5.1. Manufacturing process

Sara Levi, Valentina Cannavò

The production sequences or *chaînes opératoires* involved in making pottery are well known. Roux (2003) sees these *chaînes opératoires* and skills having dynamic interplay with the environment (c.f. ceramic ecology of Matson (1965)) and the potter in defining the potter's craft. To Gosselain (2000, 190) they may characterise a potting tradition, "an intricate mix of inventions, borrowed elements, and manipulations that display an amazing propensity to redefinition by individuals and local groups". But the component parts of the *chaînes opératoires* may respond unequally to change. Arising from his exploration of the rich ethnography of pottery making in central Africa, Gosselain (2000, 193) found manufacturing technique to be the most deeply internalised aspect of production, resistant to change and embedded in social identity. This manufacturing technique or fashioning stage ('primary forming' (Rye 1981, 62) or 'roughing out' (Courty, Roux 1995), the third of Gosselain's manufacturing stages, contrasted with his first two categories which were inherently more flexible to change: those steps, including decoration and firing on the one hand and processes such as clay processing on the other, that would leave visible and invisible evidence respectively on the finished pot.

Turning now to the detail of the manufacturing technique, there is recognition of so-called rotational kinetic energy (RKE) manifesting itself in two general methods of pot construction: wheel-*shaped* and wheel-*made* or wheel-thrown pottery (Roux, Courty 1998).The latter method uses RKE to raise walls and form the basic shape of the vessel, whereas wheel shaping involves a series of steps: to the coil-built basic shape wheel shaping then applies either slow rotation or RKE to join the coils and to progress that basic shape, for example to thin the walls. Rilling and compression ridges are consequences of the use of RKE in finishing. Despite their technical differences these two methods share the feature that the craftsman, the potter, is learning a radically new technique and needs long training.

The well-explored issue of how potters adapt to working with the wheel continues to receive attention. Going beyond Gosselain's observations in Central Africa just mentioned, Roux and Corbetta's (1989) (see also Berg 2007, n. 6) ethnographic study (in India) combined with experimental work demonstrated afresh that potters require a long time – ten or more years – to become proficient in using the wheel because they have to master any one stage before they can acquire the new motor skills to move onto the next level of difficulty. As potters improve their newly-acquired technique, they are able to progress from the 'apprentice' level making simple shapes to a height of *c*. 6 cm, to learning consistently to centre the clay and use asymmetrical but simultaneous hand movements allowing them to throw vessels up to 22 cm, and finally to a stage in which they can make larger vessels still.

In the same vein, Loney (2007, 201) has argued persuasively that physical and mental processes of learning are highly relevant in understanding aspects of craft production and in particular why mature potters may not easily acquire new skills such as those associated with working the wheel. As she put it, "….mature, highly skilled artisans have a selective and efficient array of actions and strategies, which they can draw upon to produce highly competent products, of predictable quality and quantity. The flip side of this degree of physical training is, however, the development of skills that have a potential 'negative transfer' when it comes to learning new skills….. Further, these performances have a cognitive aspect, which serves to reinforce performance, and in adult learners, act to enhance conservativeness and reduce the effectiveness of learning new skills". And in a recent, detailed investigation on the introduction of the wheel at Lerna in southern Greece in EH III, Choleva (2012) showed that some potters at Lerna adopted at that time the wheel-forming technique as that was the more natural route to take; "…by initially adopting only the wheel-fashioning technique (a conservative response), the potter could preserve part of the earlier and already-mastered tradition based on the coil-building technique" (Choleva 2012, 376). This intermediate technique was partly succeeded by wheel throwing in the subsequent Middle Helladic period.

For the purposes of the presentation here, following Berg (2008) *wheel-made* (thrown, forming) is taken to mean the use of a potter's wheel that runs at sufficiently high speeds to develop RKE which is used by the potter to pull up and shape the clay. On the other hand, *wheel-shaping* (finishing) refers to vessels constructed with the wheel at lower speeds, not high enough to develop RKE, and used to join, thin or smooth the walls that have been built using a hand-made technique. Wheel-shaping may also describe the situation where speeds are sufficient, but are not taken advantage of. Roux and Courty (1998) have identified four different methods of wheel-shaping depending on the stage within the production process during which RKE is applied, i.e. coil building, coil joining, wall thinning or pot shaping (see also Courty, Roux 1995).

5.1.1. Manufacturing techniques

For the investigation of manufacturing techniques the most powerful method is the investigation of the internal structure of the pots by X-radiography, a tool successfully used in archaeological contexts (Courty, Roux 1995; Lang, Middleton 1997; Berg 2008; Choleva 2012).

X-raying and xeroradiography have been performed on various wares from Broglio di Trebisacce (Levi, Odoguardi 1990-91; Levi 1999) and Coppa Nevigata (Boccuccia *et al.* 1995, 1998), as well as on *impasto* pottery in Central Italy (Casale Nuovo: Loney 2007) and in northern Italy (Modena area: Levi 1997; Imola area: Amadori *et al*. 1996). Observations were made on profile continuity, general symmetry, position and shape of the fractures, wall thickness and surface marks. Such features have also been investigated in the pottery from later sites, such as Sala Consilina (Ruby 1988) and Osteria dell'Osa (Cuomo di Caprio 1992, combined with observations on the internal structure in thin sections).

X-rays and features (topography, surface breaks) have been used in the discussion for distinguishing wheel-made (or wheel-thrown) pots from wheel-shaped (or wheel-fashioned), the last one involving various degrees of modification of coil-built roughouts (Berg 2007; Choleva 2012). In this case study we attempt to use this distinction, although a deeper investigation is needed in this direction for a more general classification of our pots.

Here we present some examples of images obtained with X-raying, focusing mainly on unpublished analyses of Mycenaean and Italo-Mycenaean pottery and summarizing the results for each ware. The figures presented are the original X-ray images or their printed versions. The colour ranges from black to white according to the thickness and the atomic number of the materials analysed. For instance, in the original images the voids are black, inclusions and the handle area are white; in the printed version it is the opposite.

Luigi Odoguardi took the X-ray photographs of the Broglio vessels at Trebisacce. The pots whose chemical analysis is reported in Chapter 4 are labelled with the sample number, the others with the X-ray number.

Mycenaean

The presence at Broglio of imported Mycenaean (likely from the Peloponnese and Central Greece) gives us the opportunity to analyse vessels which were produced using the fully developed technology employing fine-textured raw materials, the wheel, painted decoration and complex firing. Their characteristics can then be compared with those of Italian mixed products, that is, Italo-Mycenaean, *dolia*, Grey, PG as defined in Table 1.2.

- **A48-49**, **BT704** *EMS* 73,12 (IIIB) necked jar (likely from central Greece/Crete or Peloponnese) (Fig. 5.1a)
- **A40** *EMS* 72,3 (IIIB) necked jar (from the Peloponnese) (Fig. 5.1b)
- **A51** *N.Ric* 49,1 (IIIC middle) necked jar? (from the Peloponnese) (Fig. 5.1c).

The three X-rays of the small fragments show a homogeneous and compact ceramic paste; some pores are visible only in **A48**. The way in which the walls vary in thickness in a rhythmic fashion clearly indicates the use of the wheel with anticlockwise rotation. No inclusions are visible.

Fig. 5.1a. **A48-49**, **BT704** Mycenaean necked jar (IIIB): RX.

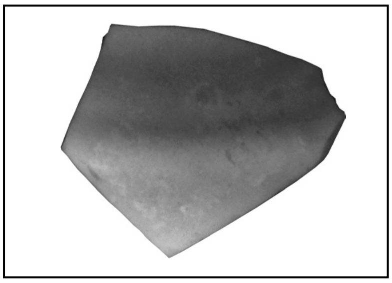


Fig. 5.1b. **A40** Mycenaean necked jar (IIIB): RX.

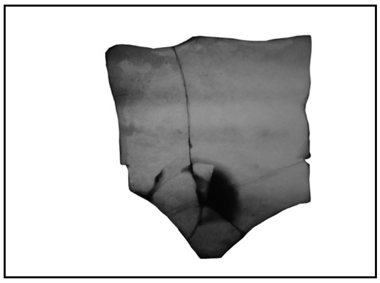


Fig. 5.1c. **A51** Mycenaean necked jar? (IIIC middle): RX.

Italo-Mycenaean

The significant amount of well preserved Italo-Mycenaean at Broglio allows examination of a series of X-rays of large portions of the vessels.

Necked jars:

- **A50** *EMS* 76,2-3 (IIIA?) (Fig. 5.2a)
- **RX21** *EMS* 73,11 (IIIA or B?) (Fig. 5.2b)
- **A1** *N.Ric.* 48,2 (IIIB) (Fig. 5.2c)
- **A13**, **BT706** *N.Ric.* 46,3 (IIIB) (Fig: 5.2d)
- **A9-65**, **BT705** *N.Ric.* 49,3 ('green pot' kiln waster) (IIIC) necked jar (Fig: 5.2e)

The series of necked jars clearly show the typical wheel marks in the rhythmic thickness of the walls. Wheel marks, as grooves, are also clearly visible in the interior of the vessels where no surface treatment has deleted the traces of rotation (Fig. 5.2f). The direction of the pores indicates an anticlockwise rotation. Horizontal fractures and some alignments of pores could indicate the existence of joints between different parts (for example in **A1**, arrows show the position of possible joints). The overall picture would suggest the use of either the wheel-thrown or wheel-shaping technique. Inclusions are present in all the pots.

Open shapes:

- **A16** *EMS* 78,3 (IIIC) deep bowl (Fig. 5.2g)
- **A36** *N.Ric* 45,7 (IIIC) deep bowl (Fig. 5.2h)
- **A38** *N.Ric* 51,2 (IIIC) carinated cup (Fig. 5.2i)
- **RX8** *Ric.3* 40,1 (IIIC) carinated cup (Fig. 5.2j)

Open shapes are wheel-thrown with anticlockwise rotation. The ceramic paste contains few inclusions, and there are no significant differences between rounded (more Aegean) and carinated shapes. No joints are visible. Although the fragment from Coppa Nevigata (sample CNS 165, Boccuccia 1995, fig.1, 4) is very small, a similar technique can be proposed.

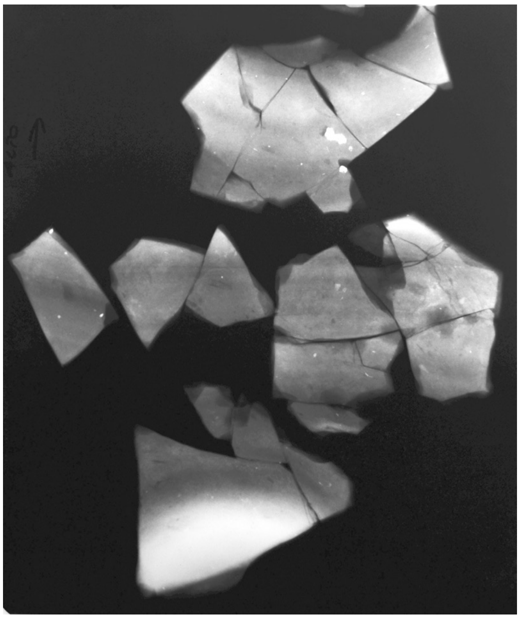


Fig. 5.2a. **A50** Italo-Mycenaean necked jar (IIIA?): RX.

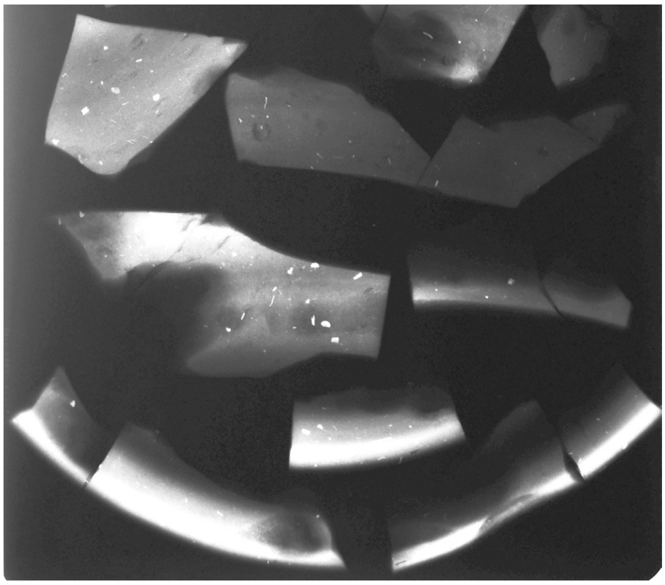


Fig. 5.2b. **RX21** Italo-Mycenaean necked jar (IIIA-B): RX.

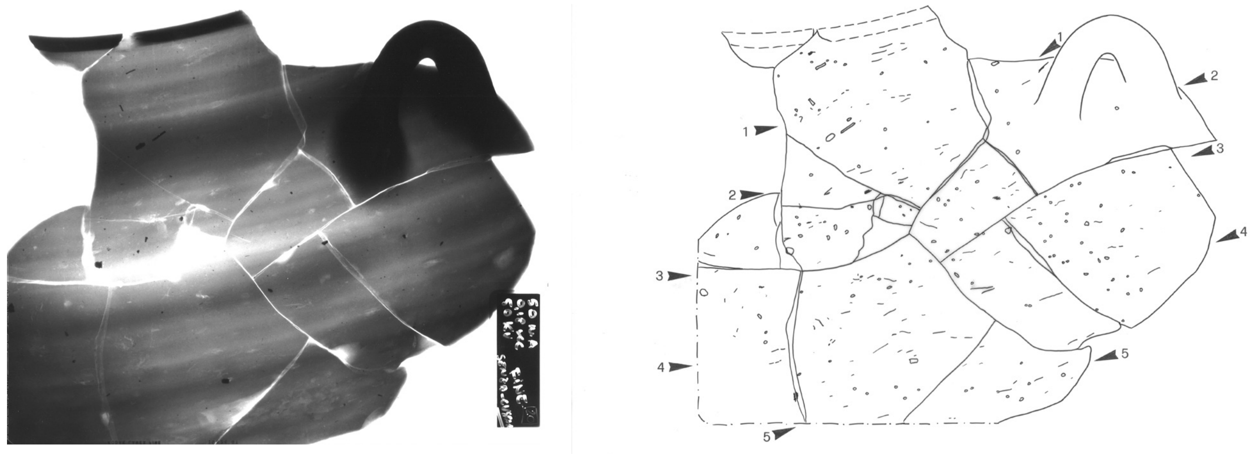


Fig. 5.2c. **A1**, Italo-Mycenaean necked jar (IIIB): printed RX, drawing of the RX arrows show possible joints.

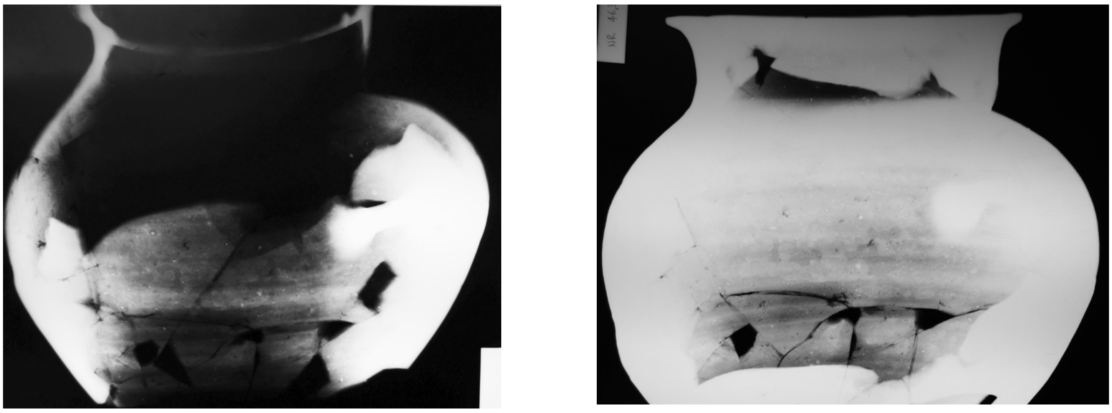


Fig. 5.2d. **A13**, **BT706** Italo-Mycenaean necked jar (IIIB): 2 RX.

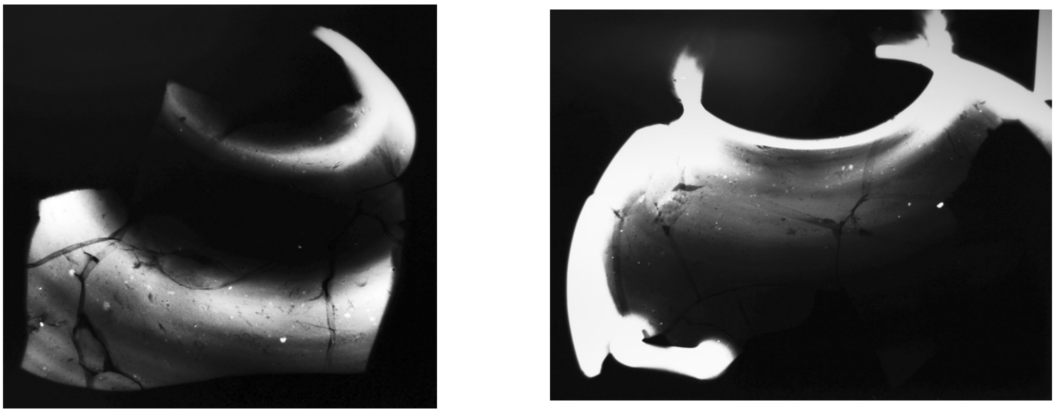


Fig. 5.2e. **A9-65**, **BT705** Italo-Mycenaean necked jar (“green pot” kiln waster) (IIIC): 2 RX.

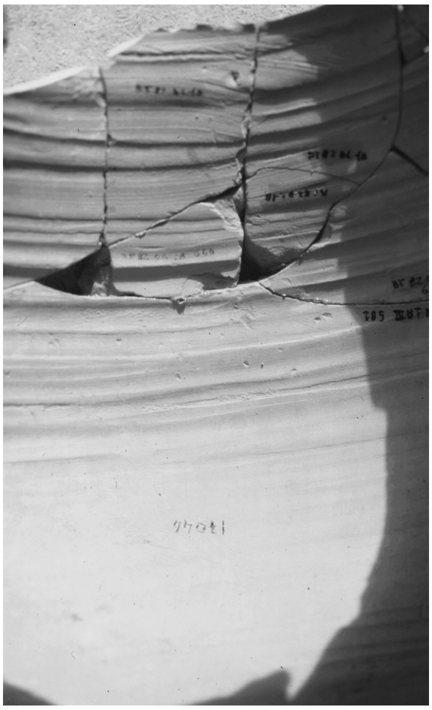


Fig. 5.2f. Photo of the internal surface of a wheel-made Italo-Mycenaean necked jar showing deep horizontal grooves and some superficial lines at various angles suggesting a rough finishing.

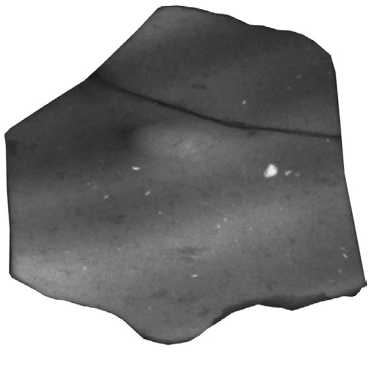


Fig. 5.2g. **A16** Italo-Mycenaean deep bowl (IIIC): RX.

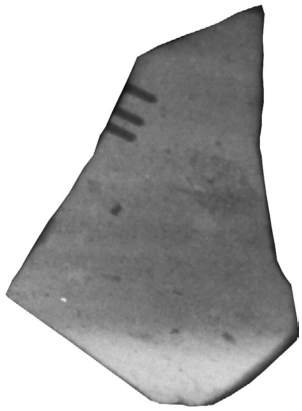


Fig. 5.2h. **A36** Italo-Mycenaean deep bowl (IIIC): RX.

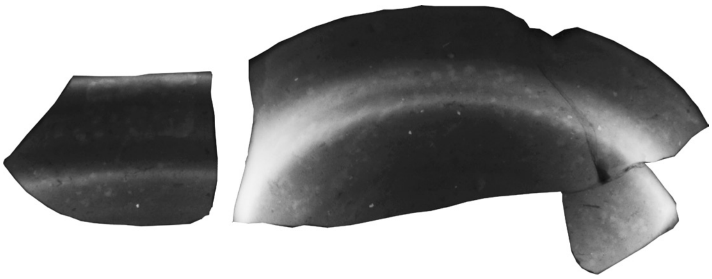


Fig. 5.2i. **A38** Italo-Mycenaean carinated cup (IIIC): RX.

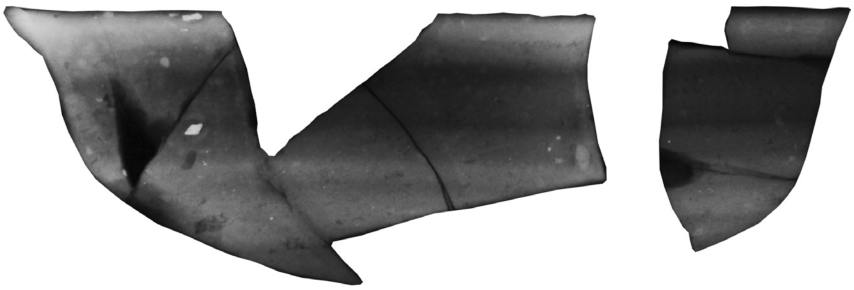


Fig. 5.2j. **RX8** Italo-Mycenaean carinated cup (IIIC): RX.

Dolia

The large number of radiographs from Broglio show that *dolia* were constructed with large coils and then wheel-shaped (with anticlockwise rotation). This applies to the *dolia* with fine-textured paste as well as to those with a paste similar to *impasto*. Of the many radiographs presented by Levi (1999), here we illustrate two:

- **D19** (*N.Ric* 41,4; Levi 1999, fig. 190, 2010, fig. 34) (RBA) (Fig. 5.3a)
- **D10, BT940** (*EMS* 46,1) (FBA) (Fig. 5.3b)

During the RBA the construction involved a series of large rings, each made with several coils and then wheel-shaped; the large rings (probably after a partial drying phase) were then assembled one on top of the other with the main joints arranged (or formed) with a characteristic 'knife-cut toothing' (or indenting) technique (Levi 1999, figs. 195, 198, 199; here Fig. 5.3a) or fingerprints (Levi 1999, fig. 192; here Fig 5.3c **RX27**). Since the main joints are generally in correspondence with the large cordons, the function of the latter was probably two-fold, to reinforce the wall and for decoration (Fig. 5.3d).

During the FBA the use of the 'toothing' technique appears to decrease although it is still used to attach the rim (Levi 1999, fig. 195), indicating a more continuous forming technique and suggesting an exploitation of the wheel's potential. The coil diameter is quite regular, usually 3.0-4.5 cm with smaller dimensions in the upper portion of the pots, closer to the rim, and in the more recent *dolia*. In some cases temper has been added which is clearly visible in the radiographs. To facilitate the detachment of the base from the rotating support a layer of non-plastic material (the same used as temper) was sometimes added, and there is one instance of a rectangular impression visible on the base of a *dolium* showing part of the support (Levi 1999, figs. 201-202).

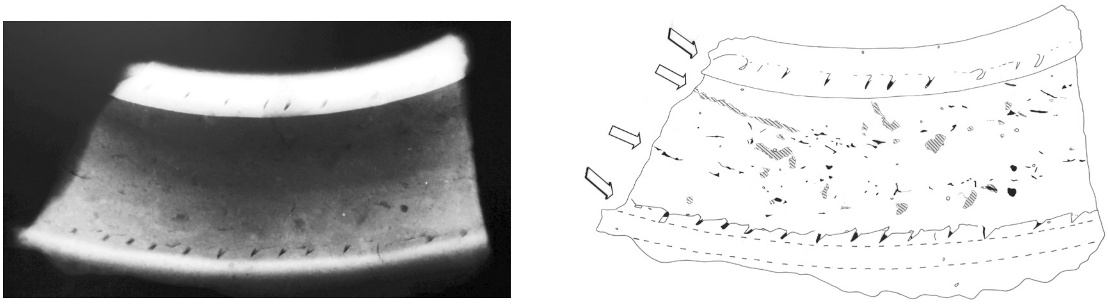
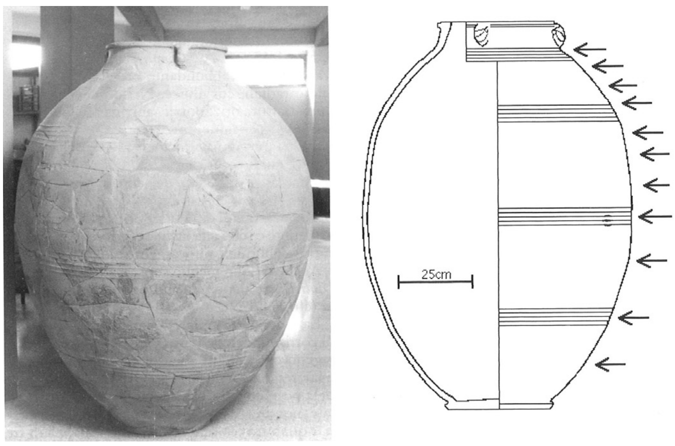


Fig. 5.3a. **D19** *dolium* (RBA): RX, drawing of RX arrows indicates the joints between coils.



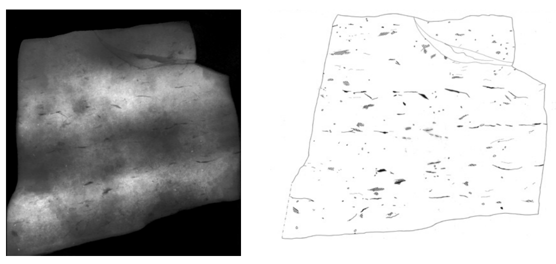


Fig. 5.3b. **D10**, **BT940** *dolium* (FBA): RX, drawing of RX, arrows indicate the joints between coils, photo and archaeological drawing.

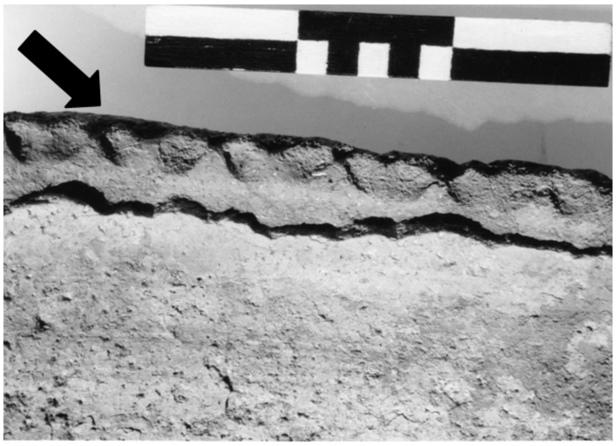


Fig. 5.3c. Photo of fingerprints (indicated by the arrow) on a RBA *dolium* in correspondence with the cordon (**RX27** NR39,2, Levi 1999, fig. 192).

Fig. 5.3d. Photo of a cordon in a RBA *dolium* applied in correspondence with a main joint between coils.

Grey

Nearly 50 pots, mainly carinated cups, from Broglio have been examined.

Necked jars
- **RX166** Bettelli 2002, Fig.104,33 (Fig. 5.4a)
- **RX15** *Ric. 1*, Tav 19.1 (Fig. 5.4b); presence of inclusions

Bowl
- **G25, BT603** *N.Ric.* 33,4; some inclusions (Fig. 5.4c)

Rounded cup
- **G26, BT605** *N.Ric.* 32,4 (Fig. 5.4d)

Carinated cups
- **RX6** (*Ric. 3*, 20,1 , Levi 1999, fig. 151, Levi 2010, fig. 35) (Fig. 5.4e)
- **RX29** (*Ric. 2,* 14,7) (Fig. 5.4f)

Grey ware is always wheel-thrown usually with anticlockwise rotation. X-rays of various shapes show homogeneous ceramic pastes with readily visible elongated pores and the absence of joints; sporadic inclusions are attested in some closed shapes.

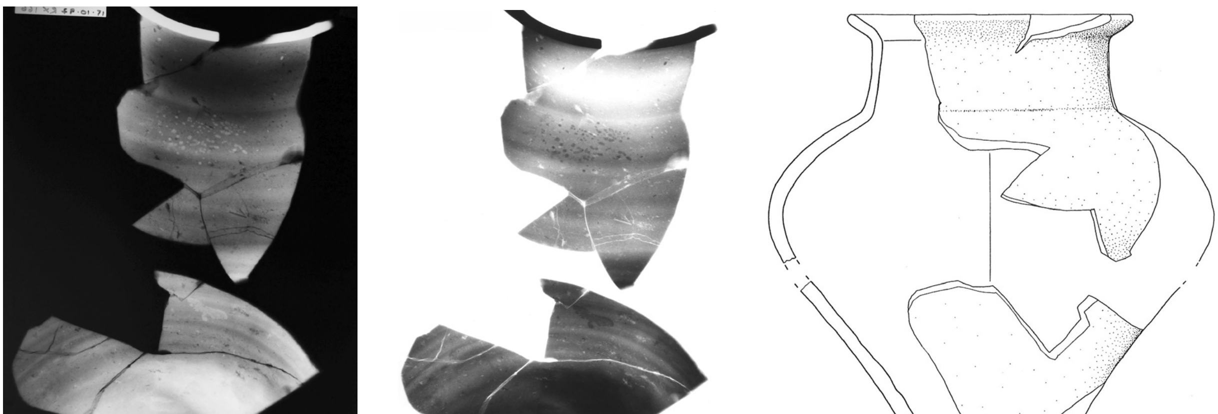


Fig. 5.4a. **RX166** Grey necked jar: RX, printed RX, archaeological drawing.

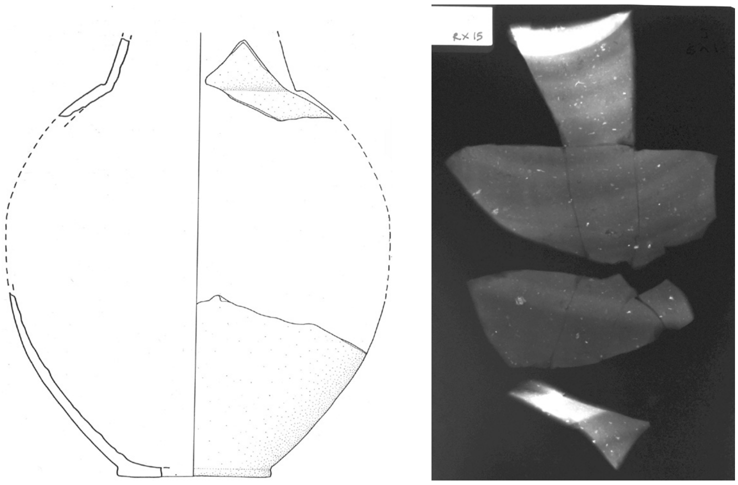


Fig. 5.4b. **RX15** Grey necked jar: RX, archaeological drawing.

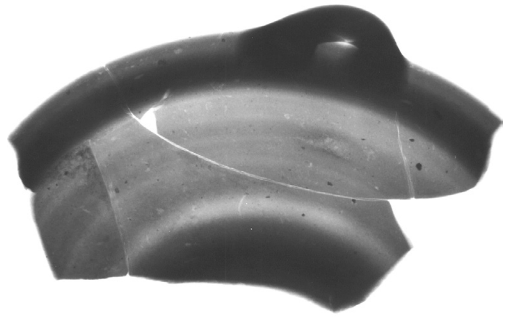


Fig. 5.4c. **G25**, **BT603** Grey bowl: printed RX.

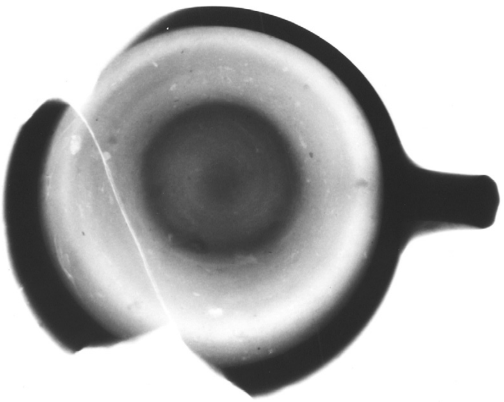


Fig. 5.4d. **G26**, **BT605** Grey rounded cup: printed RX.

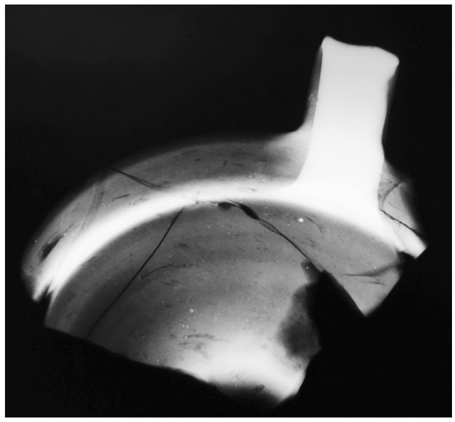


Fig. 5.4e. **RX6** Grey carinated cup: RX.

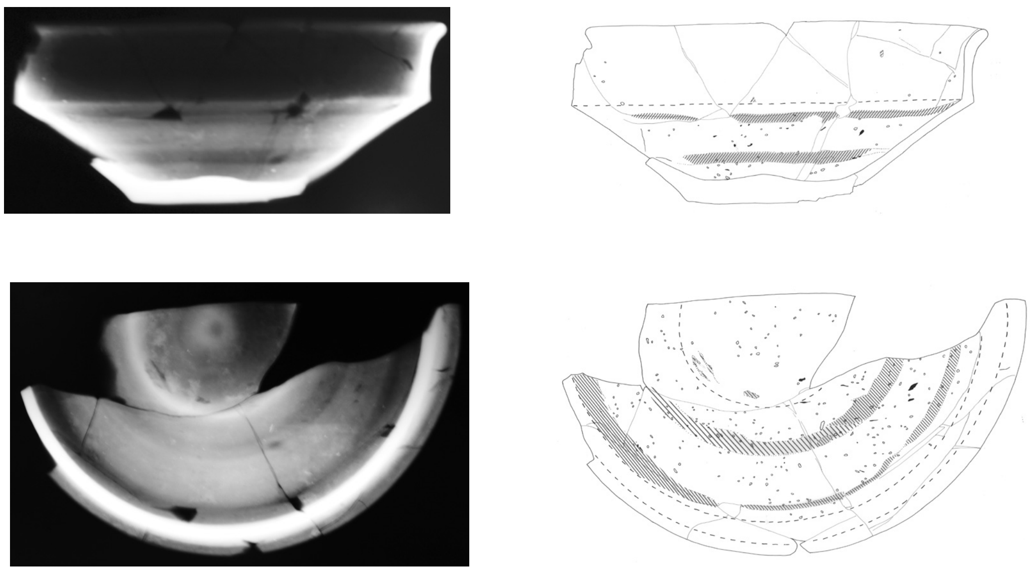


Fig. 5.4f. **RX29** Grey carinated cup: 2 RX, 2 drawing of RX shading representing the portions of the vessel with thinner thickness of the wall.

South-Italian Protogeometric and Geometric

From the large set of X-rays of these wares obtained from Coppa Nevigata (Boccuccia *et al.* 1995, 1998) and Broglio (unpublished, work in progress) it is clear that a similar pattern appears at both sites. Coils are prevalent and the wheel was used during the Protogeometric (FBA) and Early Geometric (beginning of the EIA). Wheel-throwing increased during the EIA on Early to Middle Geometric ware. Some details in the larger vessels, such as knife-cut 'toothing' and wheel-finishing of coils recall the manufacturing technique of the *dolia*. In some cases larger vessels show the presence of temper. At the EIA Campanian site of Sala Consilina coils have been observed in the Geometric pottery but together with the use of the wheel for some stages of the manufacture, mainly for forming the rim.

Impasto

Levi (1999) has illustrated many radiographs of *impasto* from Broglio. Here we show some examples of the main techniques.

Carinated cups

- **RX3** *N.Ric.* 6,3 (Levi 1999, fig. 159) (Fig. 5.5a); pressure
- **RX2** *Ric.1* 11,1 (Levi 1999, fig. 160) (Fig. 5.5b RX); coils

Jar

- **RX167** (Levi 1999, fig. 177; see also figs. 176-180) (Fig. 5.5c); wheel-shaped anticlockwise, ceramic paste very coarse-grained

Bronze Age *impasto* pottery was generally hand-made with pressure (moulding, paddle and anvil, pinching) or coils. In several cases there is a combination of the two techniques with the body of the vessel shaped in a mould and the upper part with coils or slabs. The pressure techniques were common for open shapes, specifically for basins and non-carinated shapes and they were particularly frequent during the Early and Middle Bronze Ages. The slab technique has been reported (Loney 2007) in Latium during the MBA and

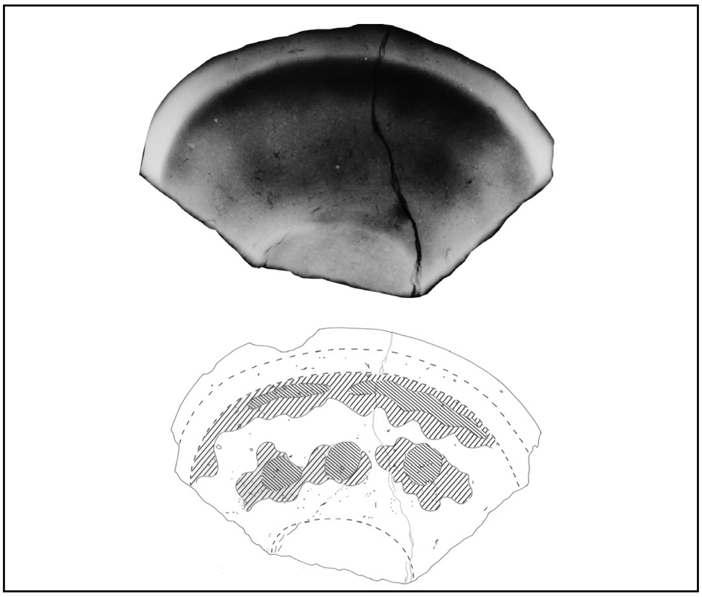


Fig. 5.5a. **RX3** *impasto* carinated cup manufactured with pressure: RX, drawing of RX shading representing the portions of the vessel with thinner thickness of the wall pressure.

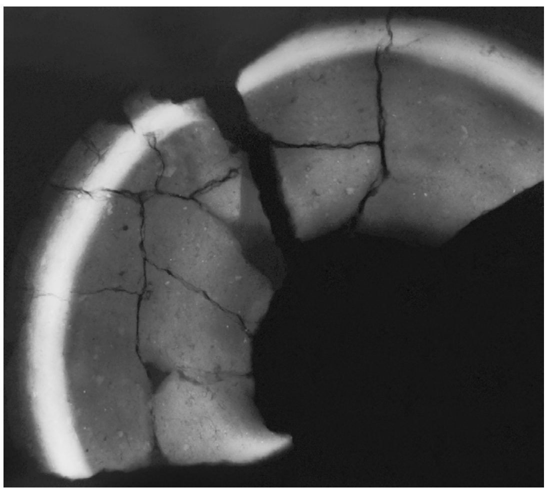


Fig. 5.5b. **RX2** *impasto* carinated cup manufactured with coils: RX.

RBA. The coiling technique was consistently employed in Latium for closed shapes and large pots, while its use for open shapes seems to be more frequent on the Adriatic coast, tending to become generalized during the RBA. The size of the coils was generally in the range 12-30 mm according to the shape and size of the vessels. From the RBA there are a number of cases of finishing or forming with the wheel (Fig. 5.5c).

At Broglio these usually occur in jars with thick or shaped rim (types 96-101 in *EMS*: 242) and in contexts related to the main Central Hut, where the highest concentration of Italo-Mycenaean occurs. Since some of them are very coarse (clasts up to 5 mm, wall thickness 10 mm (Levi 1999, fig. 177; see also figs. 176-180), it seems that the wheel was ill suited to this ceramic paste. At Coppa Nevigata one *impasto* pot could have been coiled and wheel-finished (Boccuccia 1995, fig. 1). The use of the wheel for *impasto* decreases during the FBA only to increase again in the EIA. At Osteria dell'Osa the significant increase in the use of a 'primitive wheel' during the EIA (900-770 BC: 8%; 770-720 BC: 66%) has been observed.

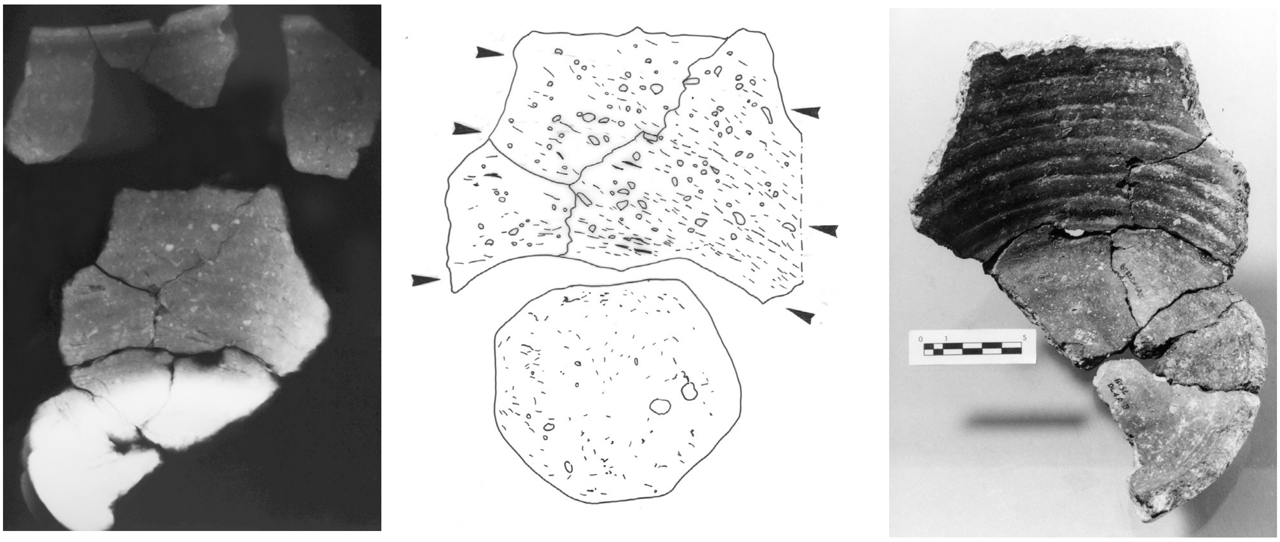


Fig. 5.5c. **RX167** *impasto* jar manufactured with the wheel: RX, drawing of RX (base belongs to another pot made with the same technique), photo; wheel anticlockwise, ceramic paste very coarse-grained, arrows show possible joints.

5.1.2. Discussion

Traces of the wheel have been recorded in all the 'mixed Italian products' indicating a wide use of this technique; we believe the wheel was employed in an almost continuum of modes that would surely have included modelling and finishing. According to the pattern of the internal structure of the ceramic paste, the wheel rotation was generally anticlockwise for these wares. More difficult to establish is the speed of the rotation: experiments show that in small pots with a regular cylindrical shape the angle of inclination of pores and clast alignments tends towards the horizontal as rotation becomes faster (Fig. 5.6 from Desogus *et al.* 1995), but also a wide range of angles is observed with both slow and fast rotation, probably due to variation of speed during the forming process (Berg 2008). Nevertheless measurement of the speed of rotation has been tentatively tested. Considering the dimension of the pots (the radius), the angle of alignments and the wall height, we obtained a speed coefficient (defined as (angle/radius^2)/height) for five archaeological pots. Comparison with the same coefficient obtained during experimental reproduction, in which the speed of the wheel rotation had been measured (Desogus *et al.* 1995), allows an estimation of the speed of rotation. This test suggests that for some RBA Italo-Mycenaean necked jars and grey carinated cups the wheel speed was very fast (about 150 rotations/minute?), whilst the wheel-shaped coarse *impasto* could have been formed using

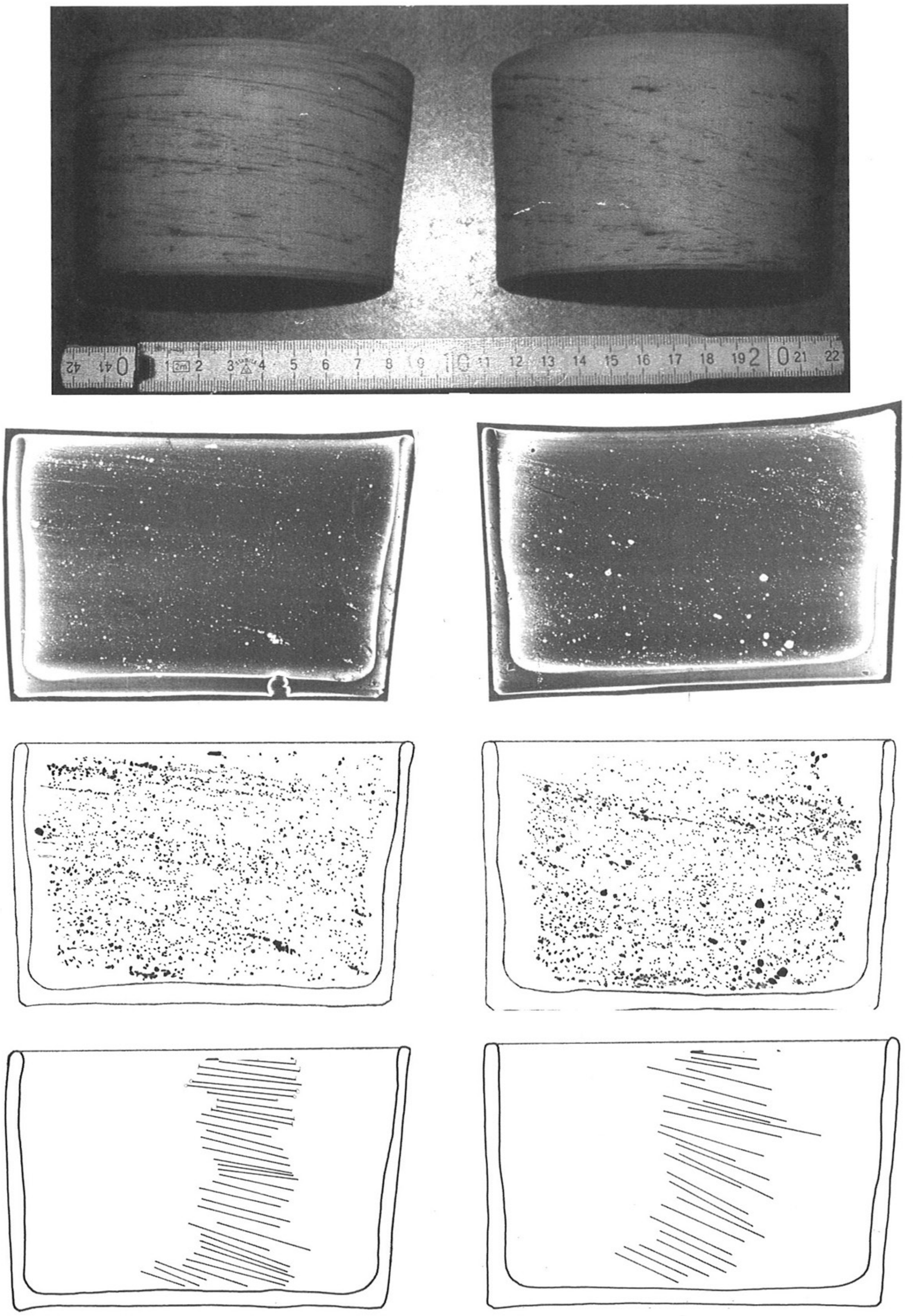


Fig. 5.6. Fast (left) and slow (right) wheel-made experimental pots (Desogus *et al.* 1995; Levi 2010, 94-95): photos, xeroradiographs, RX drawings, alignment of inclusions.

a slower rotation speed (about 50 rotation/minute?). However this trend, deriving from a very small set of measurements, cannot yet be generalized.

One of the main differences between Italo-Mycenaean and imported Mycenaean seems to be a coarser raw material with some inclusions in the Italian production. Results of investigating manufacturing techniques can be summarized as follows:

- MBA: appearance of the wheel for Italo-Mycenaean.
- RBA: the skilled use of the wheel for forming or finishing the 'Italian mixed products' was general and apparently standardized ('fast' speed). The wheel was sometimes also used for some *impasto* pots, mainly closed shapes, maybe using a slower rotation speed, suggesting the integration of coiling and wheel techniques and probably a certain degree of receptivity to innovation on the part of the local craftsmen producing the traditional ware.
- FBA: the use of the wheel appears less general and linked to specific products; it was fully employed for *dolia* but scarcely for the Protogeometric. Nevertheless, certain similarities between the wares suggest a strong interaction between artisans and workshops producing the two wares. The use of the wheel for *impasto* pottery is rare.
- EIA: the use of the wheel not only increases as attested in Geometric pottery, *dolia* and, in some cases, *impasto*, but is also adopted beyond southern Italy.

Turning for comparison to the east, in the Aegean and Cyprus, an island whose relatively late adoption of the wheel is well known, several findings have emerged in common from the recent technological studies of Bronze Age pottery, notwithstanding the difficulties of identifying macroscopically the distinctions between wheel-thrown and wheel-shaped pots (Knappett 2004, 260) and their possible hybrids. As Table 5.1 makes clear, the introduction of the wheel and specialised production went hand in hand; at a general level, wheel-made pottery reflected the new social status purposely attained by its users, distinguishing it from the narrower social identity associated with the users and makers of hand-made pottery. Both these points would seem to apply to the situation in Italy. Yet local circumstances dictated how the hand-made/wheel-made dichotomy was perceived in practice, the evidence from Enkomi being particularly relevant here. Furthermore, as in Italy, hand-made pottery at Enkomi did not decline with the adoption of the wheel, rather the reverse occurred.

Writing about the adoption of the wheel at Middle Minoan Knossos and drawing on work presented by van der Leeuw and Torrence (1989), Knappett (1999, 128) drew attention to the perceived risk and associated uncertainty felt by the potter having an inhibiting effect on his adoption of an innovation, but that "different members of a group, according to their social standing, may have quite different perceptions of the risk involved". Nevertheless, the initial adoption of the wheel at Knossos was, it seems, confined to a more socially select group of potters than was the case at other contemporary Minoan sites (Malia, Myrtos Pyrgos and Palaikastro) (Knappett 2004).

Site (date range)	Characteristics and consequences of adoption of the wheel	Publication
Knossos, Malia, Myrtos-Pyrgos, Palaikastro (MM IB-III)	Over the course of hundreds of years, one basic technique of 'wheel fashioning' was gradually applied at Knossos to small, medium, medium-large and finally to large vessels. The other sites also used wheel fashioning for small and most medium vessels by the end of MM IIB, but Knossos stands out as having a greater range of technological responses, suggesting the potters there were not socially uniform.	Knappett (1999; 2004)
Lefkandi (EH III-MH)	Pottery classified as hand-made, wheel finished, wheel forming (which includes coil-made pots shaped on the wheel). Use of wheel increased over time, correlating with use of finer-textured clays, increased skill in manufacture, and appearance of pots that on firing were completely oxidized and those fired under reducing conditions. These features, similarly observed elsewhere in Central Greece, point to increased specialisation; the potters were producing beyond the level of the household in marked contrast to the contemporary situation in southern Greece.	Spencer (2010)
Lerna (EH III)	Fine Grey Burnished ware, the probable precursor of wheel-thrown (Middle Helladic) Minyan pottery, was made by wheel fashioning (or forming) rather than wheel throwing. This new *chaîne opératoire* at Lerna included the adoption of a new repertoire of shapes.	Choleva (2012)
Phylakopi, Melos (late Middle Cycladic -Late Cycladic II)	Pottery classified as hand-made and wheel-made/shaped. Co-existence of the local (hand-built) and Minoanising (wheel-thrown) traditions, the proportion of the latter, appearing mostly in the small Minoanising conical cups, rising from *c.* 5% to 69% over the period *c.* 1700-1450 BC. The hand-built tradition representing elements of the Melian identity (such as kinship, social class or gender) contrasted with the wider, more competitive social arena associated with the wheel-made/shaped tradition.	Berg (2007)
Toumba,Thessaloniki (LH III)	Co-existence of technologies of hand-made and Mycenaean wheel-made pottery by LH IIIB-C at Toumba (and nearby Assiros (Buxeda i Garrigos *et al.* 2003) and Kastanas). That they were separate technologies emphasised the pottery's different roles, the wheel-made pottery, commonly found as serving vessels, creating an arena for the negotiation of societal roles, identities and relationships.	Kiriatzi *et al.* (1997)
Enkomi, Cyprus (Late Cypriot I-II)	Red/Black Slip, Plain White and painted wares classified as hand-made, wheel-made or uncertain. Co-existence in the same fabric of hand and wheel-made pots. The latter did not displace the hand-made ones, in fact hand-made pots increased in number. Only in the 13th century was hand-made and wheel-made pottery replaced by painted and plain wheel-made wares, the first standardised and mass produced class of pottery, whose arrival was a deliberate choice to acquire 'urban-style' pottery, influenced by increasing contact with the Levantine centres. The wheel-made/hand-made pottery dichotomy appeared not to reflect elite vs. non-elite. Pottery with the appearance of being plain and mass produced was linked to communal behaviour and thus to encourage group identity.	Crewe (2007)

Table 5.1. Recent work on the introduction of the wheel in the Aegean and Cyprus.

5.2. Decoration and Firing temperature ranges

Richard Jones, Effie Photos-Jones

5.2.1. Plain of Sybaris

There are three studies to report:

(a) The largest, that by Buxeda i Garrigos *et al.* (2003), was part of a broader effort investigating the technology of pottery production in the periphery of the Mycenaean world, that is, in Calabria and Macedonia. Examination of the microstructure with the SEM was used to determine the firing parameters (see Kilikoglou 1994).

(b) an extension of (a) carried out by the present writers.

(c) a mineralogical characterisation by Levi (1999).

(a) The samples, which are listed in Table 5.2, had with few exceptions been characterised by INAA (see Chapter 4: Broglio di Trebisacce, Programme 4) where they were assigned a local/regional origin, with the exception of two decorated sherds, BT**A003** and **68**, which were Aegean imports. Table 5.2 classifies the samples as calcareous (C) (>5% CaO) or low calcareous (LC) (<5% CaO).

Ware	Samples	Clay	Atmosphere	Decoration	Firing temperature range °C
Mycenaean	**BTA003, 68**	C	R; O	Black	Vc 850-1050
Italo-Mycenaean	**BTA007, 8, 11**	C	RO/O; O	Red	NV <800
	BTA069	C	O		NV <800
	BTA005	C	RO/O	Red	Vc 850-1050
	BTA006, 16	C	R; RO/O		Vc 850-1050
	BTA001	C	RO/O	Red	Vc/Vc+ 850-1080
	BTA002, 9	C	RO/O	Red; Black	Vc/Vc+ 850-1080
	BTA004	C	RO/O*	Black	TV >1080
Dolia	**BTD034, 36**	C	R; O		NV/IV <850
	BTD063	C	O		Vc-/Vc 800-1050
	BTD035	LC	RO/O		V 800-900
	BTD062	C	RO/O		Vc 850-1050
	BTD029, 30, 31, 32, 33	C	O		Vc 850-1050
Grey	**BTG022**	C	R*		NV <800
	BTG023	C	R*		NV/IV <850
	BTG071	C	R		Vc-/Vc 800-1050
	BTG026	C	R*		Vc 850-1050
	BTG024, 67	C	R		Vc/Vc+ 850-1080
	BTG025	C	R		Vc+ 1050-1080
	BTG027, 28	C	R*; R	Black	Vc+/TV >1050

Ware	Samples	Clay	Atmosphere	Decoration	Firing temperature range °C
Protogeometric and Geometric	**BTF042**	C	O		NV <800
	BTF039	C	O	Red	NV/IV <850
	BTF043	C	O		NV/IV <850
	BTF047	C	RO/O		NV/IV <850
	BTF041	C	RO/O		IV/Vc- 750-850
	BTF048	C	O		Vc-/Vc 800-1050
	BTF021	C	O		Vc/Vc+ 850-1080
	BTF037	C	R	Black	Vc/Vc+ 850-1080
	BTF038	C	RO/O	Black	Vc/Vc+ 850-1080
Impasto	**BTI055, 59, 65, 70**	LC	RO/O		NV <750
	BTI049, 50, 51, 54, 57, 60, 61, 66	LC	RO/O; R		NV <750
	BTI056	C	RO/O		NV<750

Table 5.2. SEM examination of pottery from Broglio di Trebisacce (Buxeda i Garrigos *et al.* 2003).
NV: no vitrification, IV: initial vitrification, Vc: extensive vitrification, and TV: total vitrification. RO/O: reducing-oxidising/oxidising; * indicates a dark core. Samples are arranged according to the firing temperature estimate.

The principal result is the clear difference between the firing temperature ranges of *impasto* and locally/regionally produced Aegean-influenced pottery classes. The *impasto* was consistently fired at temperatures below 750°C (Fig. 5.7), while the latter, made on the wheel with fine calcareous clays, was fired typically in the temperature range 850-950°C.

As the carbonate component in the clay reaches 800°C, new phases are formed leading to more extensively vitrified microstructure, as shown for instance in the imported sherd (Fig. 5.8) as well as a representative example from Mycenae (Fig. 5.9). However, it is equally clear that control over the firing of the Aegean-influenced pottery classes was not uniform; there are a few examples of decorated and Grey wares whose microstructure exhibit no vitrification (NV) indicating temperatures that were not higher than 750-800°C, as well as some at the other end of the scale with total vitrification (TV) (Fig. 5.10). This high level of vitrification was found in **BTA004** which was designated macroscopically as overfired owing to its green colour.

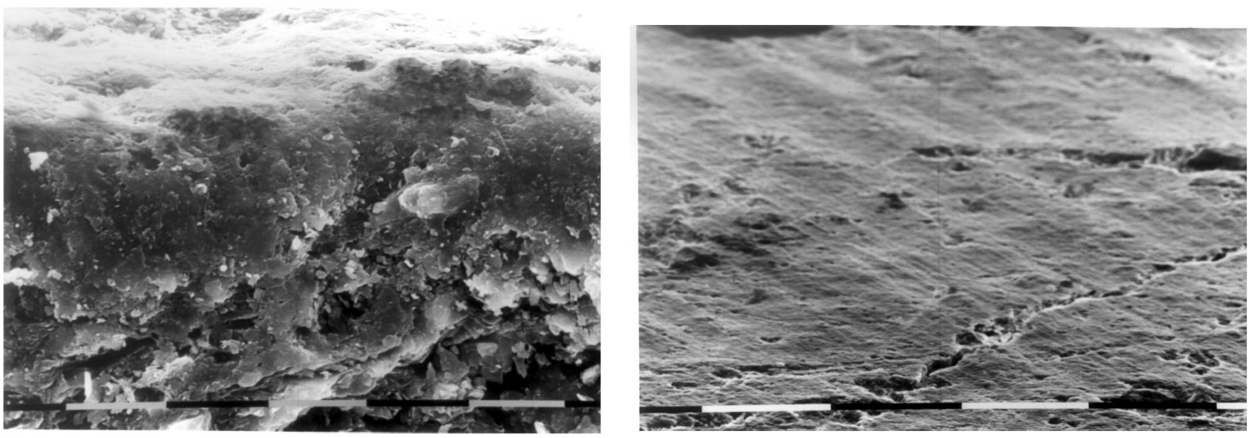


Fig. 5.7. SEM images (x2000) of *impasto* **BTI066**, showing section (left) and outer polished/burnished surface (right).

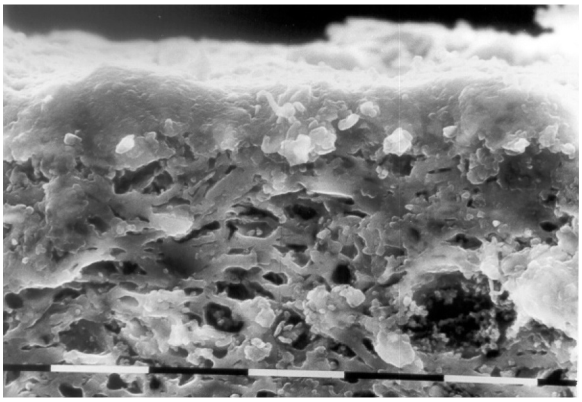
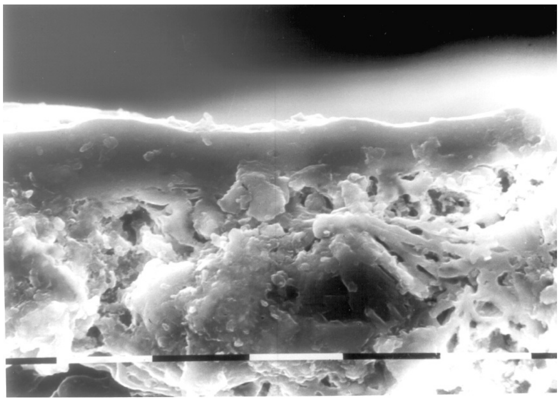



Fig. 5.8. SEM images of (left) **BTA068** (Mycenaean decorated import) showing the white slip and matrix of a Vc (continuous vitrification) microstructure, and (right) red decoration of **BTA005** (Italo-Mycenean). x2000

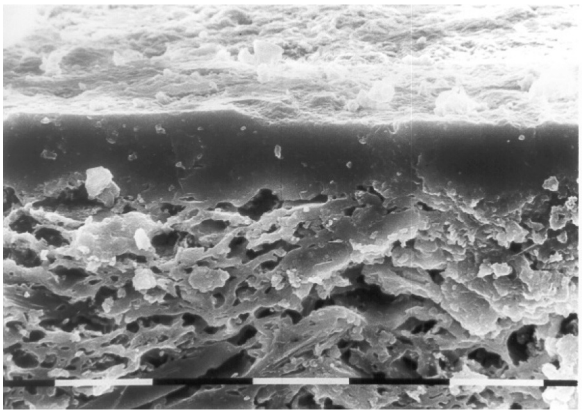
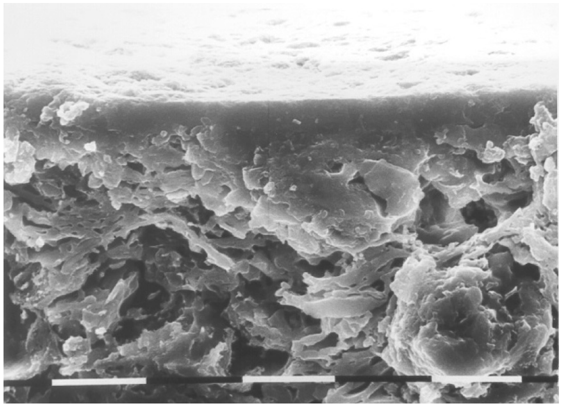



Fig. 5.9. SEM images of Mycenae sherd showing (left) the black and matrix of a Vc (continuous vitrification) microstructure, and (right) the red and Vc matrix. x2020. The bar indicates 10 μm.

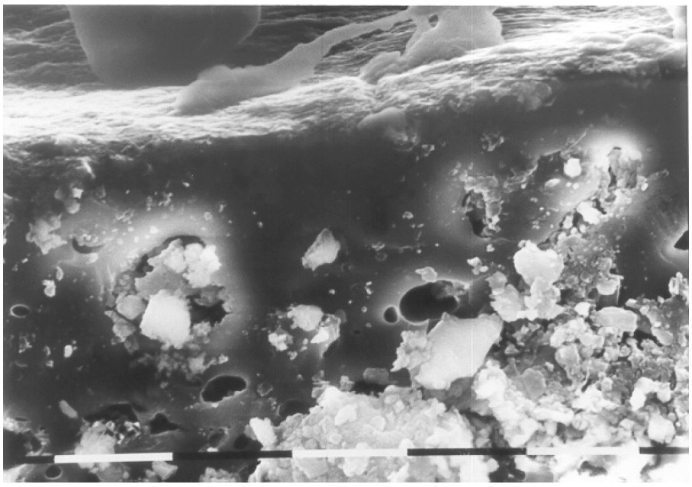


Fig. 5.10. SEM image of **BTG028** (Grey ware) showing the black decoration and Vc+/TV (continuous vitrification/total vitrification) matrix. x2020. The bar indicates 10 μm.

Regarding the decoration, the red and black paints represent the finer fraction of an illitic clay enriched in iron, and in this respect they are very similar to the corresponding decoration on pottery from Mycenae (Fig. 5.9 and Table 5.3). Fig. 5.8 (right) shows the paint layer to be *c.* 8-10μm. A white slip on the likely import, **BTA068** (Fig. 5.8 left) was found to be rich in Al and Ca, with smaller amounts of Fe and Mg; it may be a lime silicate white, as observed on some Aegean Bronze Age pottery (Noll 1982; Jones 1986a, Table 9.8a).

Grey ware, whose surface treatment was polished/burnished but apparently unslipped and only occasionally painted (see below), was the product of consistent reducing firing; of the nine examples examined, five were uniformly reduced, the other four had cores darker than their

Ware	Sample		Na_2O	MgO	Al_2O_3	SiO_2	K_2O	CaO	TiO_2	MnO	Fe_2O_3
Mycenaean	BTA003	Body	0.4	3.94	15.14	45.92	3.0	19.05	1.01	0.27	11.3
		Black	1.03	1.71	28.78	38.32	9.21	5.55	0.52	0.25	14.63
	BTA068	Body	0.46	3.11	15.45	40.65	3.59	19.42	1.29	0.14	15.9
		White	0.17	6.57	25.54	38.27	0.86	18.48	0.54	0.36	9.02
Italo-Mycenaean	BTA001	Body	0.3	2.19	16.3	45.45	4.9	19.74	0.75	0.11	9.38
		Red	nd	4.16	21.43	44.8	11.37	3.41	1.01	0.29	12.65
	BTA005	Body	0.47	2.83	17.29	51.74	3.21	14.98	0.93	0.24	8.12
		Red	0.99	2.21	23.73	40.34	12.36	3.46	1.31	0.62	14.09
	BTA009	Body	0.52	2.36	16.86	51.53	3.12	12.74	1.04	0.2	10.77
		Black	3.72	4.35	22.74	48.47	0.74	3.9	1.58	0.21	12.26
Protogeometric and Geometric	BTF037	Body	nd	2.98	20.77	54.02	1.92	10.26	0.94	0.19	9.01
		Black	0.43	2.79	28.54	51.56	3.67	5.52	0.46	0.14	6.81
Grey	BTG027	Body	0.83	2.87	18.59	49.71	3.3	11.85	0.89	0.19	10.15
		Black	nd	1.57	21.07	46.89	4.42	10.91	1.23	0.21	10.64
	BTG028	Body	nd	2.83	20.91	52.21	3.58	8.25	1.03	0.24	9.44
		Black	nd	2.38	28.97	48.21	6.97	0.81	0.78	0.22	10.27
Decorated sherd from Mycenae		Body	0.13	3.86	16.22	45.12	2.84	17.04	1.06	0.3	10.84
		Red	0.48	2.23	26.93	41.92	9.43	4.87	0.66	0.13	11.84
		Black	nd	nd	27.42	42.48	10.92	2.8	0.8	0.18	13.83

Table 5.3. SEM-EDAX compositions (expressed as weight %age oxides) for the body and paint for samples from Broglio di Trebisacce and a reference sample from Mycenae.
nd not determined.

surfaces. They were well fired, all but two having firing temperature ranges over 850°C. **BTG024**, **67** and **25** exhibited a characteristic shiny metallic grey colour which is attributable to the effect of high firing temperatures. This effect is well known in calcareous clays fired under reducing conditions at high temperatures, for instance in the technological recipe of Aegean Minyan Ware (Jones 1986a, 788f). By contrast, **BTG027** and **28**, rare examples having dark lustrous decoration, stood apart by virtue of very high firing temperature (Fig. 5.10), although it was not established whether these two features were related.

Less control over the firing conditions of Figulina is apparent from the nine examples examined, over half of them being fired below 850°C, and the same remark seems to apply to the *dolia* which may cause little surprise given the size of these vessels.

(b) Further samples from Broglio di Trebisacce

Previously unpublished results of SEM-EDAX were obtained by E. Photos-Jones and the present authors on samples from Broglio, Coppa Nevigata and Roccavechia. The instrument (in Earth Sciences, University of Glasgow) was a Cambridge Stereoscan S360 with a Link ISIS–300 series software package for analysis and an Oxford Instruments EDS detector, Model 7060. The system was operated in both SE (secondary emission) and BS (backscattered electron) modes, images from the former aiming to represent texture, the latter reflecting composition. The samples for SEM alone were in the form of freshly fractured surfaces mounted on a stub and coated with carbon, while those selected for SEM-EDAX were mounted in resin, ground, polished with 6μm and 3μm diamond pastes, and subsequently carbon-coated. A sample of Greek black gloss pottery (**BG1**) was used as a reference sample (Fig. 5.13). SE images were produced, and in the case of BG1 a ‘mixed’ image formed by overlaying the SE image with the backscattered one. The sensitivity of the analysis for most elements was 0.2%. Quantitative SEM-EDAX analyses were undertaken on the entire surface of the polished block (area analyses) at different locations within the sample, and subsequently on each of the different mineralogical or glassy phases observed (spot analyses).

A feature of this study was the chronological dimension of the sampling: Italo-Mycenaean, PG to G (five examples of each), all expected to be local-regional products. On initial low-power examination with the optical microscope the paint layer on the majority of the Italo-Mycenaean and PG samples (varying in colour from orange, brown to black) appeared thin and rather fugitive, ranging from **BT718** with distinct areas of coherent paint to what was more like a wash on **BT889**. By contrast, the paint layer was more distinct among the Geometric samples (Figs. 5.12a, b).

SEM-EDAX examination (Table 5.4) shows that all the paint layers are very thin, in the region 4-8 μm. The microstructures are at the initial to extensive vitrification stage, suggesting firing temperatures in the 750-850°C range. **BT717**, which has a very calcareous fabric, is decorated with dark paint, notably enriched in iron with a manganese impurity, whereas **BT892** should be classed as Matt Painted as its paint layer is manganese rich.

(c) XRD analyses (by L. Lazzarini): 5 *dolia*, 5 *impasto* and 5 clays (fired at 850°C) (Levi 1999, 213)

Abundant quartz, some plagioclase and variable amounts of calcite, biotite and potassium feldspar were found in the *impasto* and *dolia*.

The presence of diopside in three of the *dolia* was indicative of a firing temperature of 850°C and above. The corresponding range for *impasto* was below 850°C owing to the presence of calcite.

SAMPLE	DESCRIPTION	PAINT LAYER THICKNESS (μm)	Al_2O_3	K_2O	Na_2O	CaO	TiO_2	MnO	FeO	MgO
BT717	Brown paint	5	17.5	3.4	nd	16.3	0.7	1.21	11.4	nd
BT717	Unpainted		16.6	3.4	nd	21.4	0.75	0.23	6.5	nd
BT719	Dark brown- red	6								
BT891	Black	?								
BT892	Dark red paint	5	8.4	1.5	nd	4.7	0.32	17.1	23.3	nd
BT897	Brown	4-5								
CN71	Brown	10	18	3.1	nd	9.5	0.75	0.09	3.9	nd
CN71	Unpainted		12	2.1	nd	13.3	0.45	0.07	3.3	nd
CN72*	Brown	nd	33.6	4.7	nd	2.7	1.7	0.03	11.3	0.5
CN72*	Unpainted		10.4	2.6	nd	35	0.56	0.24	3.7	0.7
RO1P	Dark brown	12	20.8	4.9	2.0	4.8	1.52	nd	7.9	1.0
RO1P	Unpainted		13.8	2.5	1.4	11.3	0.70	nd	7.1	2.2
RO2P	Dark brown	6	19.8	0.2	2.5	7.7	0.40	nd	7.1	0.8
RO2P	Unpainted		13	1.4	1.2	17.0	0.66	nd	7.3	3.3
RO3P	Dark brown	very uneven but up to 8*μm*	12.3	1.9	0.9	5.6	1.7	nd	9.7	0.8
RO3P	Unpainted		12.0	1.7	1.0	12.2	nd	nd	7.1	2.5
RO8P	Red-brown-black	6	23.1	4.3	1.9	2.3	0.25	nd	13.2	2.1
RO8P	Unpainted		13.2	2.0	1.2	8.8	0.29	nd	9.0	5.6
RO9P	Red	8								
BG 1	Black	15								

Table 5.4. Results of SEM-EDAX for paint layer thickness estimation and composition (expressed as normalised weight %age oxides) of paint and body in pottery from Broglio di Trebisacce (BT), Coppa Nevigata (CN) and Rocavecchia (RO). nd not determined; * spot rather than area analyses.

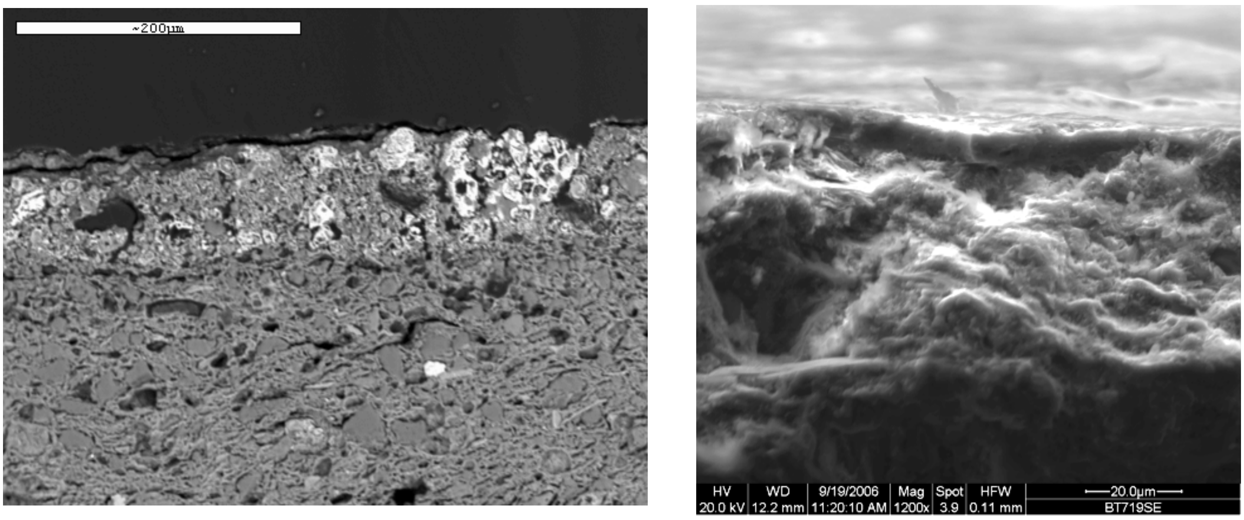


Fig. 5.11. SEM-SE images of decorated layer and body of (a) **BT717** (Italo-Mycenaean) and (b) **BT719** (Italo-Mycenaean) (x1200).

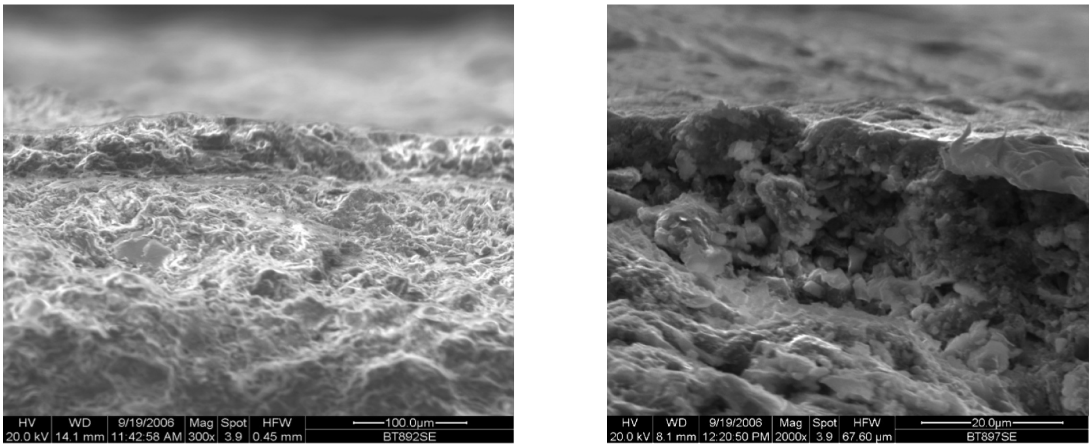


Fig. 5.12. SEM-SE images of decorated layer and body of (a) **BT892** (PG)(x300) and (b) **BT897** (Geo).

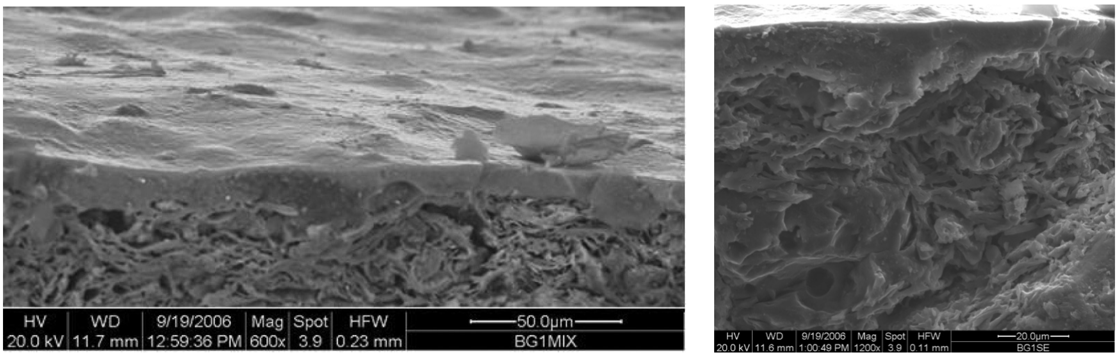


Fig. 5.13. SEM-SE images of Greek Black Gloss (**BG1**) reference sample: (a) x600, (b) x1200.

5.2.3. Coppa Nevigata

Italo-Mycenaean example, **CN71**, has a well-defined brown paint, *c.* 10µm thick (Fig. 5.14) which is richer in iron, potassium and aluminium than the body (Table 5.4; see also Database 5). The analysis of **CN72** reveals a localized enriched aluminium, iron and titanium spot in the paint layer. Not recorded in Table 5.4 is the phosphorus content which is higher in the paint than in the body.

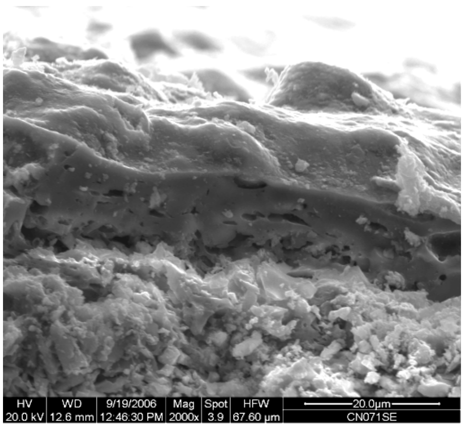


Fig. 5.14. SEM-SE image of decorated layer and body of Coppa Nevigata **CN71** (x2400).

5.2.4. Rocavecchia (Guglielmino *et al.* 2010)

Five decorated examples were examined with SEM-EDAX (FEI Quanta 200F Environmental SEM and Zeiss Sigma field-emission analytical SEM, both in Earth Sciences, University of Glasgow): **RO1P**, **2P**, **3P**, **8P** and **9P**; all are Italo-Mycenaean, apart from **RO8P** which was shown in Chapter 4 to be an import. It is significant that they all share the features of uniform firing, there being no dark core present, and high quality decoration. The paint layers are somewhat thicker than those at Broglio di Trebisacce and Coppa Nevigata in Table 5.4 but in all other respects are similar. Optical microscopy of the remaining six samples from Rocavecchia indicated that only **RO6P** (dark paint on exterior, red wash on interior) had a grey core.

SEM-EDAX analysis of **RO1P**, **2P**, **3P** and **8P** in their 'as received' state provided the semi-quantitative data given in Table 5.4. Their compositions follow the consistent pattern, also observed at Broglio di Trebisacce and Coppa Nevigata, of higher Al, K and Fe and much lower Ca contents than in the body. An interesting observation, also noted at Coppa Nevigata, is the higher concentration of phosphorus (*c.* 1%) in the paint than in the body. The microstructures (Figs. 5.15 and 5.16), although rather variable in appearance, seem to belong to the initial to extensive vitrification stage as observed at Coppa Nevigata and Broglio di Trebisacce, that is, in the 750-850°C range. The exception may be **RO3P** whose microstructure shows a hint of small bloating pores and hence higher firing temperature.

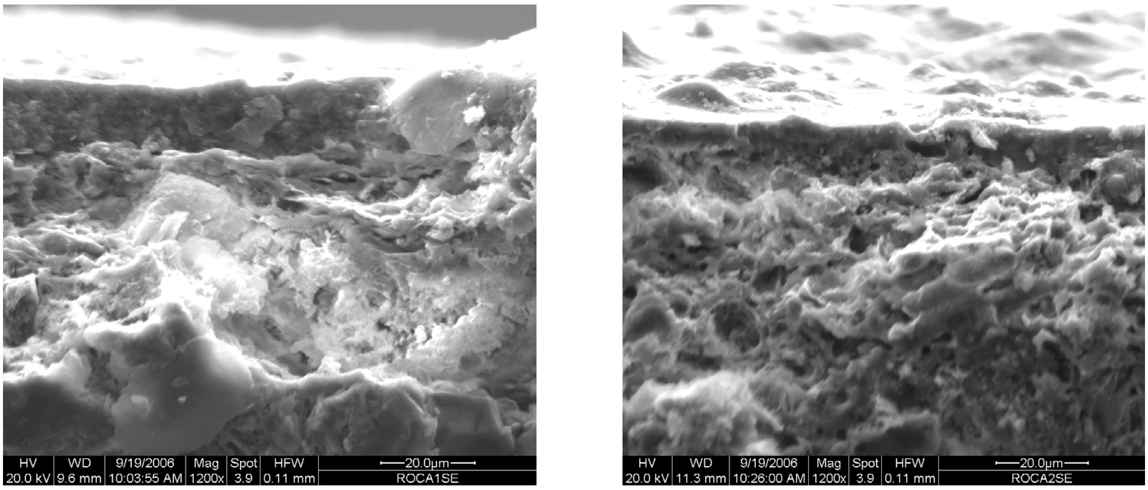


Fig. 5.15. SEM-SE images of decorated layer and body of Rocavecchia **1P** (left) and **2P** (right) (x1200).

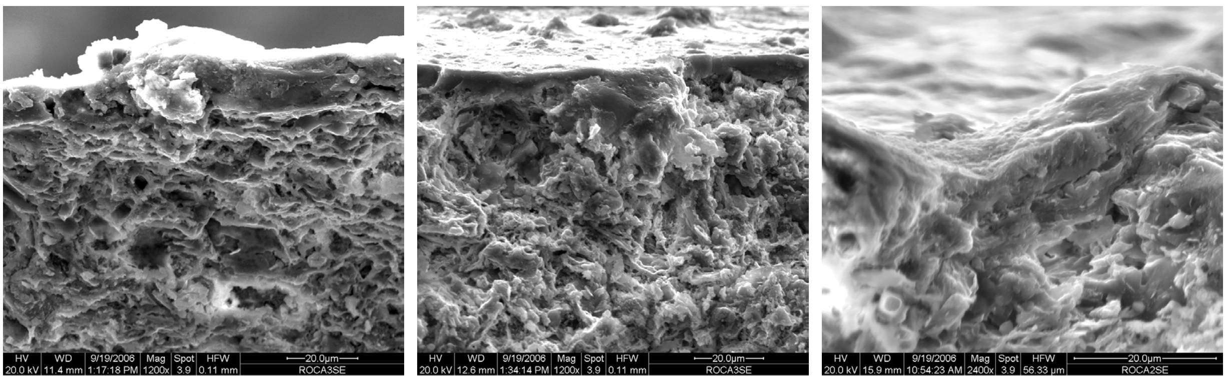


Fig. 5.16. SEM-SE images of decorated layer and body of Rocavecchia **3P** (x1200) (left), **8P** (x600) (middle) and **9P** (x2400) (right).

5.2.5. Capo S. Maria di Leuca

Boschian (1996) reported the thickness of red decoration on Italo-Mycenaean and PG sherds (see Chapter 4) to be *c.* 30-50 μm, notably greater than that at the sites considered above. Amorphous iron oxides sometimes with traces of clay were present in the red decoration.

5.2.6. Discussion: decoration and firing temperatures

The data, although limited, shows that there is much variation in the quality of the iron-rich paint on Italo-Mycenaean pottery. At Broglio this layer is thin and fugitive, whereas it seems to be less so at Coppa Nevigata. At Rocavecchia the paint is not necessarily uniform, but it is well formed and its thickness can rival that in the Aegean. It is interesting to find manganese paint at Broglio as early as PG.

As regards firing, the first point to make is that the ability to produce a black, sintered iron-rich clay-based paint is a strong indicator of a controlled firing sequence involving a reducing phase after an initial oxidising phase and terminating in a final oxidising phase. Such a sequence is best accomplished in a conventional updraft kiln which would also be suited to the firing in an overall reducing atmosphere of Grey ware. But as the account below of the experimental firing at Broglio explains, the Grey ware effect can be achieved more simply in a pit and enclosing the pots in a reducing environment. This result concurs with observations on the pottery microstructures which indicate that the firing of Italo-Mycenaean, Grey and *dolia* was neither standardised nor uniform. For example, as observed above, there are instances of low firing ranges ie below 800°C, as well as examples at the other end of the scale, between 850 and 1050°C. At face value, this might suggest that firing occurred in a variety of structures, both true kilns and pits. Furthermore, the appearance of the microstructures hints at further variability, namely the incidence in, for example, Rocavecchia **3P** (Fig. 5.16) of small bloating pores; when associated with a grey core, this is a feature of a fast firing (Gosselain 1992) which in turn is frequently associated with pit firing. The presence of a grey core and bloating pores in the microstructure occurred in some examples of locally-made decorated Mycenaean in Macedonia (Fig. 5.17), but the difference between them and the examples from Rocavecchia is that the former have a low calcium content.

Limited though the science-based data presented here is, it points to a diversity of firing structures in late prehistoric southern Italy, ranging perhaps from the kiln in which the pots were separated from the firing chamber to the more common and simpler pit firings, whether they were for particular classes or all classes of Aegean-inspired pottery. This model finds support from both archaeological and experimental evidence in sections 5.3 and 5.4 respectively below. Finally, it is worth recalling here the current thinking on the mechanical and thermal resistance properties of pottery. Drawing on much of the available literature, Tite *et al.* (2001, 313) assert that the presence of temper in clay reduces the fracture strength but increases the toughness of the resulting pottery. As regards thermal shock resistance, accepting that non-calcareous clays are superior to calcareous clays leads on to a consideration of the associated variables of (a) the concentration and grain size of the temper and (b) the pot's wall thickness. While thin walls reduce the thermal gradient, they also reduce the strength although that may be compensated for by lowering both the factors in (a). As the results reported in Chapter 4 have shown, the dominant tradition of *impasto* was based on the use of a non-calcareous clay, and to that clay various tempers were added, some of them, such as pumice at Coppa Nevigata, being well suited to absorbing the thermal shock. But as a counterbalance to any enthusiasm for pursuing 'technological determinism' is the remark by van der Leeuw (1993, 239), with which we concur, that "In pre-industrial societies, one must assume a considerable freedom of action for the potter. The non-availability of the appropriate raw material(s) turns out to be only very rarely the limiting constraint in the manufacture of pottery".

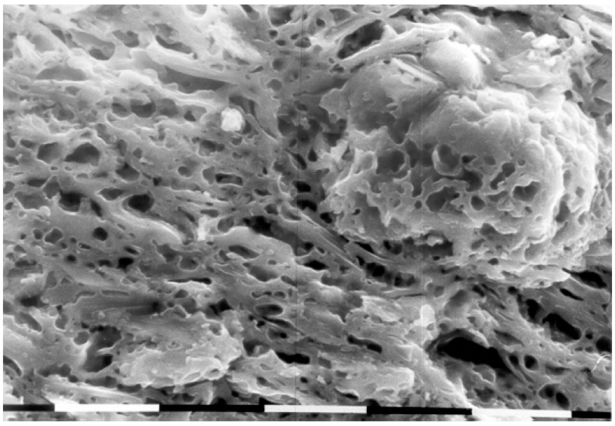


Fig. 5.17 SEM image of local Mycenaean found at Assiros in Macedonia showing the microstructure in the grey core with high concentration of fine bloating pores. x2020. From Buxeda i Garrigos *et al.* 2003, fig. 4.

5.3. Firing structures

Claudio Moffa

Regarding the firing of pottery in the protohistoric period in Italy, various hypotheses have been advanced about firing structures documented in the settlements: mud mortar bars, domed ovens and kilns. Recent discoveries now allow a clarification of the technical characteristics of these structures as well as the formulation of hypotheses about the evolution and the operating principle of kilns. Although there are only few documented examples of firing devices dating to the protohistoric period, the general belief is that such structures were quite common in settlements at that time. However, our understanding of the form and use of such devices is still quite vague for two main reasons. First, because these types of materials were generally made using a mixture of mud and shredded straw (*torchis*) similar to that used for other types of domestic artifacts, such as cooking stands, or building materials, typically daub. Therefore the poor quality of the mixtures, together with the irregular firing of the artifacts, does not allow a good preservation of the fragments, so that only in rare cases can a complete reconstruction of the firing structures' shapes be made. As a consequence, the recorded fragments related to this different category of artifacts are often generically identified, in Italian archaeological terminology, as '*concotto*' (fire-hardened clay). The second factor, partially related to the first, is due to the lack of attention that has been given to these types of remains in classifications and archaeological reports from protohistoric sites, where often only fragments with a distinctive morphology (such as, for example, firing floor fragments with ventilation holes) are documented. Confusion between remains of ovens and kilns often occurs, but significant functional and sometimes structural differences exist between them. The limited knowledge we have regarding the structural characteristics and the functioning of these installations leads to uncertainty about the distinction between ovens and kilns.

5.3.1. Ovens

Single-chamber *ovens* (Fig. 5.18) have a characteristic domed shape.[1] In Italy they date from the Neolithic period (Tasca 1998) with a form that remained almost unchanged until the Iron Age, probably

[1] Also called 'bread oven' (Tasca 1998). M. Miari instead defines this type as a '*forno in cotto*' (Miari 1995).

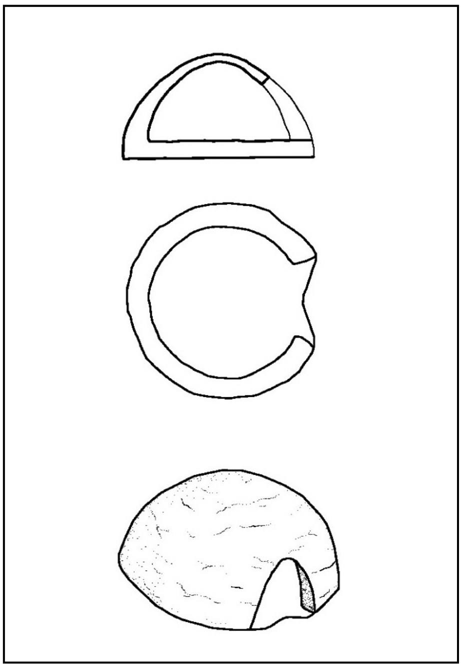


Fig. 5.18. Reconstruction drawing of a domed oven (by Francesca Trotter).

because of its simple structure. The main characteristics of this type are its small size, its floor leaning on the ground, and its *terracotta* walls. The shape is usually elliptical, as well as circular or horseshoe-shaped, even rectangular in the Late Iron Age. The floor is made with a layer of mud mortar with an under-floor of potsherds or stone fragments, that in some cases presents traces of renovation (for example at Giovinazzo in Apulia). The solid walls and vault were constructed with *torchis* tiles, measuring between 10 and 20 cm in thickness. In some examples, as at no. 1 of Sorgenti della Nova (Miari 1995, 276), the summit of the dome has a circular opening that was used as a chimney for the combustion gas. The front entrance, generally horseshoe-shaped, ranges from 20 to 40 cm in width, and in the example present in the Apennine levels of S. Maria di Ripalta, it seems to have been closed with a stone slab. The interior dimensions range from 60 cm to 1.5 m in length and from 50 cm up to 1 m in width, while its height should have been about 60 cm. The interior surfaces of documented examples can be divided into four size categories – 0.2-0.3, 0.5-0.6; 0.8-0.9 and 1.1-1.2 m^2 – that may reflect the size of the family group or maybe various functions. It has been observed that the ovens present inside a house (for example at Coppa Nevigata or at Sorgenti della Nova) are always part of the medium-sized class.

Single-chamber *ovens* are widespread at settlements in southern and central Italy where they are usually found next to dwellings, but less frequently inside them, as at Nola (east of Naples) and Cures Sabini in Latium (Guidi 1988). In these cases they were probably used for high temperature cooking of solid foods,[2] in particular bread (Miari 1995). Only in one case, in the Apulian village of Scalo di Furno, several aligned ovens have been found associated with a kiln (Lo Porto 1986). From a functional point of view these are structures with no separation between the chambers for combustion and firing. In northern Italy single-chamber ovens are rarely documented, an exception being in an IA house at Castiglione Mantovano (L. Salzani, pers. comm.). This situation should not mean that such ovens were not used, but rather to the randomness of the archaeological finds since this type of kiln is widely attested not only in the central and southern regions of the peninsula, but also at protohistoric sites in central and eastern Europe.

5.3.2. Kilns

The kilns recorded in protohistoric villages can be divided into three classes based on their structural typology which range from very simple structures like *open kilns,* to more complex ones, such as *updraft kilns with a sunken chamber.*

[2] In analogous Aegean structures of the Middle Bronze Age, archaeometric analyses have determined that inside temperatures could reach up to 650°C (Maniatis *et al.* 2002).

Open kilns

Open kilns can be defined as constituting a small area with no permanent structures or a shallow pit, where the pottery is stacked and fired together with the fuel, consisting of kindle, wood or dried cow dung (Fig. 5.19). This pile was covered with additional fuel, on top of which a layer of dung and soil was spread in order to provide maximum insulation. Some holes left open in this protective covering allowed in the draft and were gradually closed by the potter with soil when it was necessary to move the fire inside the heap in a specific direction (Cuomo di Caprio 1985, 136). It has also been hypothesized that mud slabs (Moffa 2002, 47) were used as bases for fireplaces in order

Fig. 5.19. Open kilns in operation in Bhaktapur, Nepal (Claudio Moffa).

to isolate the fire from the ground (Paiola 1998). The *mud mortar fireplace slabs*[3] are squared, rectangular, circular or oval-shaped installations, with surfaces extending from 1 to more than 3 m^2. Those in the smaller range were probably used as the base for domestic fires and are also often found inside huts, while the larger ones were most likely used for craft production purposes. Such an interpretation was proposed by Eaton (1975) for the *industrial level* of the Tufariello di Buccino settlement in Campania, where an area in which nineteen mud mortar fireplace slabs were found in association with the so-called *ash stratum* (Holloway 1975, 13). Eaton theorized their use as installations connected with the firing of pottery based on comparisons with structures widespread among the Hopi Indians of North America. The use of *mud mortar fireplace slabs* dates back to the early Neolithic, for example at the village of Rendina and Melfi there are "fireplaces with stone foundations and clay covers" (Cipolloni Sampò 1982a), while throughout the Bronze and Iron Ages they are found, as fragments, at every site. Slabs in open areas from Bronze and Iron Age levels occur at various sites of southern (Coppa Nevigata, Punta Le Terrare and Otranto in Apulia; Tufariello di Buccino in Campania, and Broglio in Calabria), central (Luni sul Mignone, Scarceta, Torrionaccio in Lazio) and northern (S. Rosa di Poviglio, Montagnana, in Emilia Romagna) Italy. At sites, such as Tufariello di Buccino, Coppa Nevigata, Luni sul Mignone or Montagnana, open areas with several slabs grouped together have been documented. The slabs were made with a layer of sherds, or small stone or pebble as at Coppa Nevigata, arranged next to one another to form a continuous flat area that served as a rigid support for a layer of mortar. This layer had an average

[3] The term 'mortar' is preferable to that of 'paste' because these are installations rather than objects such as ovens or ceramic. Thus it is better to use terms that are more related to buildings than pottery technology. Such installations are also defined as 'fireplaces with preparation bases' (Miari 1995), or 'cooking surfaces' (Cazzella, Moscoloni 1998; Tasca 1998).

thickness of 2-4 cm, but at Cavallino and Torre Mordillo it could reach 15-20 cm. In many cases the surfaces were carefully smoothed, since through this procedure the surface in direct contact with the embers crumbled less easily.

A structure that is maybe recognizable as an *open kiln pit* occurs at the EIA settlement of Torre Chiaruccia in Lazio (Barbaranelli 1956). It is a circular pit with a truncated conical section, with a diameter of 2.5 m at the mouth and 1.3 m deep. The bottom was red due to the fire and contained scattered charcoal fragments; sherds and ash were recovered from the filling. But this type of firing architecture had numerous limitations concerning the firing of pottery: the irregularity of the draft, the low temperatures reached together with the uneven heating produced low quality ceramics that certainly were not adequate for specialized productions and probably produced much waste (Cuomo di Caprio 1985, 136).

Single-chamber kilns

In the Italian peninsula, these kilns are documented only from the Apennine levels at Porto Perone and Scalo di Furno in Apulia and from the EBA site of Manfria in Sicily. At Porto Perone four of these structures were discovered, all of them having circular plans and a short access corridor. The best preserved of these structures, named b (Fig. 5.20), has an internal surface of about 4 sq m with a mud mortar floor with a layer of sherds underneath. The walls, 25-30 cm thick, are composed of stones cemented with mud mortar, as at Manfria. Different interpretations have been formulated about the use of these structural remains, which were thought to be habitation structures (Lo Porto 1963) and only more recently have been interpreted as firing structures (Radina, Battisti 1987; Pacciarelli 1991-92; Peroni 1996, 180). It was also hypothesized that the walls might be part of a protection wall and not the base of a dome (Cazzella *et al.* 2001), but this interpretation would not explain the presence of the access corridor that, in the case of kilns, could be easily explained as

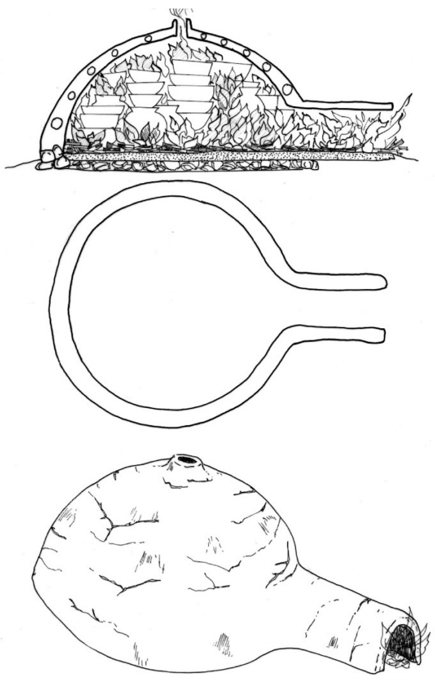


Fig. 5.20. Reconstruction drawing of the single-chamber kiln remains at Porto Perone (by Paola Vertuani).

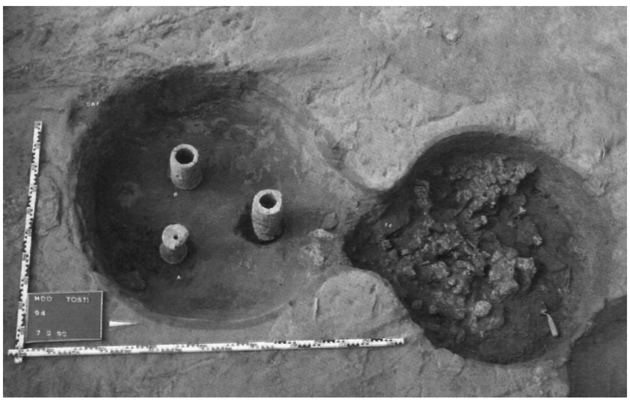
Fig. 5.21. The kiln at Scalo di Furno (Lo Porto 1986, Fig. 9).

a *prefurnio*. At Scalo di Furno (Fig. 5.21) there is an area with two nearby single-chamber ovens along with a larger structure (around 2 sq m) with a horseshoe-shape (Lo Porto 1986), that recalls the structures of Porto Perone.

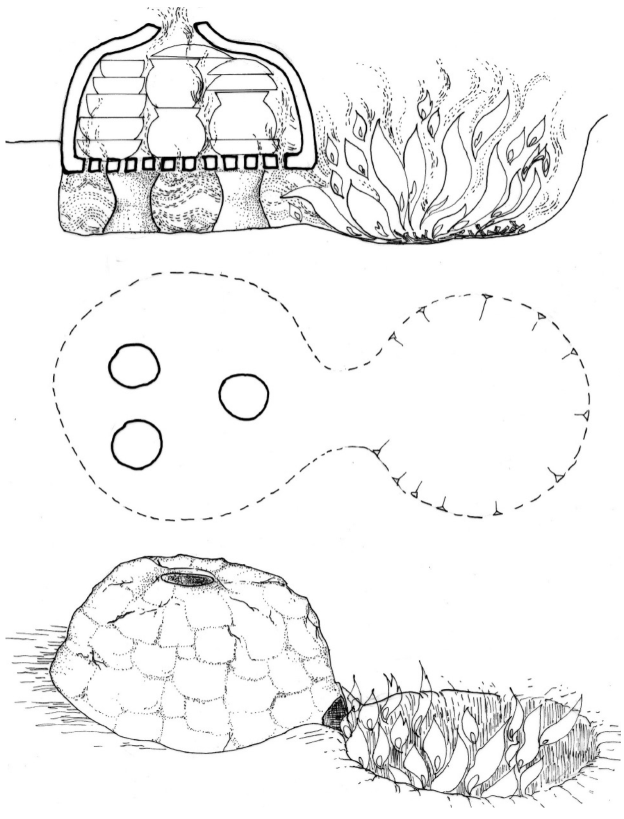
The most reliable interpretation for these firing structures is that they are single-chamber kilns shaped as large ovens. The structure had a domed vault, which likely had an exit hole on the top for venting the combustion gases and to improve the draft. The fuel was placed in the chamber together with the pottery ready to be fired. Consequently, in this type of kiln, it was not possible to control the temperature or the quantity of oxygen during firing, and the fuel was always in contact with almost all parts of the pottery.

Updraft kilns with a separation between firing and fuel chambers

The main characteristic of this type of firing structure is a lower part sunk into the earth or rock. The archaeological evidence generally consists of two tangential and communicating pits forming a figure of eight (Fig. 5.22a, b). One of them is nearly always circular and forms the base for the firing chamber of the kiln; while the other can be circular, oval or rectangular, in some cases it is deeper than the first, and this is the area where the fuel was burnt. Instances of this type of installation in the EBA are rare, they remain uncommon during the LBA and they increase at the beginning of the IA. Due to the small number of remains and to their poor state of preservation, the current



a



b

Fig. 5.22. View (a) of the updraft kiln at Montedoro showing the ceramic supports and (b) reconstruction drawing of the same kiln (by Paola Vertuani).

available data is quite scarce, nevertheless by supplementing them with later examples dating to the 7th-5th centuries BC it is possible to understand them better and to formulate some hypotheses regarding their structure and functioning. The advantage of a sunken structure evidently derives from its resistance to high thermal stress. Furthermore, to better withstand elevated temperatures and to improve the insulation, both the walls and the bottom could have been plastered with mud mortar (at Ponte S. Marco, Monteriggioni) or covered with pebbles (at Bologna and Pontecagnano) or sherds (at S. Rosa di Poviglio). The circular pit that forms the base of the furnace, always with vertical walls and a flat floor, ranges in diameter from 80 cm to around 2 m. The preserved depth ranges from 20 to 75 cm and varies according to diameter, probably *c.* 50 cm on average. The kilns come in different sizes – 0.3-0.5, 0.7-1.1, 1.5-2 and 3-4 m^2 – suggesting a differentiated use according to both the quantity and the size of the pots to be fired. Ash, charcoal and *concotto* fragments are often found in the filling of the pits, and their walls are vitrified as a result of the heating. Inside the pits ceramics (Fig. 5.22a) with cylindrical, truncated conical, truncated-pyramidal, or clepsydral forms have been found. They are often hollow and up to 30 cm in height.[4] It has been proposed that the function of these artifacts was to support or separate the vessels during firing (Salzani 2002, 187), but their *in situ* discovery inside various kilns indicates that they were used to support the firing floor,[5] composed of a thick layer of clay perforated with holes.[6] Remains of the firing floor are not frequent.

We are therefore dealing with updraft firing structures, and it is crucial to highlight the small height of the firing chamber, a maximum of 30 cm, as demonstrated by the height of the supports.[7] Such a small height of the firing chamber prevented not only easy loading of the firewood but also the flames from developing freely. On the other hand, it meant that the heat was localised such that the clay lining of the adjoining pit, for example at Montedoro, was vitrified.

Thus, according to the classification criteria generally used for kilns of the classical periods (Cuomo di Caprio 1985, 135), the protohistoric kilns with two pits could stand between updraft and horizontal structures. They are updraft in the sense that heat moves from the bottom towards the top, but heat also moves laterally because the combustion chamber is at the same level and not underneath the firing chamber.[8] Regarding the firing chamber structure, there are few useful archaeological remains that would permit a reconstruction, but it probably had thin walls made from mud mortar slabs or maybe with sherds[9] and it also could have been dismantled and reassembled after every phase of firing. It may as well have been a more permanent and solid structure, that was loaded and emptied through an opening on the top (Scott 1961, 399). An example of how the firing chamber could have been made comes from the specimen discovered in France at Sévrier (Bocquet, Couren 1974). A different type of kiln, less frequently found, is composed of a single

[4] They were discovered inside some IA sites at Montedoro, Crosare di Bovolone, Faenza - Piazza d'Armi, Ponte S. Marco, Savignano, but also in Bronze Age contexts: S. Rosa di Poviglio and Lipari. The presence of similar but smaller objects (about 20 cm in height) is reported at Lipari, S. Maria di Ripalta, Castione dei Marchesi, Valle del Mezzano.

[5] In later kilns of larger dimensions, the baffle is also supported by a central pillar or by low brick walls (Cuomo di Caprio 1985, 273). At Lipari a little oven, or maybe a stove, had one of these cylinders inside it, which was believed to have been used to support the baffle (Cavalier 1986).

[6] At Faenza – Piazza d'Armi, Ponte S. Marco and Savignano, where fragments of the vault were also found. The perforated baffle was also used in kilns with two superimposed chambers, and fragments of this were found at many sites beginning from the LBA.

[7] While in the Classical period the combustion chamber was about 1 m deep.

[8] It should be remembered that for the LBA example from Basilicanova, where no fragments of the firing floor have been discovered, it was hypothesized that the artifacts were placed on the bottom of one of the two pits that formed the kiln (Cattani 1997, 507).

[9] In the Roman period, tiles plastered with mud mortar were used.

circular pit with a small access corridor or *prefurnio*, thus without a second pit for firing fuel. A structure that probably pertains to this type of kiln is the *ambiente B* of Sorgenti della Nova, which dates to the LBA. It is a pit with a diameter of 1.5 m and a depth of 40 cm, while the *prefurnio* is 40 cm wide. The presence of a *prefurnio* rather than a combustion pit suggests that the fuel was placed directly inside the circular kiln. Other pits with the same characteristics but with different dimensions are also present at Satricum. In conclusion, these kilns worked like a true updraft kiln, as proposed for a similar specimen discovered in the 7th century BC site of Monteriggioni-Campassini (Acconcia, Aiello 1999). In both types of kiln with a sunken floor, the separation between firing and combustion chambers, unlike the open kilns or single-chamber kilns, allowed continuous loading, and gave a better control over the firing process. These improvements allowed the production of a more refined pottery, difficult to obtain without a precise control over the firing conditions.

At this point it is possible to proceed to a concise summary of the archaeological evidence available on pottery firing structures in Italy. The domed ovens seem to have internal spaces too small to contain both pottery and fuel at the same time, but it is possible that they were occasionally used for this purpose. However, in order to produce pottery, structures designed specifically for this purpose were undoubtedly in use. Furthermore remains recognizable as kilns are probably traceable to some Neolithic Italian sites,[10] and kilns with updraft structures are documented from the 4th millennium BC in Eastern Europe and the Near East.[11] Regarding the Italian Bronze Age, it is commonly believed that, especially in the early phases, a simpler structure was used to fire pottery: the open kiln type (Cuomo di Caprio 1985, 135; Cattani 1997). However, during the EBA there are no available data for the settlements in the peninsula, and the only evidence of possible kilns are the installations discovered at Manfria in Sicily. These can probably be interpreted as the remains of large single-chamber kilns, similar to the specimens documented at MBA Porto Perone and Scalo di Furno in southern Italy. In this same period, various evidence of large mud mortar plates for fireplaces (3.5 sq m) found in open areas could suggest their use as bases for open kilns. Only in the LBA do we have once again evidence of kilns with separate spaces for firing pottery and fuel, and this becomes widespread during the Iron Age which accounts for 70% of the documented kilns in the Italian peninsula.

This reconstruction of the transformation of kilns from the Bronze Age to the beginning of the Iron Age is in agreement with the research carried out by Sara Levi regarding the production of protohistoric pottery in the Plain of Sybaris. She suggested (Levi 1999, 220) that during the firing process, control over the air supply was poor during the MBA (spots and fire marks are common on the pottery), but it improved during the LBA (with a recurrence of a uniform black colour especially for open forms) along with the beginning of fine ware pottery production. It appears particularly advanced during the IA with the appearance of the characteristic homogenous red-orange coloration. Furthermore, Levi noted that the firing of specialized productions that appear during the LBA (Italo-Mycenaean, *dolia*, Grey and Protogeometric) implies the use of kilns that allow control over firing conditions in order to obtain a homogenous coloration (Levi, Lazzarini 1999, 227).

[10] Pits with a figure of eight shape, filled with earth rich in charcoal are reported in Neolithic settlements at Razza (Tirabassi 1987, 7) and Ripoli (Grifoni Cremonesi 1990, tav. 11). It is important to note that the production of Neolithic painted fine ware pottery could have been carried out only with complex kilns.

[11] For example at Habasesti (Ellis 1984, 150), or at Abu Salabikh and Tell el-'Oueili (Aurenche 1977, 231). See also Streily 2001.

5.4. The Broglio experiment in reproducing 'mixed Italian products'

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In September 2006, an experiment to reproduce ancient pottery took place in the archaeological park at Broglio near Trebisacce. Although this experiment did not adhere perfectly to the scientific framework of experimental archaeology, its results have great relevance to the present discussion.[12]

5.4.1. Introduction

The reproduction concerned both *impasto* pottery and two of the mixed Italian pottery classes in fine clay (Grey ware and Italo-Mycenaean painted ware). As is well-known and widely reported in the present volume, Broglio near Trebisacce is one of the sites where the hypothesis of the existence in Italy of Aegean-derived pottery classes was formulated, and where targeted analyses later confirmed this hypothesis. Before the 1979 excavations at Broglio (*Ric.1*), no Grey ware had been proposed to have been produced in Italy, even though whole pots of this ware were known at least in the context of the Torre Castelluccia RBA cremation cemetery (both as urns and lids) since the 1960s; only rarely, and without conclusive results, had local painted Mycenaean production been proposed; no *dolia* had been attributed to a local production before the 1979 Broglio excavations (*Ric.1*). Moreover, almost no pithos was recognised, and accepted, as part of the pottery repertoire of protohistoric peninsular Italy (cf. Chapter 1). It seemed therefore appropriate to have a replica of the pottery in this specific context, based on the direct knowledge acquired in the 23 research campaigns at Broglio from 1979 to 2005, and on the professional experience of one of us, G. Pulitani, a professional potter and expert in the reproduction of ancient pots.

5.4.2. The pottery: replicas of the local tradition and Aegean-derivative wares

We immediately ruled out the possibility to make replicas of the *dolia* because it would have absorbed almost all our energy, concentrating on a single (risky) success or failure. However, in light of our experiments, the knowledge that we acquired on local clay and temper, as well as on the functioning of the firing structure, confirmed that the wider perspective we started with is indeed appropriate, and so we are now in a position to proceed to the pithos replica. We therefore concentrated on (a) both hand-made and the wheel-made[13] *impasto* pottery (see above manufacturing techniques: Fig. 5.5c, **RX167**), (b) wheel-thrown Grey ware and (c) Italo-Mycenaean painted ware.

[12] We are grateful for the opportunity to prepare this communication. We would like to thank many people who helped with this experiment: Walter Astorino, Carmen Basile, Laura Ciardi, Vincenzo Covelli, Luigi Malvito, Domenico Massafra, Veronica Puntorieri, Ugo Vulnera. The late Renato Peroni constantly contributed to the conception and realization of the whole process. The project was financed by POR Calabria 2000/2006—Misura 2.3b (coordinated by Veronica Puntorieri); the pots are preserved in the museum in Trebisacce. A first report on the experiment has been presented in the didactic guide to the archaeological park of Broglio di Trebisacce (Peroni, Vanzetti 2008, 54-71).

[13] Wheel-shaped or thrown *impasto* is a hybrid ware, applying the Aegean-derivative wheel technology to the traditional (only hand-made) *impasto* ware. Only a limited range of *impasto* pots was produced with the use of the wheel at Broglio, namely cooking and storage jars; often the use of the wheel is apparently limited to the part of the profile closer to the rim. At sites around Taranto, such as Scoglio del Tonno, Porto Perone-Satyrion, Torre Castelluccia, during the RBA, the wheel was more widely used, and also some carinated cups appear to have been wheel-thrown (Castagna 2006; only visual inspection).

The main questions were formulated in accordance with Levi (1999):

a. to verify the suitability of the locally available clay for the production of the selected wares;

b. to employ the same temper type that is dominant in the local production (i.e. siltstone), and check its workability and response to manufacture;

c. to check which types of firing structure were suitable for the three productions;

d. to produce Grey ware and check the differences in the grey shades;

e. to obtain the right knowledge in order to plan both the production of pithoi and possibly fully experimental reproductions.

The decision on what pottery to replicate was based on the repertoire at Broglio, using the drawings and examining the sherds themselves; both open and closed shapes were selected for each ware (Fig. 5.23).

Fig. 5.23. View of the assemblage of replicated pots.

Fig. 5.24. Designing the replica pot.

Hand-made impasto (8 pots)

One big (>50 cm high) truncated-ovoid jar, with a rectilinear cordon with finger impressions, without handles; shape not properly copied from any specific period, to be used as muffle.

MBA pottery: one carinated cup, with short everted rim and Apennine tongue-handle, with triangular perforation; one rounded profile cup, with expanded funnel rim and axe-handle, with triangular perforation; one rounded profile cup, with expanded funnel rim and simple vertical ribbon handle (Fig. 5.24); one long-necked jar, with globular body, expanded funnel rim and two simple vertical ribbon handles.

RBA pottery: one carinated cup, with concave wall and internally angular rim, with handle bearing truncated horn projections (so-called snail horns); two barrel-shaped cooking jars, with a wavy cordon with finger impressions, and one simple or overarching ribbon handle.

Wheel-thrown impasto (1 pot)

RBA pottery: one ovoid (cooking?) jar, with thickened everted rim, without handles.

Grey wheel-thrown pottery (7 pots)

RBA pottery: one shallow inverted-rim bowl, with horizontal rod handle; one deep inverted-rim bowl, with oblique rod handle; one small-sized carinated cup, with concave wall and simple rim, with triplerod vertical overarching handle; one mid-sized carinated cup, with concave wall and simple everted rim, with vertical ribbon overarching handle; one big-sized carinated cup, with concave wall and (internally slightly angular) everted rim, with vertical ribbon overarching handle; one short-necked jar, with ovoid body, funnel rim and two horizontal rod handles; one short-necked juglet, with curving everted rim and vertical rod handle.

Italo-Mycenaean wheel-thrown painted ware (7 pots)

RBA pottery: two mid-sized carinated cups with concave wall and simple everted rim, with vertical ribbon overarching handle; one skyphos with two oblique rod handles; one stemmed kylix, with slightly concave wall and two small vertical ribbon handles (the decoration is similar to an original found in Termitito near Montalbano Jonico, Matera); three short-necked jars (or amphorae), with simple everted or angular rim and horizontal or oblique rod handles (stamnoid jar).

5.4.3. The firing structures, based on the Italian tradition and on Aegean firing practices

The model for the firing structures has not been taken from local examples, as no such structure of protohistoric date is known from Calabria; indeed one single-chamber pit kiln is reported for northern Apulia, from S. Maria di Ripalta (Cerignola, Foggia: Nava, Pennacchioni 1981) and one possible (double chamber?) kiln for pithoi has been reported from Punta Manaccora (Peschici, Foggia: A.M. Tunzi Sisto pers. comm.). Other double-chamber kilns could be present at Porto Perone-Saturo (Leporano, Taranto), and possibly at Coppa Nevigata (Manfredonia, Foggia). In the end we decided to adopt one northern Italian example and one Cretan.

a. The **single-chamber pit kiln** (Fig. 5.25a) was therefore built with reference to the best-known Italian protohistoric kiln, that is the one from Basilicanova (Parma, terramara archaeological facies, Cattani 1997), already used by G. Pulitani at the Montale Archaeological Park (Castelnuovo Rangone, Modena). G. Pulitani therefore dug out a *c.* 0.40 m sunken round chamber, with a diameter of *c.* 1.25 m, opening on a horizontal front channel; he experimented with a particular chimney type by locating it at the end of a further channel, on the rear of the chamber, and not on top of it.[14] The chamber did not need a draining floor given the dry climate; it was lined with straw-rich mudbricks, and dressed with clay, defining the round chamber and a *c.* 0.40 m long firing channel, with a 0.30 m wide mouth, and furnished with a movable clay lid; the rear chimney channel was *c.* 0.80 m long, 0.20-0.25 m wide, and was furnished with a movable clay lid, made of two adjoining slabs. The top of the kiln was partially built with mudbricks and partially with big clay coils, which can be removed for the pottery loading; all is dressed with clay, in and out, after the loading in order to prevent air and heat loss.

b. The **double-chamber kiln** (Fig. 5.25b) was built with reference to the LM IA kiln of the potters' quarter at Kommos (Shaw *et al.* 2001), which is of a standard Minoan type like that at Ayia Triadha (Levi, Laviosa 1979; see now Puglisi 2011) (Fig. 5.26). The kiln has a sunken keyhole plan, with a basement built with an encircling drystone wall, and a central axial wall (more walls could be realized for a wider kiln),[15] both lined and dressed with clay (Fig. 5.27); the central wall is used as the pillar

[14] The rear chimney worked well, and was very practical, but it is not recorded in Italian kilns, in which it would be expected to be located on top.

[15] The Kommos kiln has three longitudinal walls, made of rubble and much clay, with the effect of highly reducing the air volume; its shape is more oval, with a narrow ante-chamber in front of the longitudinal walls, for the burning of wood. The fuel-burning chamber in the Kommos kiln is a little lower in elevation than the firing chamber where the pots were

for the termination of the lower chamber with shallow vaults, but also has the function of reducing and channelling the hot air volume. A draining floor was not necessary. After the daub dressing, the outer channel (with a movable clay lid) is about 0.50-0.60 m wide, with a semi-circular section, and extends for *c.* 0.80 m of length; the inner lower chamber is *c.* 0.70 m high, under the vaults, and has an oval plan, *c.* 1.20x0.80 m in length. A perforated clay grid was built over the vault and the axial partitioning wall; the holes were obtained by piercing a continuous clay floor built over the vault. The superstructure, and the definition of the upper chamber, was built in mudbrick, with almost vertical walls and an upper dome; the height had to accommodate the intended load by properly raising the sub-vertical walls; all is clay dressed.[16] After firing, about half of the kiln was dismantled for removing the load (Fig. 5.28h). A chimney stands on top of the kiln, with mudbricks used as lids.

Both kilns were dried by burning wood in the firing chamber before use. Some differences between these two kilns and their archaeological counterparts are recognised: the rear chimney of the single-chamber oven is not attested; mudbricks are unknown in Italy before the Greek Archaic period, even if some clayey materials from the Italian FBA could derive from something similar to mudbricks; the Kommos kiln did not have a perforated floor, but possibly some stone slabs were placed in order to bridge the space between internal walls; the firing pit in the Kommos kiln differed in shape, there being no restricted and protruding channel. Notwithstanding these discrepancies, our kilns have a definite archaeological basis to them and their construction required the direction of a skilled craftsman.

Fig. 5.25a. Constructing the single-chamber pit kiln.

Fig. 5.25b. Constructing the double-chamber kiln.

stacked (J. Rutter, pers. comm.), thereby helping the kiln to operate by natural convection.

[16] It could be raised more or less for each load, for instance in order to fire a pithos.

Fig. 5.26. View of the excavated (double-chamber) kiln at Kommos, Crete (Shaw *et al.* 2001, fig. 9).

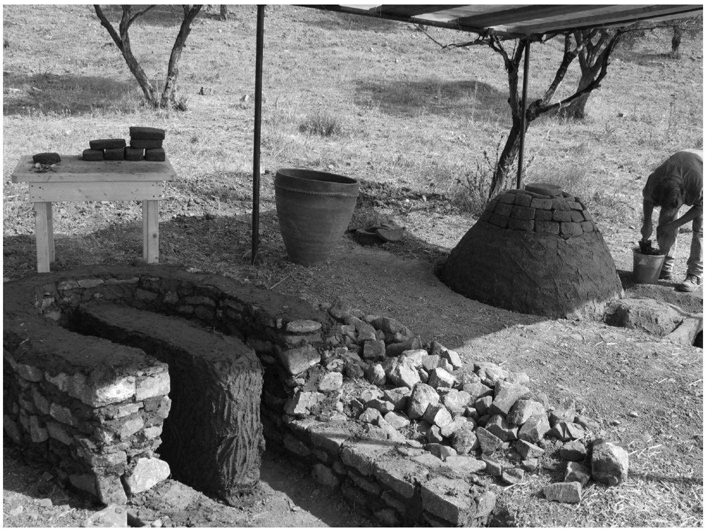


Fig. 5.27. The double-chamber kiln in the foreground with sunken keyhole plan. A basement was built with an encircling drystone wall and a central axial wall.

5.4.4. Manufacture

Clay was extracted from the Trebisacce Pliocene clay quarry, still in use in the late 20th century; it is one of the possible sources of raw materials of protohistoric pottery, identified by petrographic and chemical analysis (see Chapter 4; Levi 1999). Clay blocks were crushed, sieved and inspected for impurities, left to settle in water, then dried to a plastic condition. Temper, when needed (for *impasto* pottery), was obtained from siltstone by crushing rocky blocks, outcropping close to the site (Fig. 5.28a); it is one of the most used temper types throughout the site's lifetime; for instance, the best preserved wheel-thrown *impasto* jar contained only this temper, like most of the pithoi; some Grey ware indeed also contained some temper.

Shaping the pots

Coil manufacture of hand-made pots took place on the spot, in shady conditions (Fig. 5.28b; Plate 11d). The wheel-thrown pots were instead manufactured with a modern potter's kick wheel inside the workshop of Domenico Massafra, a local potter. The standard kick wheel had a lower kicking wheel and a raised upper working wheel, while, for instance, the evidence from the Gouves workshop in Crete (Vallianou 1997) points to a near-floor position of the single rotating wheel, operated by one or two potters in a squatting position.

Fig. 5.28a. Fragments of siltstone to be used as temper.

Fig. 5.28b. Completing the decoration on a coil-made pot.

Fig. 5.28c. Fracture on the rim of a large jar owing to over- rapid drying.

Drying

Pots were dried either inside buildings out of direct contact with sun and wind, or were left outside in shade, covered with a cloth. During this operation, the night wind removed the cloth from the large (>50 cm high) truncated-ovoid hand-made jar, and this caused an accelerated drying of the pot which subsequently cracked without really breaking (Fig. 5.28c). This damage had the consequence that, even if the potter had tried to prevent it, the pot would have broken during firing, a fact to which we will return.

Finishing and decoration

The wheel-thrown *impasto* jar was simply smoothed; Italo-Mycenaean wheel-thrown pottery was covered in slip made of a fine calcareous clay. When pots reached leather-hardness, hand-made *impasto* pottery and wheel-thrown Grey ware were burnished using pebbles (Fig. 5.28d); no plastic decoration was added; painted decoration were made by brush on the Italo-Mycenaean ware (Fig. 5.28e), using a fine clay slip to which crushed goethite was added. The source of the goethite was Grotta della Monaca near S. Agata d'Esaro (Larocca 2010), some 50 km away as the crow flies; it is likely that this cave was used as a quarry for pigments during the Neolithic period.

Firing

Both kilns were sheltered under a roofed shed in order to avoid damage from occasional rain. After the pre-heating phase, the single-chamber pit kiln was loaded with pottery and fuel (some

Fig. 5.28d. Burnishing *impasto* with a pebble.

Fig. 5.28e. Decorating the Italo-Mycenaean pots.

wood, much straw), in direct contact, and sealed. It was lit from the front firing channel, working with the chimney in order to let the fuel ignite and temperature rise; this operation took a couple of hours. After combustion started in a proper way, both the firing channel lid and the chimney lid were closed, letting the fuel slowly carbonize, and checking from time to time from the front opening; the firing time was about 8 hours, corresponding to a whole night. A reducing atmosphere was thus obtained. The cooling phase lasted some 8-10 hours more, the duration of the total firing being about 20 hours (Fig. 5.28f).

Fig. 5.28f. View into the pit kiln at the end of the firing.

After the pre-heating phase, the double-chamber kiln was loaded in a bipartite way. The big pot (with the crack, Fig. 5.28c) was employed as the muffle for the Grey ware: it was placed (dried, but not yet fired) upside-down over the perforated grid of the upper kiln chamber, containing the Grey ware pots stacked in piles; the grid had been closed by plugging plastic clay stoppers in each hole falling under the muffle; furthermore, some embers were placed under the muffle, before sealing its rim on the grid floor with plastic clay, in order to consume the residual oxygen, and to produce a fully reducing atmosphere (Fig. 5.28g). The other part of the grid was loaded with free-standing and stacked Italo-Mycenaean pots, exposed to the oxidizing atmosphere produced by firing. The kiln was sealed, but leaving the upper chimney largely open, and then lit from the front firing channel. It was continuously supplied with burning wood (mostly dried reeds, branches and light wood), letting air constantly flow inside. After about 4-5 hours of fuelling, burning was stopped, and the kiln closed, taking care that no

Fig. 5.28g. View into the double-chamber kiln after firing, showing the area at the back where the holes in the perforated floor had been blocked and on which the Grey ware vessels were placed. The large jar was inverted and placed over them.

Fig. 5.28h. View of the top of the double-chamber kiln after firing, showing an Italo-Mycenaean vessel and behind it the large jar which had been inverted to cover the Grey ware during firing.

flame remained, and no reduction in its oxygen content could take place. After 20 hours, the temperature had gradually reduced, and the kiln was opened (Fig. 5.28h). About one whole day was necessary for the firing procedure.

Final products

The *impasto* hand-made pottery was perfectly fired, its appearance resembling the Bronze Age originals, with some mottling and carbon deposits (Fig. 5.29a). Colours were slightly more reddish or blackish in the Bronze Age products, rather than the intermediate light/pinkish brown obtained by most of our products. Pots were possibly heavier than the archaeological counterparts. No pots broke.

The fissured muffle broke during firing, and this caused fresh oxygen to enter the sealed atmosphere. As a consequence, the Grey ware pots which were not contained inside others (as a result of the stacking) turned to a pinkish-red/reddish-buff colour (Fig. 5.29b). Although this was a relative failure, it proved interesting, as some of the RBA *impasto* fine pottery shared the feature of a markedly homogeneous reddish colour. By contrast, the Grey ware pots which were enclosed within larger pots resulted in a nice dark grey colour, one of the typical grey gradations found at Broglio.

The Italo-Mycenaean pots had a very white surface and the paint was not as bright as the original one (Fig. 5.29c; Plate 11e). The slip was probably made of a different clay which was too calcareous, and the paint was insufficiently levigated, as goethite should have worked well as a colouring material.

Fig. 5.29a. The *impasto* replicas.

Fig. 5.29b. The Grey ware replicas.

Fig. 5.29c. The Italo-Mycenaean replicas.

Some carbon sooting was observed, probably originating from one of the holes in the kiln floor. Aside from the fissured muffle, the Grey ware necked jar broke inside the double-chamber kiln, and the rim of one Grey ware cup chipped.

Concluding remarks

The Broglio experiment proved satisfactory enough. We obtained particularly satisfactory results for *impasto* and Grey ware, but we have still to learn more about how to reach the full quality of Italo-Mycenaean. The experiments highlighted some basic differences in the whole manufacturing process of hand-made *impasto* and of Aegean-derived wheel-thrown pottery classes, from clay levigation to the firing process. In the end, we collected a good amount of information; returning to questions posed in 5.4.2. above, it can be stated that:

a. the locally available clay is suitable for the production of the selected wares;

b. siltstone as temper can be easily prepared and performed well;

c. both kilns worked well, even if the Italo-Mycenaean pots were not fully satisfactory; while the double-chamber kiln can achieve homogeneous fully oxidized and fully reduced products, it remains to establish whether that is possible in the single-chamber kiln;

d. Grey ware can be produced in the same load together with other products; the important issue is the efficiency of the muffle; gradations in colour should be connected to the control of the local atmosphere;

e. sufficient information has been collected for the production of pithoi (only the firing time needs to be properly calculated) and for carrying out fully experimental reproductions.

5.5. General Discussion

Richard Jones

5.5.1. Pottery making: an archaeological perspective from the Aegean

A welcome feature of archaeology in Greece during the last two decades has been the relatively frequent discovery of kilns throughout Greece. Although a majority of them belong to the Classical, Roman and later periods, a significant number are of concern here, dating to the prehistoric period (Hasaki 2002). Examining the evidence from the Mycenaean world — ranging chronologically from the LH I-II kiln at Kirrha (Skorda 2010) to later ones at Berbati (Schallin 1997) and Mycenaean Dimini (Andreou *et al.* 2001, 268) — and from Minoan Crete (Michaelidis 1993; Evely 1993; Shaw *et al.* 2001; Vallianou 1997), the picture remains abundantly clear: potters making decorated pottery were accustomed to working with the wheel and firing their products in various configurations of up-draught kilns. As for the location of these activities, there is a spectrum of situations: from a fully-developed potters' quarter, such as at LM III Gouves in central Crete (Vallianou 1997), to a workshop with kiln (Berbati), to a space appropriated for a (LM I) kiln but with no apparent formally associated workshop as at Kommos (Shaw *et al.* 2001) to the more common circumstance of a kiln situated perhaps for good reason away from settlement and lacking evidence of an associated workshop. The numbers working at a small workshop like that at the LH II-IIIA1 workshop at Berbati, although impossible to determine, was surely variable depending on the season but may have been quite large. Also impossible to establish is whether the personnel at that workshop at Berbati would have been constant or whether there were opportunities for individual potters to come and go, that is, to detach themselves from the workshop perhaps to go it alone either temporarily or for good.

To the north of the Mycenaean world, for example in Macedonia, however, where the hand-made pottery tradition was predominant and continued often well beyond the Bronze Age, no true kilns of Bronze Age date have yet been found, apart perhaps from a small updraft kiln of LH IIIC date claimed at Ferres in the Evros region (Batsiou-Efstathiou 1994). Belonging to the EBA are a few firing structures which include an oven containing vessels *in situ* at Ayios Mamas (Heurtley 1939, 5-7; Jones 1986a, Fig. 9.5b), a well-defined lower chamber resembling more a kiln but lacking a perforated floor at Polychrono (Pappa 1990), and a possible pit kiln at Sindos near Thessaloniki (Andreou 1996-97; Kiriatzi *et al.* 1997). The kiln found at Torone, whose last firing contained both wheel-made and hand-made pottery, is of 8th century BC date (Papadopoulos 1989). In whatever structures Mycenaean pottery was fired, the technology of its production in Macedonia was less controlled than that in the Plain of Sybaris. Buxeda i Garrigos *et al.*'s (2003) examination of such pottery of LH IIIB-C date found at Assiros and Toumba-Thessaloniki in Macedonia showed that the choice of clays, forms of decoration and firing were not uniform, suggesting localised rather than centralised production. Mention has already been made of the evidence in the local Mycenaean pottery of rapid firing which is much more likely to have taken place in a pit than a kiln. A similar study of contemporary hand-made pottery from Toumba-Thessaloniki reached a similar conclusion (Kiriatzi *et al.* 1997).

Against the backdrop of the considerable recent scholarly interest in the mobility of craftsmen in the later Bronze Age of the eastern Mediterranean as exemplified by Minoan artists who were probably commissioned to paint the walls at the palace at Tell el-Dab'a in the Nile Delta (Brysbaert 2008, 191), we can consider the alternative situation of the relocation of craftsmen in times of stability or in response to crisis. Papadopoulos (1995) champions the former case in respect of Mycenaean pottery, arguing there was much relocation of Mycenaean potters across the Mycenaean world and to Cyprus. He finds support for his case in the Linear B tablets at Pylos, in particular Tablet 52 (An26 (207)) which "is a list of tradesmen prefixed by what appears to be ethnic adjectives or placenames". This raises the possibility of significant numbers of specialised workers moving within and between regions, leading in turn to the question whether these workers moved of their own volition or because they were forced to. What then was their status?

5.5.2. Pottery making: an ethnographic perspective from the Aegean and Cyprus

This section draws on evidence based upon informal conversation with a number of traditional potters working in Greece during the 1980s (Jones 1986a, 849-876), supplemented more recently with the late Maria Voyatzoglou, professional potter and ceramic ethnographer (Voyatzoglou 2009), and with Nektarios Garis, a traditional potter from Mesagros on Aegina (Gauss, Kiriatzi 2011, 74-6).

There is a view that potters trained in and accustomed to working with the fast wheel and using a true kiln tend not to adapt their habits even when placed in a 'new' environment. Moving away from 'home', travelling only with essentials such as a turntable or kick wheel, places considerable stress on the potter in terms of finding new supplies of appropriate clay, fuel and water, but in this task he is unlikely to start from scratch; it is always best if he either knows or can communicate with someone in the area: 'word of mouth' is everything. Furthermore, he will have rapidly ascertained with his own eyes the common occurrence of clays in his new environment; the relevant issue is that it will take him time and effort to find the 'right clay', as this writer's observations reveal on those potters originally from northern Cyprus, who, following the Turkish invasion in 1974, re-established themselves in various locations in the south of the island (Helmsley 1991; Jones 1986a, 879). Yet as soon as he has found those essential supplies and has begun adapting to his new environment, he will set about building a true kiln; the notion of firing in a different manner, for example with a pit kiln, would not occur to him even though he may have seen such a kiln in his new environment. There is a further consensus among modern potters in Greece that building the kiln, even a small one, and in particular constructing the perforated floor is a hard and time-consuming task, and, perhaps crucially, one that was not carried out alone.

Finally, attention can be drawn to a recent contribution to ceramic ethnography on Crete, in particular in the east of this island, less for its immediate relevance to the situation under discussion here but more as a reminder of the complex network of factors affecting potters' identity and output. Against a backdrop of an island having until sixty years ago a vibrant pottery industry based on distinct potting traditions, Day (2004, 138) has documented the way that "potters performed a balancing act, altering aspects of their technological practice to meet the challenge of new social or economic conditions, while negotiating their own position within their craft tradition". He showed examples of itinerant potters who became sedentary, contrasting them with normally sedentary potters who left their home village in a pattern of seasonal work. Marriage and especially post-marital residence patterns were seen to have a major effect on these changes, yet potters did not lose their identity as members of their original tradition.

5.5.3. Pottery making in Italy: local and Aegean craftsmen

Drawing on the presentation above based on evidence from the Aegean, we can postulate some possible scenarios regarding technology transfer.

Aegean potters came to southern Italy for multifarious reasons but essentially because they saw opportunities. Operating as freelance independent craftsmen, they set up small workshops at a few major coastal centres in southern Italy. Without much difficulty they found the kinds of clays - pale calcareous clays having good firing properties - that they were accustomed to in their previous workplaces. Those clays were also suited to a treatment that could yield the iron-enriched clay fraction necessary for decorating the pots. Having located fuel sources, a task which was unlikely to have been problematic, the setting-up process would have been completed with the construction of the workshop and kiln. The demands involved in this step argue in favour of a group, albeit a small group, effort rather than the idea of the lone, perhaps itinerant craftsman.

The potters were catering for a series of highly localized markets. A few, probably very few, were itinerant, working at centres like Broglio di Trebisacce seasonally. The large majority of these potters were specialised, most of them making decorated pottery, but a few of them were pithos makers. Although regarded as foreign craftsmen by the local population, these potters were assimilated into local society. It is impossible to estimate how many Aegean potters came to Italy over the course of at least a century but it was surely small – a double-digit number? Whatever their number, we propose that they were domiciled in Italy, although in the light of the discussion above of the evidence from some Linear B tablets at Pylos it is not impossible that some of them moved back and forth between Greece and Italy. That situation would have altered following the destruction of the palaces when in the wake of major social dislocation what may be regarded as a second wave of craftsmen moved west.

In any case, over the course of a century, contacts would have been made with local potters, most likely those potters operating at the small workshop level rather than the household level, and these contacts, informal at first, slowly became more formalised. This occurred because the Aegean potters (a) could see that demand was increasing beyond what they could achieve on their own and (b) needed the assistance of local potters in terms of the infrastructure that the latter could provide. At the same time, the advantages of cooperation to both Aegean and local potters were mutually recognised – it was a two-way process. As the Aegean and the local potters' workshops lay close to each other, Aegean potters took on young local potters as apprentices, training them at an initial stage to wheel form (*not* wheel throw) the finer clays and then to fire the pots. The kilns, more labour intensive and costly to construct and operate than the ovens/bonfires, were situated nearby. This training was long in part because it probably extended to include wheel *throwing*, but once accomplished these young potters were practising members of the Italo-Mycenaean pottery-making tradition; they had become specialised potters and were no longer part-time makers of *impasto*. Some were mobile and moved on an itinerant basis around southern and central Italy; others perhaps moved permanently away from where they were trained. After perhaps a century, equivalent to three or four generations of potters, Italo-Mycenaean production might largely have been in the hands of indigenous potters. But evidence for this hypothesis is certainly lacking. At Broglio, the claim of local or regional production of *good quality* Italo-Mycenaean is secure, and yet it is unclear whether that production represented the output of the combination of several generations of Aegean potters who came and worked there for over a century, or whether they were the efforts of those potters joined later on by indigenous potters, or both.

Turning now to the firing, section 3 of this chapter has pointed to the existence of a diversity of firing structures in archaeological contexts in Italy, none of them however equating with an Aegean-type updraft kiln with a floor separating fuel from vessels. But the results of the experiments reported in section 4 are important for showing that reduced Grey ware can be produced in the same load as other products in a single-chamber kiln. The replication of decorated – Italo-Mycenaean – pottery proved harder to achieve in either the single or double-chamber kilns and thus will require further experimental effort. For the time being, possible reasons why true kilns of LBA date have not so far been found in Italy can be identified: they were probably small, they have not survived well, and they were built away from, but not necessarily far from, the settlement areas where excavation has tended to focus. Furthermore, the kiln was probably not part of a recognisable and deliberate 'workshop area'; in other words, if and when a true kiln is found, there may be few if any structures associated with it. One final word on the morphology and specialisation of the kilns: the general, conventional expectation is of a domed structure with a chimney on top. Yet the firing of *dolia*, as illustrated in Fig. 5.22, may have demanded a different shape, perhaps a top-loading structure akin to those built by the pithos makers from Thrapsanos in 20th century Crete. In answer to the question of whether kilns were all-purpose or specialised, the latter is more likely, to judge at least from the Plain of Sybaris where Levi's evidence for specialised production of *dolia* would extend to the use of specialised kilns. In the Aegean, the best archaeological evidence of an (ancient) pithos kiln is that at Gipari, near Prinias in Crete of late 7th century BC date, published in exemplary fashion by Rizza *et al.* (1992).

The scenarios presented thus far, simplistic though they are, apply to southern Italy, but on Sardinia the situation is different. Aegean and Cypriot pottery reached the island, but the markedly inferior quality (in terms of decoration and fabric) of the Italo-Mycenaean produced at or near Antigori argues strongly for a lack of direct contact between Aegean and local potters. Instead, either Aegean vessels reached the island in the course of trading activity by Aegean-Cypriot or Sardinian merchants, or there was indirect contact between those merchants, mediated by people on the Italian mainland (Russell 2010). The Italo-Mycenaean pottery at Antigori was surely made by local potter(s) who were copying what they had seen of the imports: they formed the vessel crudely on the wheel, using the traditional rather coarse clay and they decorated it in a rudimentary manner resulting in a matt appearance owing not to the use of manganese black but to incomplete firing. On Sicily it is different again as there is some *impasto* pottery of the Thapsos style that imitates Mycenaean shapes and sometimes reproduces Mycenaean motifs with the local technique of incised decoration; Russell (2011, 236-45), following D'Agata (2000, 74), sees this pottery as a possible hybrid combining foreign elements within a known local shape.

As the transition to the PG period progressed, Herring (1998) sees the making of decorated pottery in the hands of *impasto* potters who, recognising the perceived value of matt-painted wares, adapted their working practices but only as much as they needed to. That adaptation comprised decorating in a manganese-rich paint and firing the vessel to achieve a dark colour (irrespective of firing conditions) on a light-coloured surface.

CHAPTER 6

DISCUSSION AND PERSPECTIVES

Richard Jones, Marco Bettelli, Sara T. Levi, Lucia Vagnetti

The results of the analyses presented in Chapter 4 are discussed here in order to present the new picture that is emerging from the full integration of archaeological and characterisation data obtained for a significant number of examples of Aegean and Italo-Mycenaean wares. Much information can be gleaned from this impressive number – about 600 –, although it should be borne in mind that this number accounts for around 20% of the total corpus of published finds, and some areas, sites and time periods are better represented than others. The number of other Mixed Italian products (*dolia* and Basins, Grey, South-Italian Protogeometric and Geometric) and *impasto* analysed and compared is about 500.

6.1. Assessment of archaeological and archaeometric results

Marco Bettelli, Sara T. Levi

The results for the Aegean wares and Italo-Mycenaean, which are listed in Chapter 4.6 are summarised and compared according to region, site, ware, suggested origin, phase, function. Mycenaean and Italo-Mycenaean, which form the majority of the samples, are discussed first, followed by the other wares.

This section also draws attention to instances of disagreement between the results of analysis and archaeological expectation which have occurred in a few cases.

6.1.1. Mycenaean and Italo-Mycenaean

Of the nearly 500 examples that have been analysed, the majority can be dated to a single phase but, owing to the state of preservation, a significant number are assigned to two contiguous phases (mainly LH IIIB-C); this problem has long been recognised (Vagnetti 1993, 151, Vagnetti *et al.* 2009). 38 are dated no more closely than LH III and 13 cannot be dated.

The majority are classified as local or regional products, thus Italo-Mycenaean (Table 6.1).

	I-II	II-IIIA	IIIA	IIIA-B	IIIB	IIIB-C	IIIC	III	not det.	Total
Mycenaean	60	2	23	16	24	45	29	5	6	210
Italo-Mycenaean	1(?)	0	10	2	21	109	93	33	7	276

Table 6.1 The distribution of Mycenaean and Italo-Mycenaean according to period.

The chronological trend is now quite clear. The first appearance of Italo-Mycenaean occurs in LH IIIA (see below for the single LH I-II example from Punta Zambrone), and this production flourished in LH IIIB and LH IIIC. On the other hand, imports continued until the end of the sequence (Fig. 6.1a).

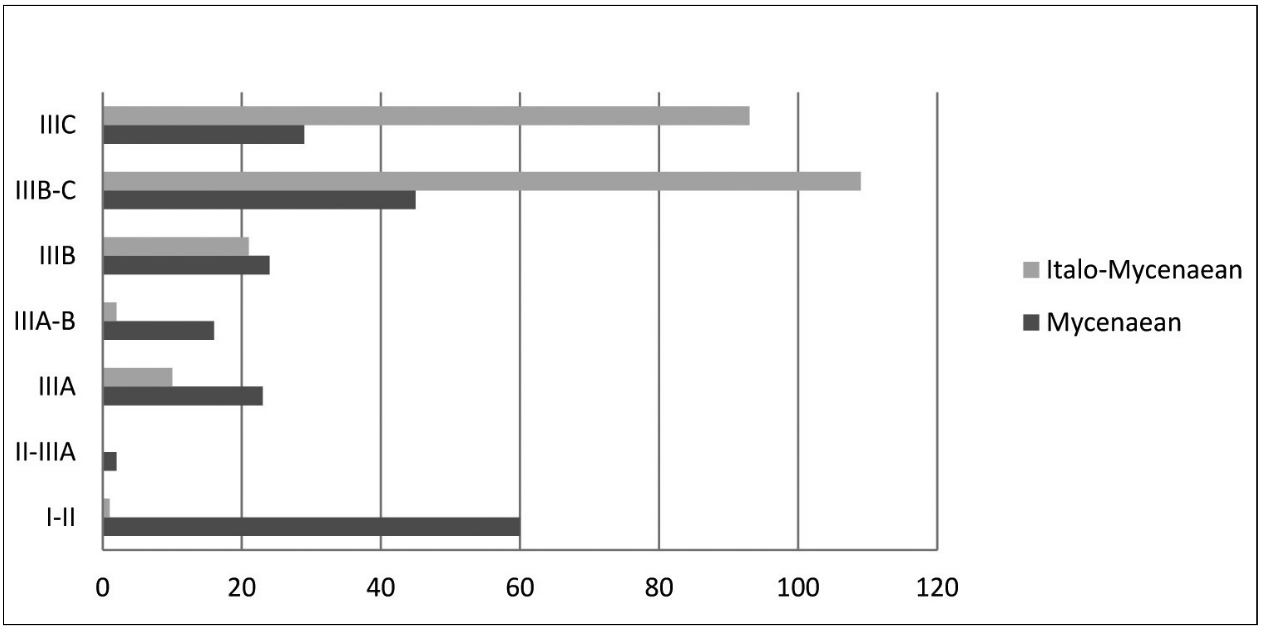


Fig. 6.1a. Number of examples of Italo-Mycenaean and Mycenaean pottery according to chronology.

The gradual increase in the proportion of Italo-Mycenaean over time is better viewed in Fig. 6.1b where only the well-dated examples are considered.

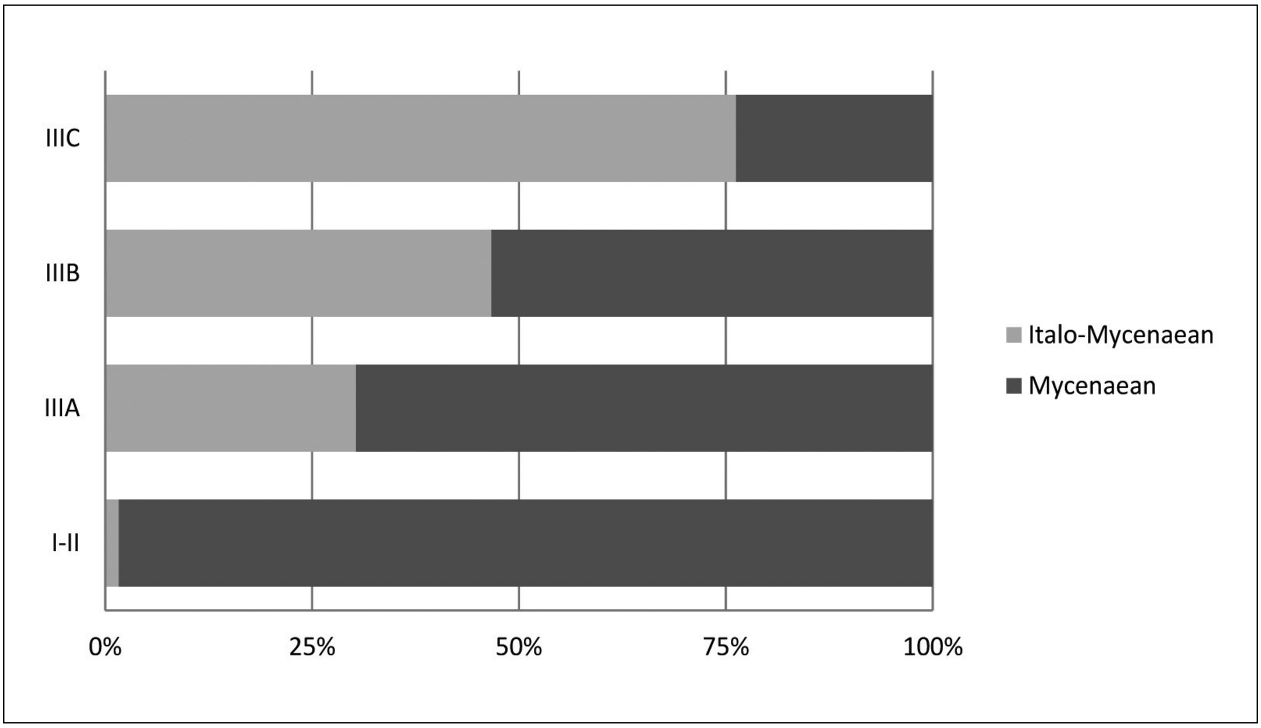


Fig. 6.1b. Proportions of Italo-Mycenaean and Mycenaean pottery in the periods LH I-II, LH IIIA, LH IIIB and LH IIIC.

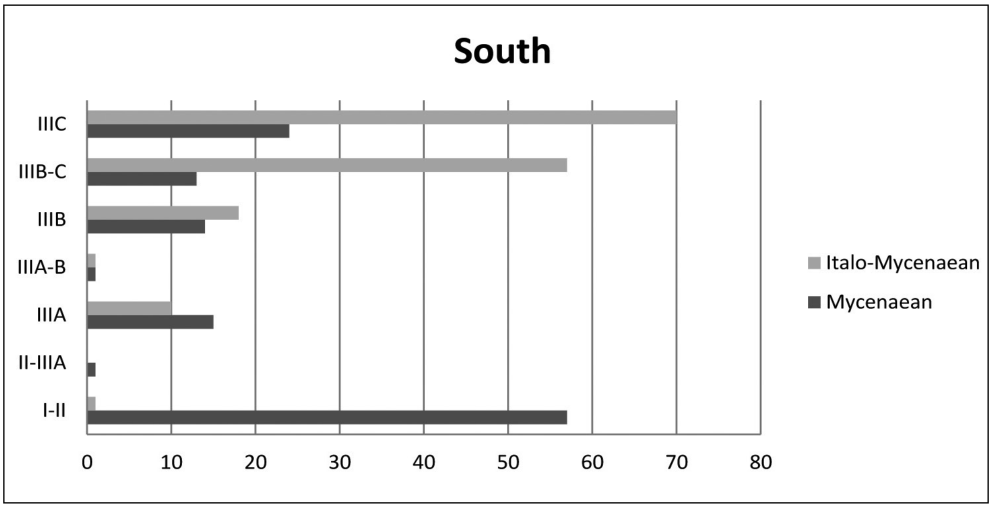
Regions

Four separate areas are considered: the South (Apulia, Basilicata, Calabria, Campania), Centre-North (Latium, Marche, Veneto) and the two major islands (Sicily and Sardinia) (Table 6.2; Fig. 6.2a-d).

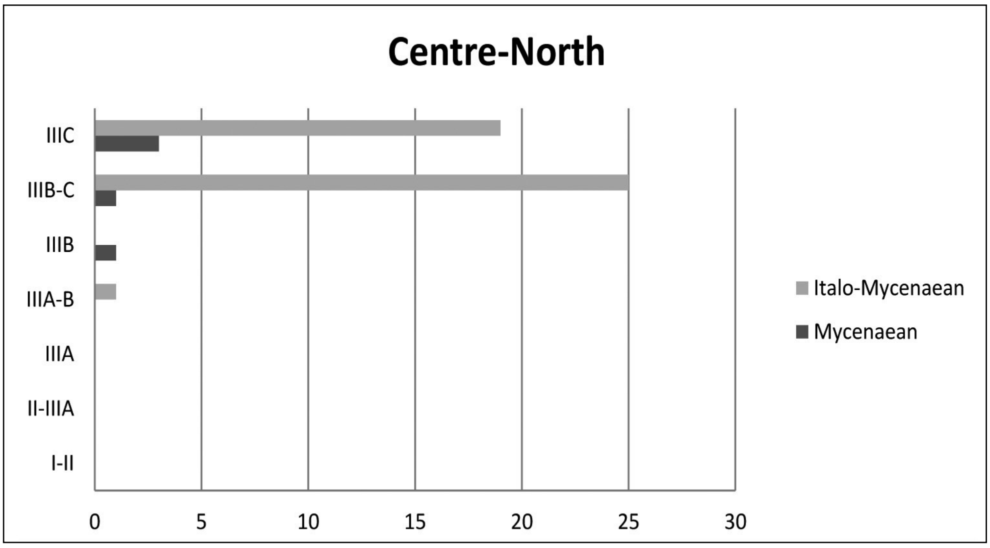
- **South**: the majority of examples studied were found in this area. Imports occur in all phases (abundant in LH I-II), while local production begins in LH IIIA and accounts for 75% of the total in LH IIIB. A single small fragment from Punta Zambrone in Calabria is classified on chemical grounds as a likely local product, an assignment which conflicts with the prognosis based on the quality of the fabric, the lustrous appearance of the painting and the precision of the pattern which conforms to Aegean examples. This problem calls for further investigation of this piece in particular and, more generally, for corroborative evidence of local production of lustrous painted wheel-made ware in this early period. Also surprising is the evidence for local Matt-painted production in Campania at Grotta del Pino. For the later periods there are problematic results at two sites: the assignment of Coppa Nevigata **CN310** to the Peloponnese is contrary to expectations on stylistic grounds, and the inability to place three critical sherds from Torre Mordillo, **TM15, 45** and **56**, again very close in quality to Mycenaean originals, is unfortunate. In particular the poor quality of **CN310**, its micaceous fabric, the matt quality of the painting and the atypical pattern used on the shoulder invite caution about the status of this piece (Vagnetti 2012, 425).
- **Centre-North**: the fifty examples analysed represent a high proportion of the total extant corpus for the region. There are a few imports (from LH IIIB), and a significant number of locally produced pieces in each region. In Veneto there is a possible early Italo-Mycenaean (LH IIIA-B) example from Bovolone, **BOV1** which in terms of its style and quality of fabric is a surprising and unexpected result.
- **Sardinia**: imports begin in LH IIIA. The trend of increasing local production from LH IIIB is clear, but the proportion of imports to local products is more balanced and there are many examples whose chronological setting remains poorly defined (IIIB-C).
- **Sicily**: clearly differs from the other regions, notwithstanding the smaller number of samples analysed dating to the later periods compared to the other regions. The imports are the rule in each phase starting in LH I-II. There is only one possible example of local production in LH IIIB-C (Milena).

		I-II	II-IIIA	IIIA	IIIA-B	IIIB	IIIB-C	IIIC	III	Not det.	Total
South	Mycenaean	57	1	15	1	14	13	24	4	6	135
	Italo-Mycenaean	1(?)	0	10	1	18	57	70	31	7	195
Centre-North	Mycenaean	0	0	0	0	1	1	3	0	0	5
	Italo-Mycenaean	0	0	0	1(?)	0	25	19	2	0	47
Sardinia	Mycenaean	0	0	1	0	6	29	1	0	0	37
	Italo-Mycenaean	0		0	0	3	26	4	0	0	33
Sicily	Mycenaean	3	1	7	15	3	2	1	1	0	33
	Italo-Mycenaean	0		0	0	0	1	0	0	0	1

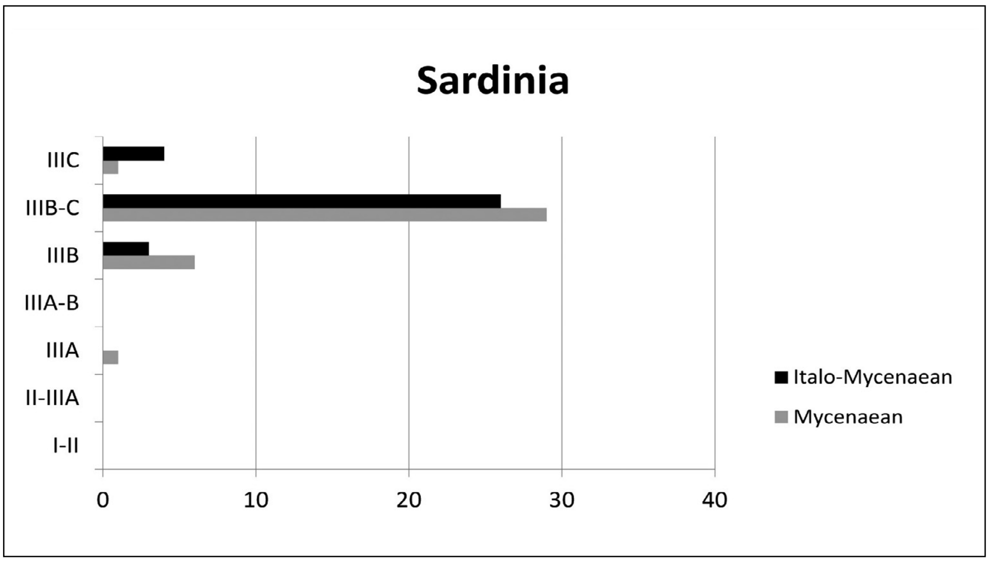
Table 6.2. Distribution of Mycenaean and Italo-Mycenaean according to period and area.


South
IIIC
IIIB-C
IIIB
IIIA-B
IIIA
II-IIIA
I-II
0
10
20
30
40
50
60
70
80
Italo-Mycenaean
Mycenaean

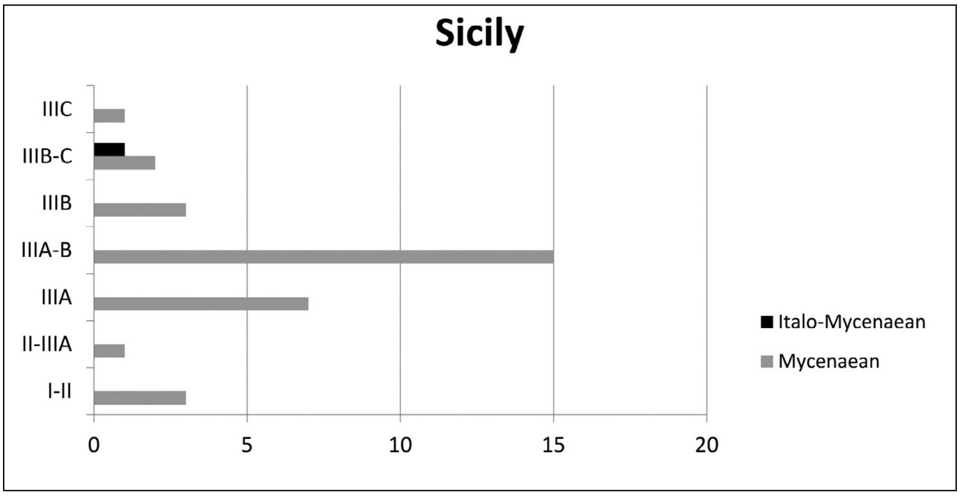
a


Centre-North
IIIC
IIIB-C
IIIB
IIIA-B
IIIA
II-IIIA
I-II
0
5
10
15
20
25
30
Italo-Mycenaean
Mycenaean

b


Sardinia
IIIC
IIIB-C
IIIB
IIIA-B
IIIA
II-IIIA
I-II
0
10
20
30
40
Italo-Mycenaean
Mycenaean

c



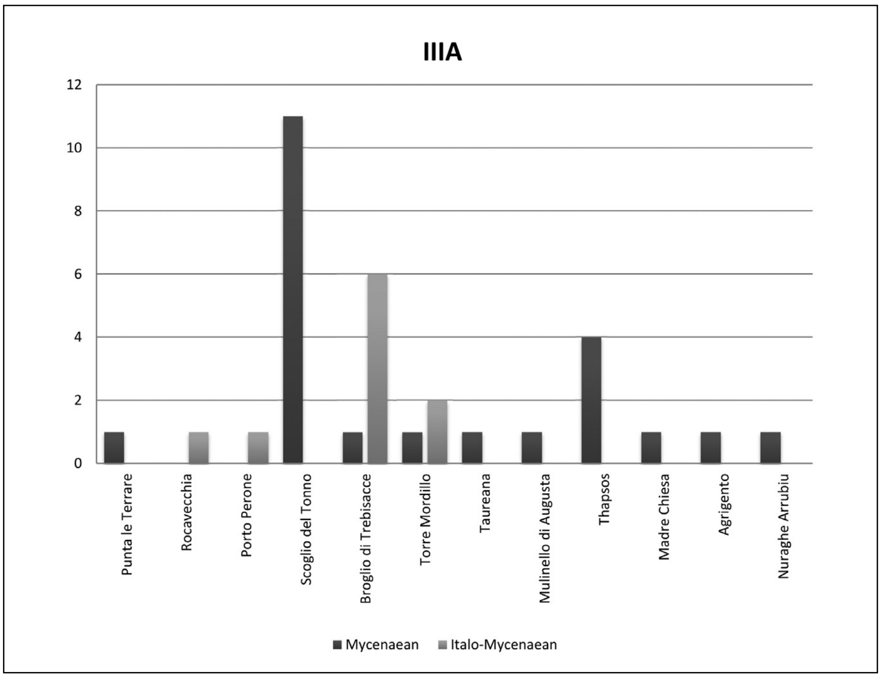
d

Fig. 6.2. Quantity of Italo-Mycenaean and Mycenaean in (a) the South, (b) the Centre-North, (c) Sardinia and (d) Sicily.

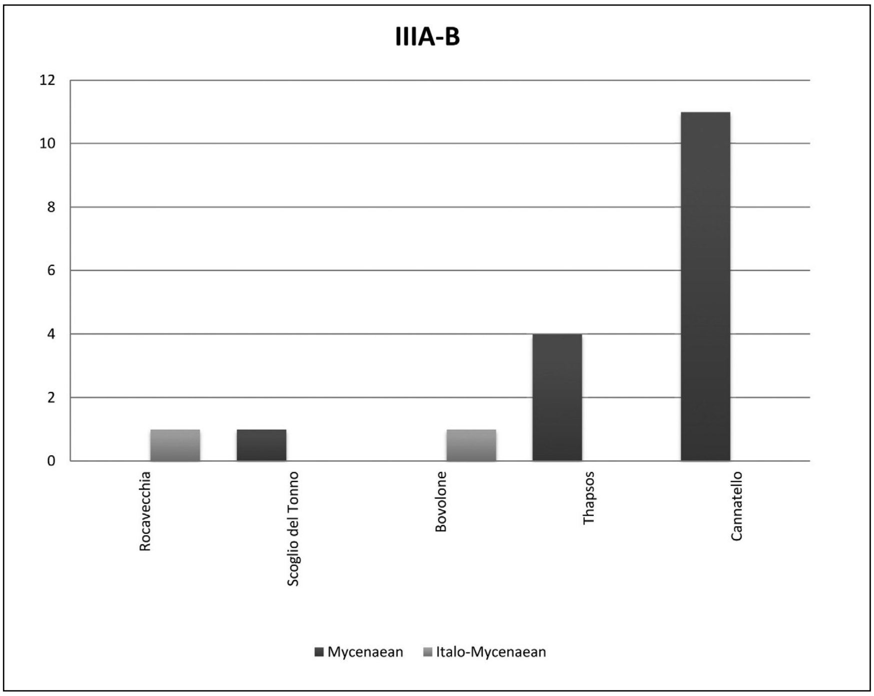
Sites

The quantity of Mycenaean and Italo-Mycenaean pottery at a range of individual sites throughout Italy are viewed in Fig. 6.3a-e according to period.

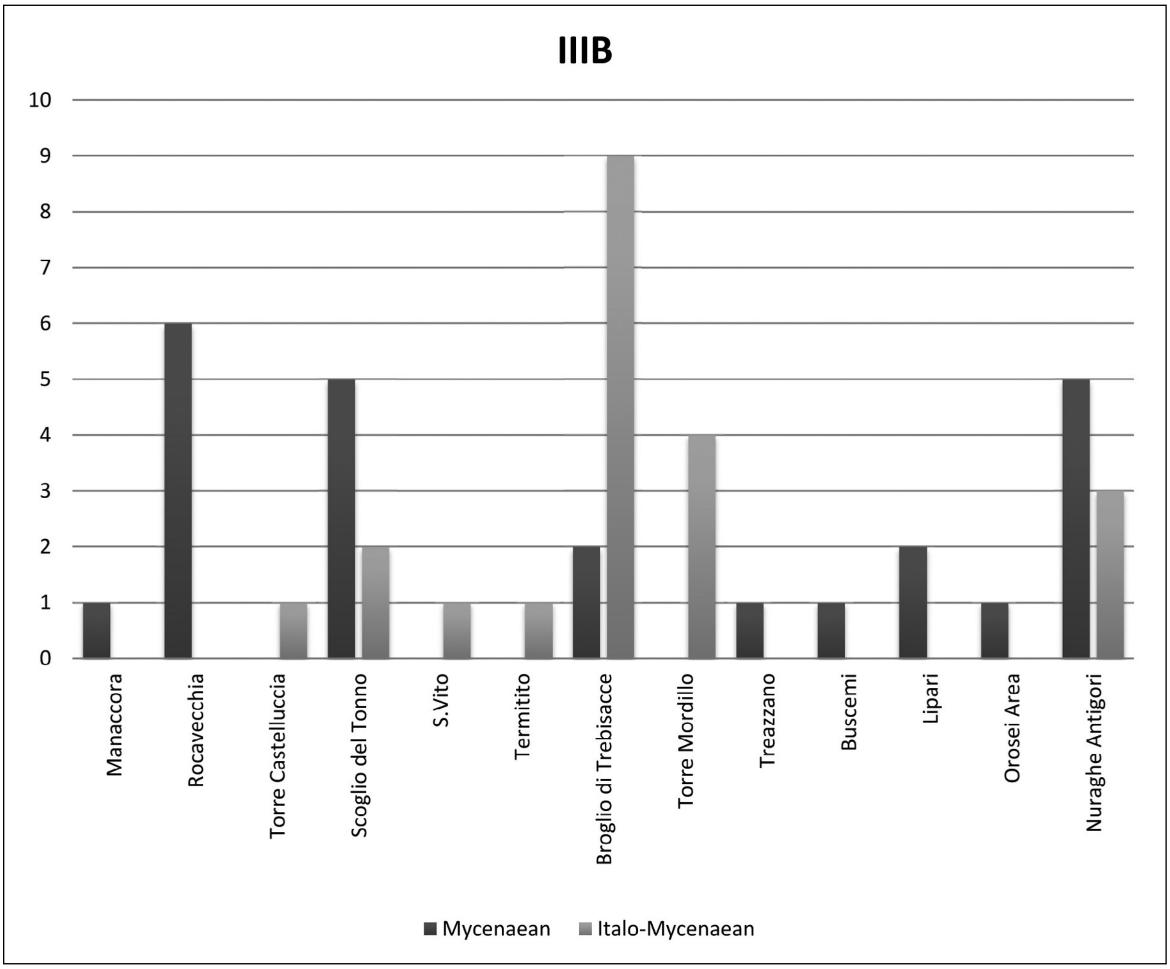
- LH I-II and II-IIIA: imports at Vivara and also at Rocavecchia, Torre Mordillo, Capo Piccolo, Monte Grande, Lipari. Hypothetical local production at Punta Zambrone in Calabria.
- LH IIIA: large number of imports at Scoglio del Tonno and Thapsos (necropolis). Local production begins in Apulia (Rocavecchia and Porto Perone) and in Calabria (Broglio di Trebisacce and Torre Mordillo) along the Ionian coast.
- LH IIIA-B: imports at Cannatello and Thapsos (necropolis). Hypothetical local production at Bovolone in Veneto.
- LH IIIB and IIIC: the majority of sites in the peninsula show the prevalence of Italo-Mycenaean, except at Torre Santa Sabina and Scoglio del Tonno.



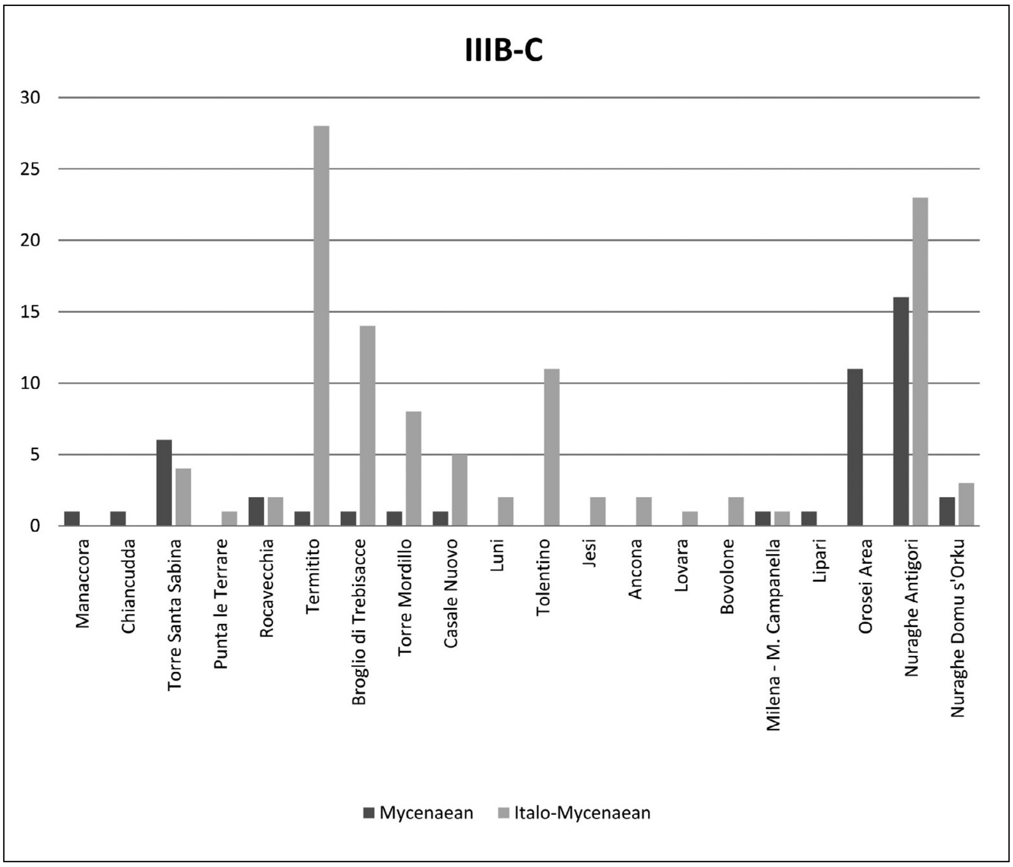
a


IIIA-B
12
10
8
6
4
2
0
Rocavecchia
Scoglio del Tonno
Bovolone
Thapsos
Cannatello
Mycenaean
Italo-Mycenaean

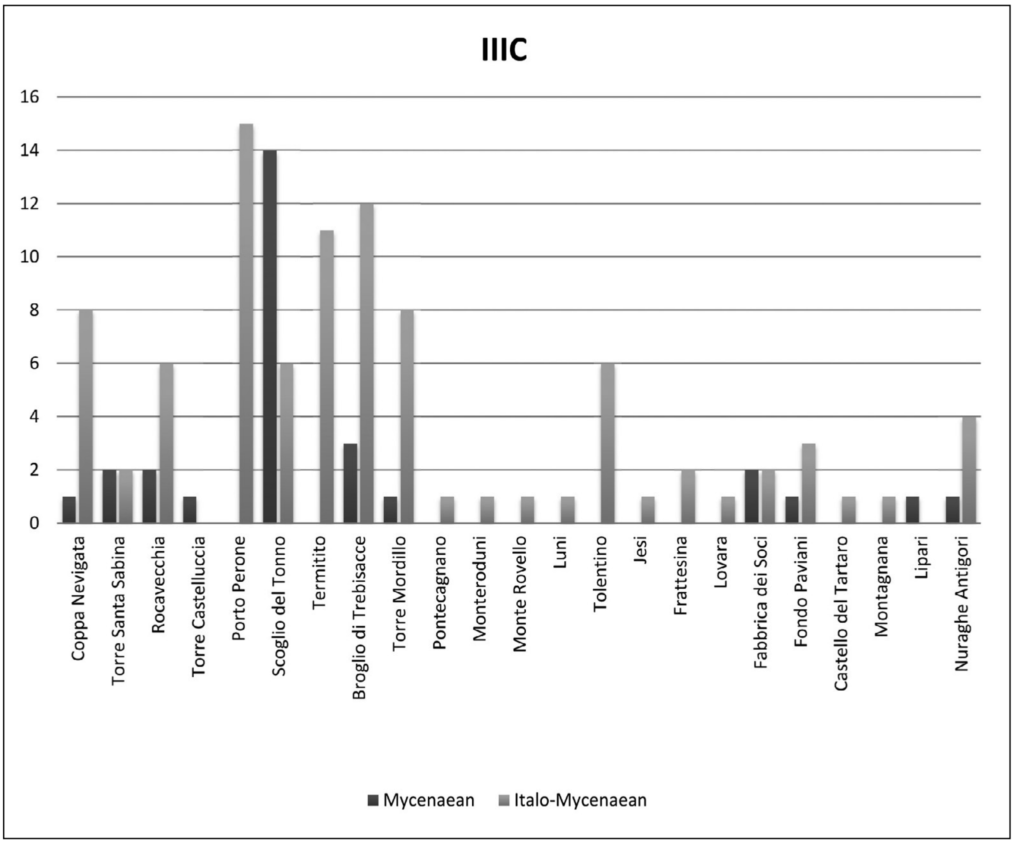
b


IIIB
10
9
8
7
6
5
4
3
2
1
0
Manaccora
Rocavecchia
Torre Castelluccia
Scoglio del Tonno
S.Vito
Termitito
Broglio di Trebisacce
Torre Mordillo
Treazzano
Buscemi
Lipari
Orosei Area
Nuraghe Antigori
Mycenaean
Italo-Mycenaean

c



d



e

Fig. 6.3. Quantity of Mycenaean and Italo-Mycenaean pottery at individual sites in (a) LH IIIA, (b) LH IIIA-B, (c) LH IIIB, (d) LH IIIB-C and (e) LH IIIC.

Imports according to suggested origin (Fig. 6.4; Table 6.3)

The Peloponnese is represented in all periods. On the basis of composition, it has been possible to propose at Vivara a source in the north of the Peloponnese for some samples and in a few other cases in the south of the region; however for the purposes of Table 6.3 these distinctions are left aside. The peak in LH I-II for the Peloponnese is exaggerated by the large number of samples analysed from Vivara and to a lesser extent Lipari. That early period also sees imports apparently from Attica but from only one site, Monte Grande on Sicily. From LH IIIB there are a variety of sources, and in LH IIIC there is an increase in Rhodian imports and the appearance at Scoglio del Tonno of a very small number of imports from Cyprus. Crete features as an exporting region in the LH IIIB-C periods especially on Sardinia and Rocavecchia.

	I-II	II-IIIA	IIIA	IIIA-B	IIIB	IIIB-C	IIIC	III	not det.	
Peloponnese	56	1	20	14	14	36	11	4	3	159
Peloponnese/ W Greece?							3			3
Attica	1									1
Central Greece			1		1		1		2	5
Cent. Crete/Cent. Greece?				1			3			4
Crete					6	8				14
Rhodes			1		2		8	1	1	13
Cyprus							2			2
Cyclades				1						1
Total	57	1	22	16	22	45	28	5	6	202

Table 6.3. Summary of suggested origins of imported Mycenaean pottery arranged chronologically.

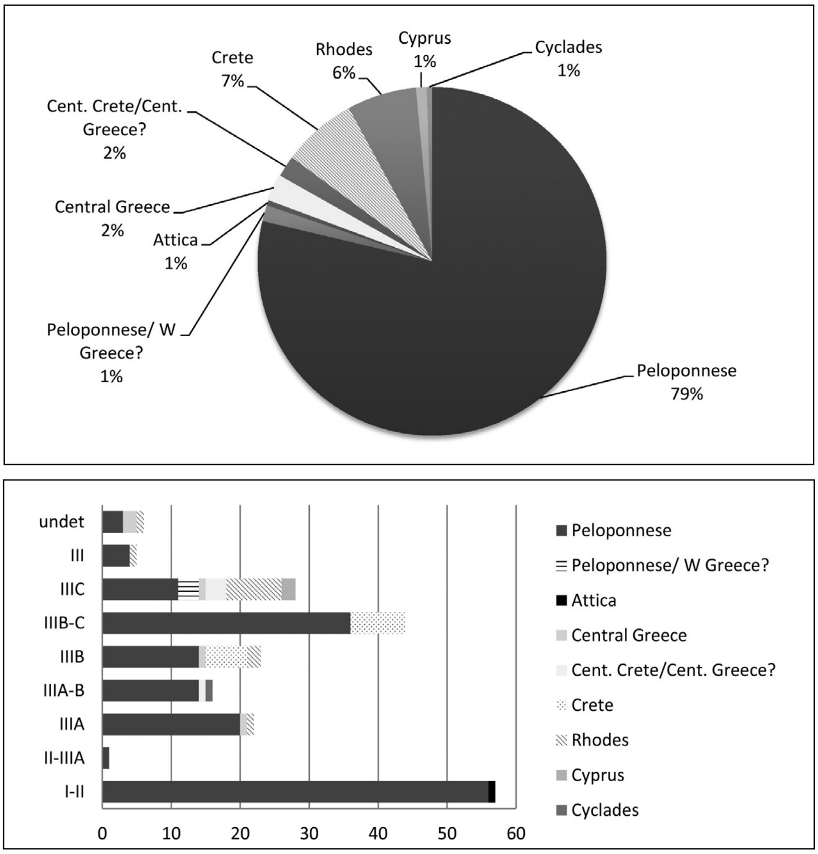


Fig. 6.4. The suggested sources of the imported Mycenaean pottery arranged chronologically.

Function (Table 6.4)

235 examples with recognisable shape have been grouped according to possible function, following the criteria of Mountjoy (1993) and Tournavitou (1992):

- *Storage/transport*: Piriform jar, Alabastron, Stirrup jar, Lekythos.
- *Pouring*: Amphora, Hydria, Jug, Rhyton, Krater.
- *Drinking*: Mug, Cup, Goblet, Kylix, Deep bowl, Stemmed bowl, Kantharos.
- *Drinking/eating*: Kalathos, Basin.
- *Storage/pouring*: Necked jar.

	Shape	I-II	II-IIIA	IIIA	IIIA-B	IIIB	IIIB-C	IIIC
Peloponnese	Storage/transport	8		15	1	5	4	1
	Storage/pouring	1						3
	Pouring	2		1		3	5	1
	Drinking	11	1	1	1	6	6	5
	Drinking/eating			1				
Central Greece/ Central Crete	Storage/transport			1	1			4
	Storage/pouring					1		1
	Pouring							
	Drinking							
	Drinking/eating							1
Crete - central and west	Storage/transport					4	2	
	Storage/pouring							
	Pouring						2	
	Drinking					2	1	
	Drinking/eating							
Rhodes	Storage/transport			1				5
	Storage/pouring							1
	Pouring							2
	Drinking					1		
	Drinking/eating					1		
Cyprus	Storage/transport							
	Storage/pouring							2
	Pouring							
	Drinking							
	Drinking/eating							
Italo-Mycenaean	Storage/transport			4		2	3	2
	Storage/pouring			2		7	7	16
	Pouring					1	13	9
	Drinking			1		10	14	28
	Drinking/eating							1

Table 6.4. Distribution of imported Mycenaean and Italo-Mycenaean pottery according to shape and date.

The most frequent functions of imported vessels are for storage/transport and drinking (Fig. 6.5a for the Peloponnese imports). The majority of imports are closed shapes, and among them are mainly storage/transport vessels of medium and small size. Their contents could include precious goods such as perfumed oils. Looking more closely at the transport vessels, we observe a predominance of piriform jars (of various sizes) in IIIA and the lack of the stirrup jar, a shape well attested in the Aegean. But beginning from IIIB, the stirrup jar becomes the most common imported shape within this function. This pattern may reflect a general trend in the production of these shapes in the Aegean, but the different contents of these vessels (for example liquids or more dense materials) may also be a factor. Among the open shapes in the early period, the presence of Vaphio cups in the Tyrrhenian area is notable. All the pots analysed from necropoleis (in Sicily) are imported closed storage/transport vessels, mainly small and medium in size, reflecting specific choices in the funerary practices.

Italo-Mycenaean production is oriented towards table ware, dominated by drinking vessels but including storage/pouring and pouring; there is a scarcity of transport vessels (Fig. 6.5b). The manner in which these three functions – drinking, storage/pouring and pouring – continue in much the same proportions throughout LH IIIB to IIIC suggests the existence of a strong, definable tradition of specific standardised shapes inspired by Aegean models but with several local characteristics. This trend, already outlined for the Plain of Sybaris (Jones *et al.* 2005), is confirmed for other areas such as Apulia and Basilicata. The development of these specialised productions is mentioned below (see section 6.2).

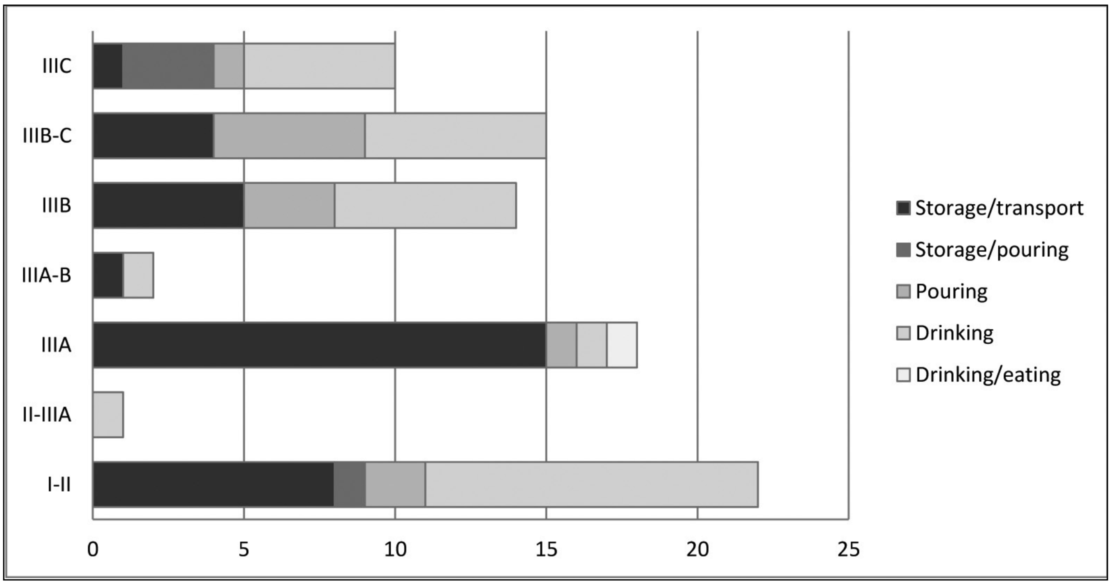


Fig. 6.5a. Mycenaean pottery imported from the Peloponnese classified according to function and date.

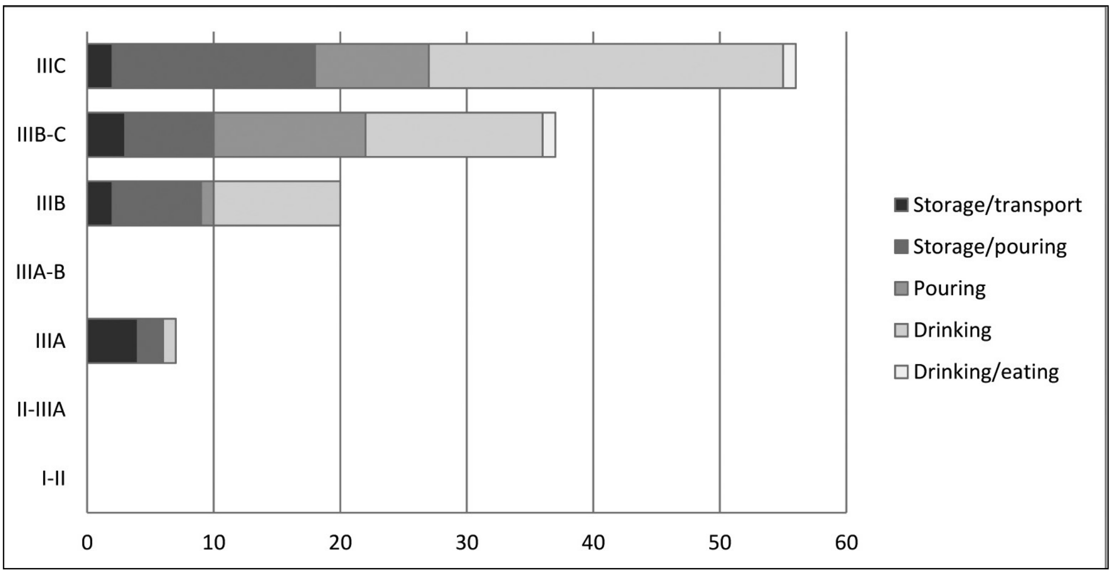


Fig. 6.5b. Italo-Mycenaean pottery classified according to function and date.

6.1.2. Other Aegean wares

69 examples of Matt-painted, Burnished, Minyan, Base Ring, Pithoi and Coarse ware – all belonging to the Aegean and Cypriot wares as defined in Table 1.2 – have been analysed (Table 6.5). According to the chemical data, the large majority are classified as imports, but there are a few examples that are candidates for local production. The situation is summarised here:

- **Matt-painted**: 26 analysed, all LH I-II, mainly closed vessels. At Vivara and Manaccora they are mainly from more than one centre in the Peloponnese; the one at Rocavecchia is probably from the north of the region and that at Grotta del Pino (**GSA2**) from elsewhere; there is a small group from Attica at Monte Grande, and four examples (from Vivara and Grotta del Pino) that could be locally or regionally made.
- **Burnished**: 11 analysed. Imports at Rocavecchia and Monte Grande; locally made at Coppa Nevigata and Scoglio del Tonno (open vessels), and possibly at Vivara. The assignment of Burnished ware at Monte Grande to Attica strongly suggests they are examples of so-called Acropolis Burnished ware (Mountjoy 1995).
- **Minyan**: 2 drinking vessels analysed from Rocavecchia are imported.
- **Base Ring**: 2 analysed from Antigori. The pots are typologically Cypriot, although the chemical composition of these samples in uncertain. A Cypriot connection involving also White Slip and White Shaved wares is archaeologically well documented in Sicily and Sardinia from LH IIIA.
- **Pithoi**: 10 analysed. Imported from Crete at Antigori and from Cyprus at Antigori, Cannatello and Salina; three were probably locally made at Porto Perone and Antigori.
- **Coarse wares**: a heterogeneous group of 18 samples, with some tripod cooking pots and closed vessels. One tripod cooking pot at Scoglio del Tonno is imported from Rhodes and another probably from Aegina, whilst three from the same site are locally or regionally made. Two coarse wheel-made closed vessels from Broglio di Trebisacce (**BT 707**, **BT 712**) are controversial: considering the bulk chemical composition they appear local/regional made yet they are tempered with non-local (volcanic) material.
- **Canaanite jar:** the single example examined in this study, from Vivara, most likely has a source in northern Syria near Ras Shamra, and it is this region that supplied comparable jars of similar date found at Tell el-Dab'a.

The significance of the finding that there are several possibly locally made pots in Matt-painted and Burnished wares dating to LH I-II needs a fuller investigation into Aegean influence in this early phase of the Italian MBA. The number of examples is still too limited to confirm the existence of a local tradition for these wares. Further archaeological evidence and related chemical analyses are needed, supplemented by petrographic analysis; this remark applies especially to the closed vessels at Vivara for which the existing data set is tantilasingly ambiguous in its interpretation.

There are also examples of very large containers possibly of Aegean type, in particular a huge transport/storage amphora from Porto Perone close to Cretan prototypes, that are probably locally made. This opens new perspectives for the introduction and use of such containers in southern Italy starting from the RBA. Very relevant are the few fragments of Coarse ware cooking pots, all from Scoglio del Tonno, which are of Aegean typology but locally produced. As these do not belong to the local tradition, they could be indicative of the occasional presence of potters of Aegean origin at Scoglio del Tonno.

Ware	Sample	Site	Shape	LH	Suggested origin
MP	MAN1	Manaccora	Closed vessel bichrome	I-II	Peloponnese
	MAN2	Manaccora	Closed vessel bichrome	I-II	Peloponnese
	RO34	Rocavecchia	Closed vessel	I-II	(North) Peloponnese
	PP16	Porto Perone	Amphora	I-II	Peloponnese
	GSA2	Grotta del Pino	Closed vessel	I-II	Peloponnese
	V40	Vivara	Closed vessel	I	Peloponnese
	V48	Vivara	Closed vessel	I	Peloponnese
	V54	Vivara		I-II	Peloponnese
	V55	Vivara		I-II	Peloponnese
	V56	Vivara		I-II	Peloponnese
	V69	Vivara		I-II	Peloponnese?
	V70	Vivara		I-II	Peloponnese?
	VD8	Vivara	Closed vessel, wheel-made, yellow slip	I-II	Peloponnese?
	MG1	Monte Grande	Closed vessel, bichrome	I-II	Attica
	MG2	Monte Grande	Open vessel	I-II	Attica
	MG3	Monte Grande	Closed vessel?	I-II	Attica
	GSA1	Grotta del Pino	Necked jar	I-II	Uncertain
	VD2=R1600	Vivara	Closed vessel, wheel made, orange slip	I-II	Uncertain
	VR3220=R8	Vivara	Closed vessel, yellow slip	I-II	Uncertain
	VR3224=R7	Vivara	Closed vessel, beige slip	I-II	Uncertain
	V39	Vivara	Closed vessel, bichrome	I	Uncertain
	V62	Vivara		I-II	Uncertain
	V71	Vivara		I-II	Local?
	VD7	Vivara	Closed vessel, orange slip	I-II	Local?
	GSA3	Grotta del Pino	Closed vessel	I-II	Regional?
	GSA4	Grotta del Pino	Necked jar	I-II	Regional?
BU	MG7	Monte Grande	Open vessel, fine orange, BU?	I-II	Attica
	MG8	Monte Grande	Open vessel, fine orange, BU?	I-II	Attica
	MG9	Monte Grande	Open vessel, fine orange, BU?	I-II	Attica
	RO36	Rocavecchia	Kantharos? Fine orange	I-II	Import
	V59	Vivara		I-II	Uncertain
	VR3212=R2	Vivara	Closed vessel, red slip	I-II	Uncertain
	V61	Vivara		I-II	Local?
	VD6	Vivara	Closed vessel, orange slip	I-II	Local?
	CN2013	Coppa Nevigata	Open vessel, BU?	IIIC?	Local
	CN2014	Coppa Nevigata	Open vessel? BU?	IIIC?	Local
	ST87	Scoglio del Tonno	Cup		Local
MIN	RO356	Rocavecchia	Kantharos	I-II	Import
	RO360	Rocavecchia	Bowl	I-II	Import
BR	AN54	Antigori	Base Ring shaped base		?
	AN55	Antigori	Wishbone handle		?

Ware	Sample	Site	Shape	LH	Suggested origin
P	AN49	Antigori	Minoan-type pithos		C Crete
	CAN401	Cannatello	Yellow, with grooved decoration		S Cyprus
	CAN402	Cannatello	Yellow, with wavy grooved decoration		S Cyprus
	POR1	Salina, Portella	Pithos, with grooved decoration		S Cyprus
	POR3	Salina, Portella	Pithos, with grooved decoration		S Cyprus
	AN48	Antigori	Pink, with wavy grooved decoration		S Cyprus
	MIC6	Lipari	Base, pithos?	?	Uncertain
	PP17	Porto Perone	Pithos		Atypical local
	PP23	Porto Perone	Pithos/amphora	IIIB	Atypical local
	AN44	Antigori	Pithos - herring bone		Local
CW	ST83	Scoglio del Tonno	Tripod cooking pot		Aegina
	ST84	Scoglio del Tonno	Tripod cooking pot	IIIC	Rhodes
	V82e/360+	Vivara	Canaanite jar	I-II	N Syria
	VD11=R1604	Vivara	Closed vessel, yellow slip	I-II	Uncertain
	VD12	Vivara	Closed vessel, pink slip	I-II	Uncertain
	VD4	Vivara	Closed vessel, grey slip	I-II	Uncertain
	VD9	Vivara	Closed vessel, yellow slip	I-II	Uncertain
	VR3219=R5	Vivara	Closed vessel, orange slip	I-II	Uncertain
	VR3222=R4	Vivara	Closed vessel, orange slip	I-II	Uncertain
	VR3223=R1	Vivara	Closed vessel	I-II	Uncertain
	VR3235=R6	Vivara	Closed vessel, micaceous	I-II	Uncertain
	VR3242=R3	Vivara		I-II	Uncertain
	BT712	Broglio di Trebisacce	Closed vessel, CW?		Import?
	A11, A34, BT707	Broglio di Trebisacce	Jar, CW?		Import?
	ST85	Scoglio del Tonno	Tripod cooking pot		Local
	ST86	Scoglio del Tonno	Tripod cooking pot		Local
	VD1	Vivara	Closed vessel	I-II	Local?
	VD10	Vivara	Closed vessel; grey-red	I-II	Local?
	VD3	Vivara	Closed vessel, light brown slip	I-II	Local?

Table 6.5. Other Aegean, Cypriot and other wares: description and suggested origin (MP: Matt-painted, BU: Burnished, MIN: Minyan, BR: Base Ring, P: Pithos, CW: Coarse ware).

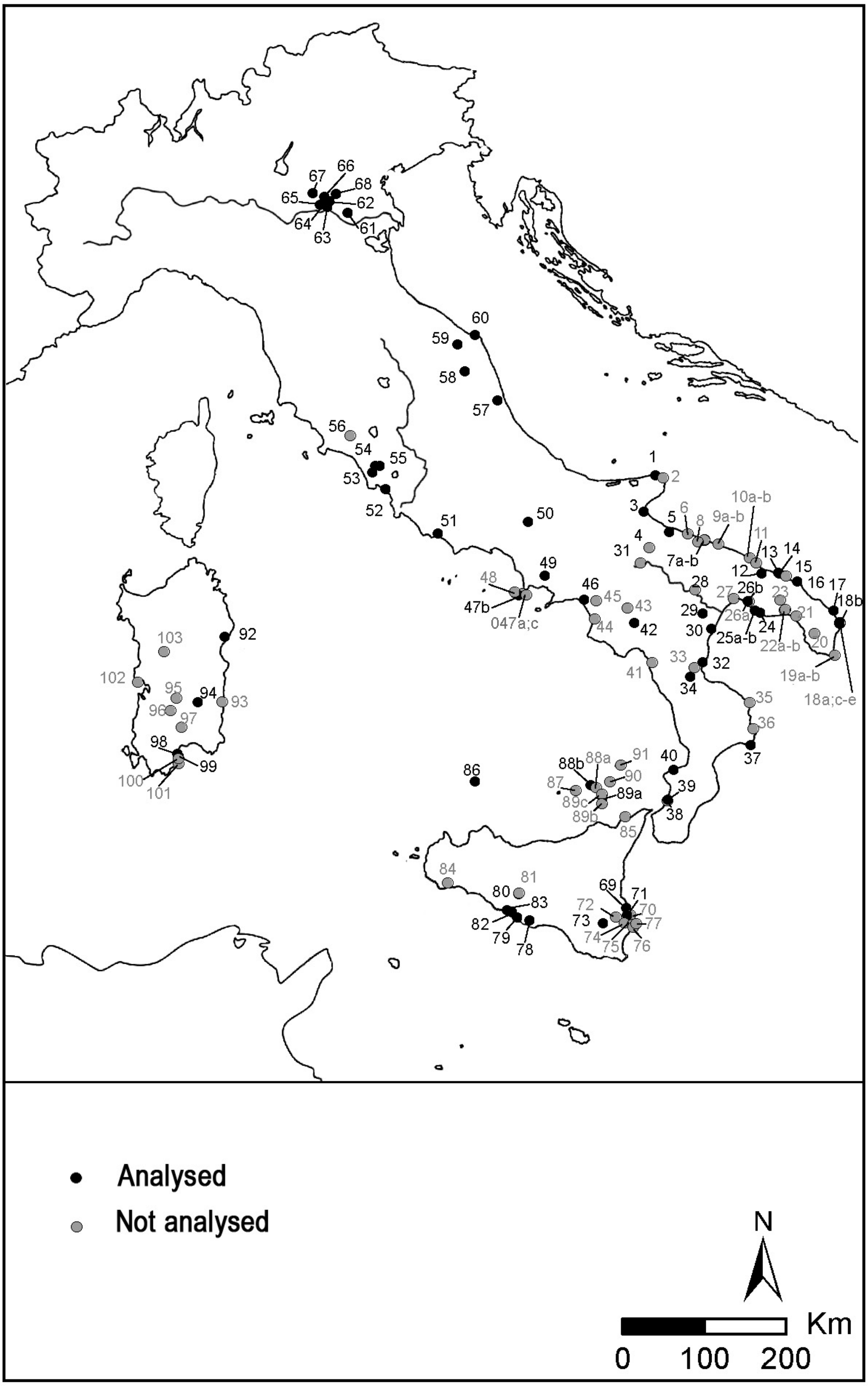


Fig. 6.6. Sites with Aegean-type pottery investigated by archaeometric analyses. Site numbers according to the Gazetteer (Chapter 2).

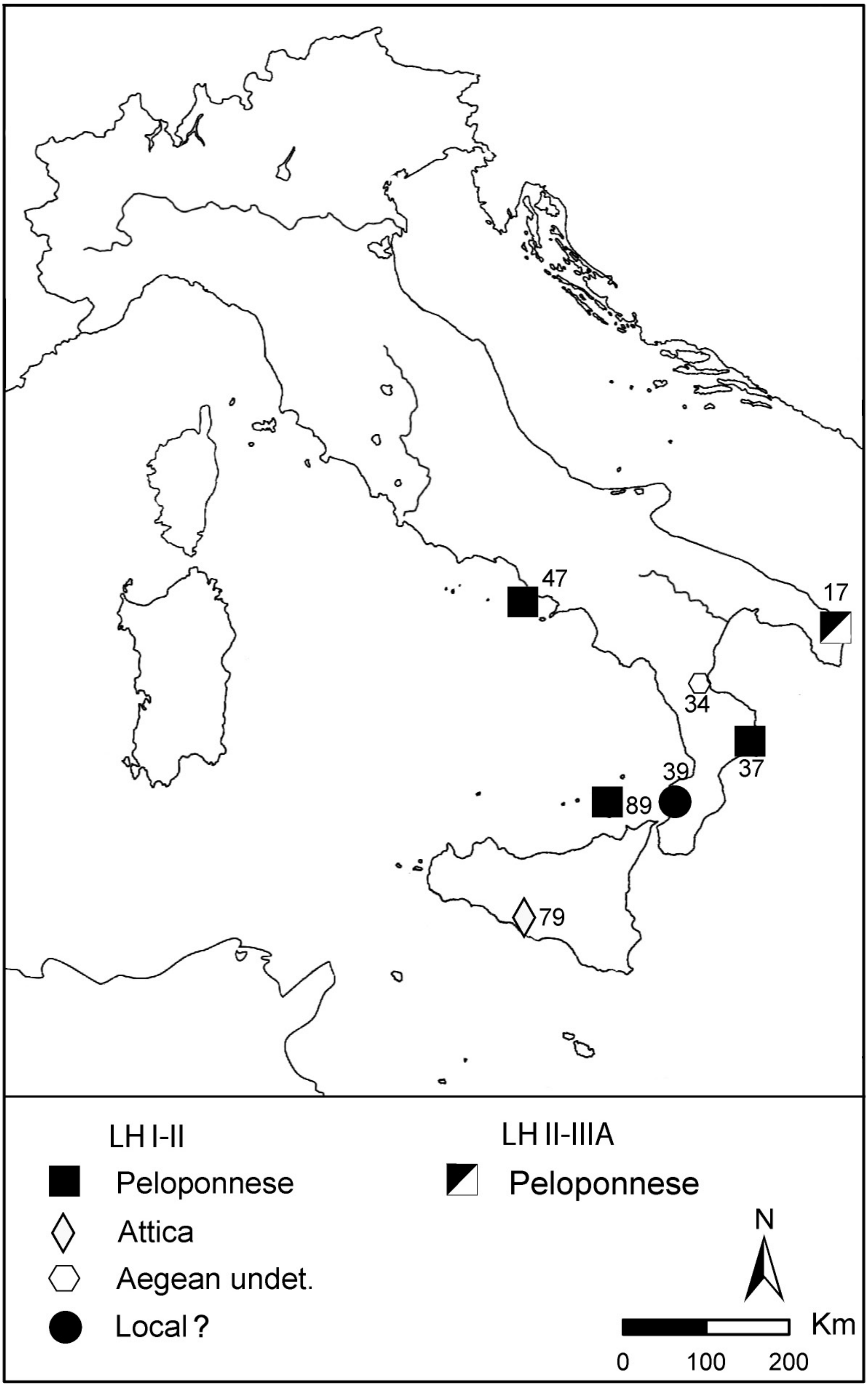


Fig. 6.7. LH I-II and LH II-IIIA Mycenaean pottery: suggested origin according to analyses.

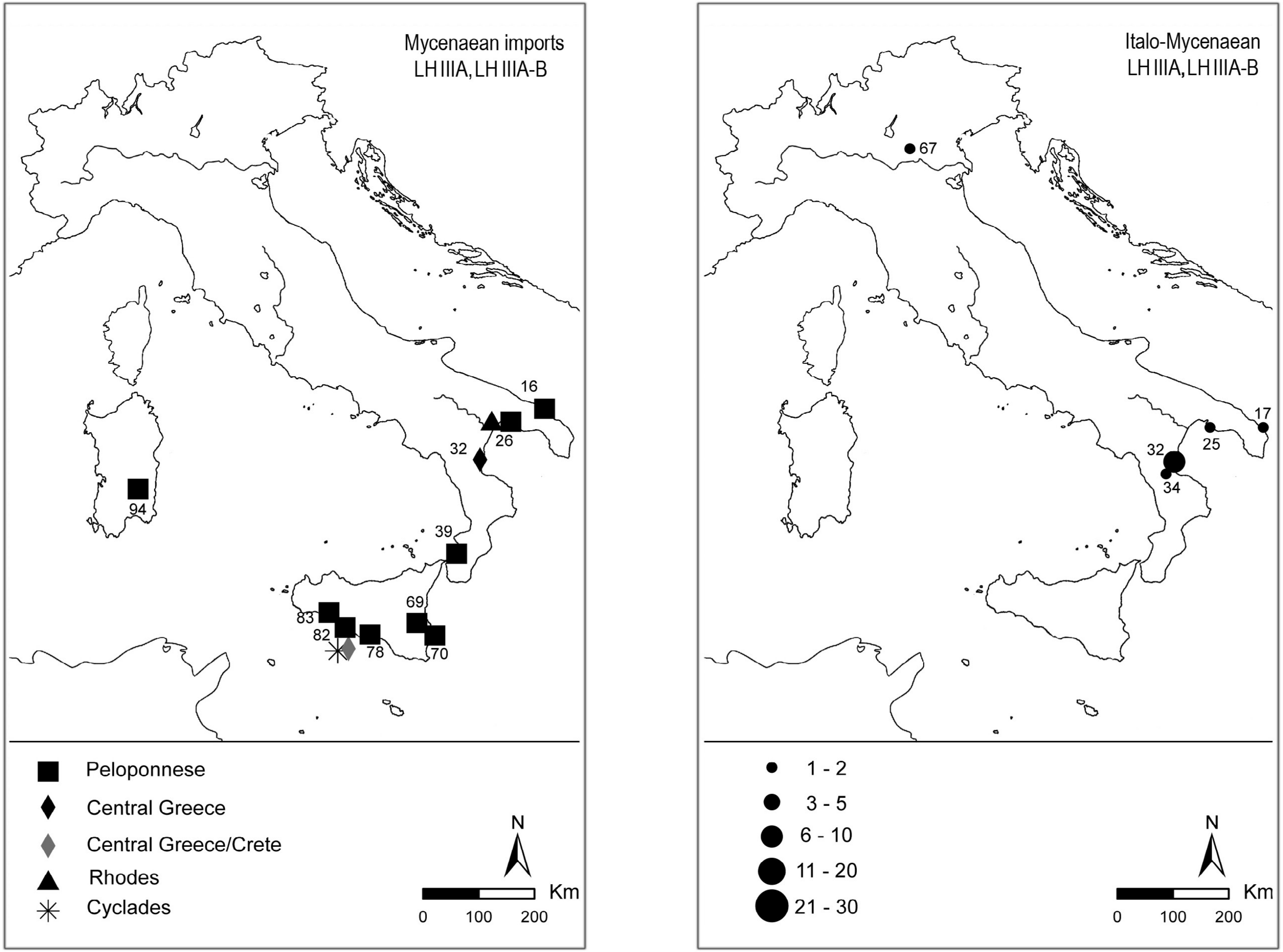


Fig. 6.8. LH IIIA and LH IIIA-B analysed pottery. a. Imported Mycenaean, with suggested origin; b. Quantity of Italo-Mycenaean.

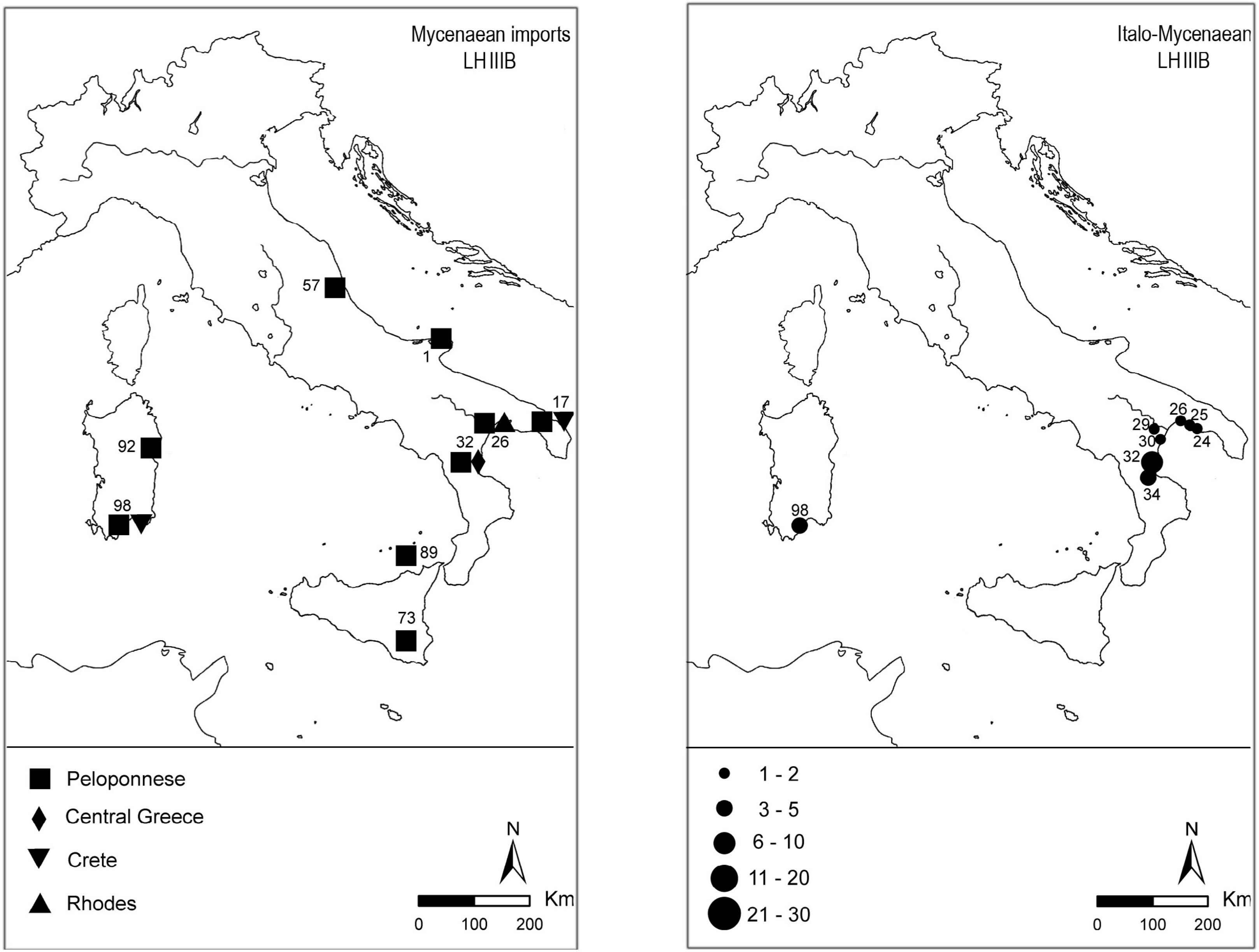


Fig. 6.9. LH IIIB analysed pottery. a. Imported Mycenaean, with suggested origin; b. Quantity of Italo-Mycenaean.

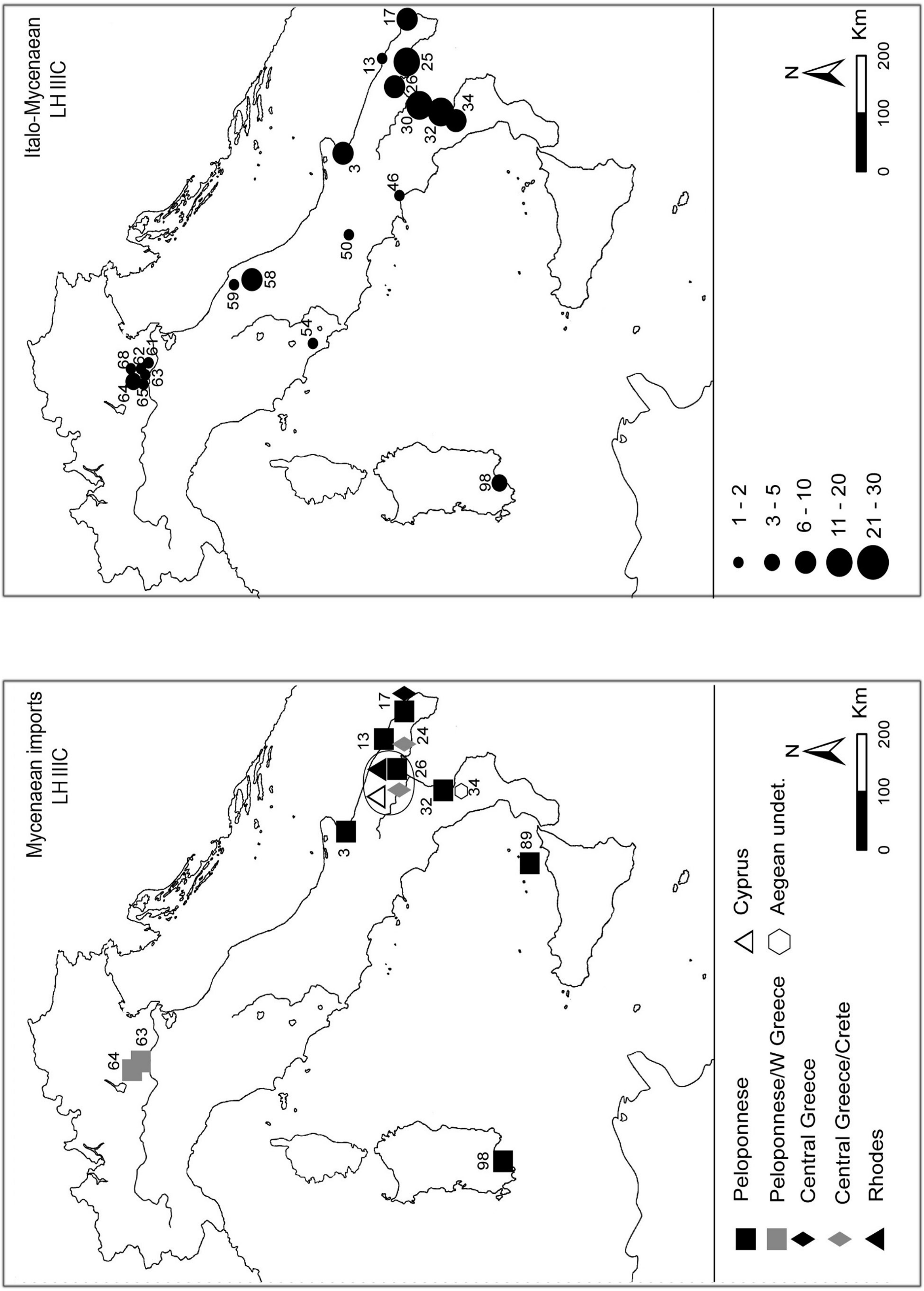


Fig. 6.10. LH IIIC analysed pottery. a. Imported Mycenaean, with suggested origin; b. Quantity of Italo-Mycenaean.

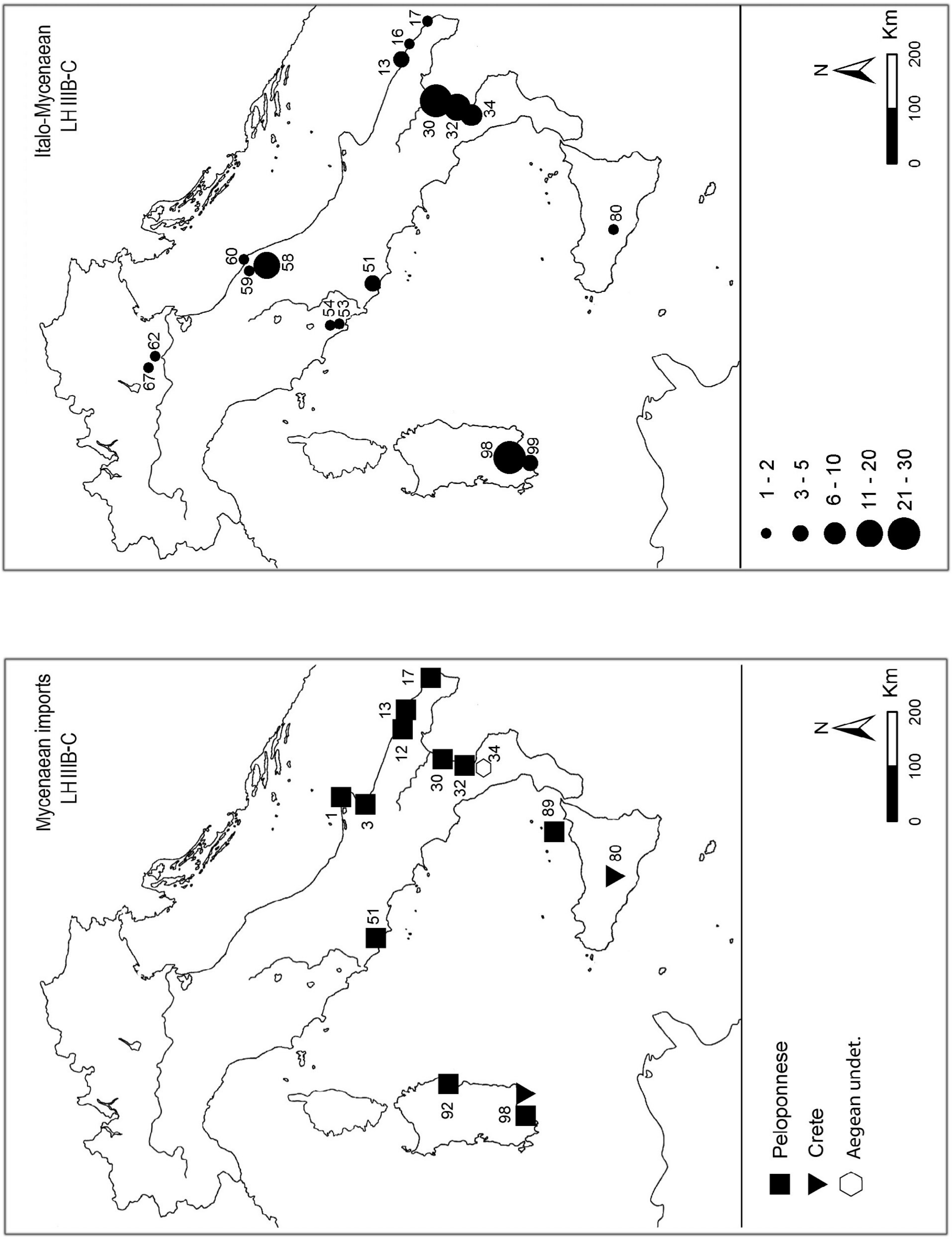


Fig. 6.11. LH IIIB-C analysed pottery. a. Imported Mycenaean, with suggested origin; b. Quantity of Italo-Mycenaean.

6.2. Typological classification of Italo-Mycenaean pottery

Marco Bettelli

In this section a thorough classification of the entire set of the locally produced 'Mycenaean' pottery is proposed. We are aware that this does not account for the totality of this kind of pottery present in the Central Mediterranean, but, in the absence of chemical or petrographic analysis concerning provenance, it seems preferable to avoid the risk of confusing imports with local products in order to obtain a clearer typological outline of true Italo-Mycenaean pottery. There are only a few exceptions, such as carinated cups, which have not been analysed but are included in this exercise because they are, on stylistic grounds, very probable local products. Another exception is the case of S. Maria di Leuca-Punta Meliso, considering the high degree of stylistic and chronological homogeneity of the Aegean pottery. However, one should keep in mind that the analyses performed on this group of finds, whose result is in favour of a local production, are limited to petrography (Boschian 1996).

Shapes are organised from open to closed, and within these main categories they go from the simplest to the most complex profiles. Where possible, the Furumark order of the shapes is also respected, but this was complicated by the large number of shapes and types belonging to this particular ware. Types are numbered. If for a given type some specimens can be grouped on the basis of common features – formal or decorative – capital letters are used to denote different groups, here called 'varieties'. Where these types or varieties consist of only one piece we are confident that there are similar examples which on the basis of style are probably locally produced even though this assignment has not been confirmed by analysis. A further analogous case happens when there are single sherds or pots belonging to a recognisable Furumark shape. Lowercase letters are used to name a single piece, here called 'variant', classifiable within a type or variety, but which differs from the whole for minor formal or decorative features. We are conscious that this is just a qualitative classification not based on an objective and quantitative analyses. It is appreciated that this is a dynamic classification scheme; in fact as new finds are made, variants can become varieties and varieties could become specific types.

Regarding decoration, they have been classified according to Furumark's motifs. They are presented according to findspot, following the same topographic order as in the Gazetteer. When a motif is attested at only one site, it is written in bold in Figs. 6.10-20. At the end of the series are listed again the sites where Late Minoan motifs are attested. Punta Zambrone and Bovolone are also included in the list, according to the results of analysis that suggest local production but bearing in mind the comments made above about them.

6.2.1. Shapes

Type	Example
Type 1 - Rounded bowl with straigth or turned inwards rim.	TM20
	BT, Bettelli 2002, cat. 143
	BT, Bettelli 2002, cat. 118
Type 2 - Deep bowl. Distinct and spreading rim. Conical body. Medium or low maximum diameter.	PM19 Benzi, Graziadio 1996, fig. 4
	PM20 Benzi, Graziadio 1996, fig. 4
2a - Carinated body, slightly convex profile. Medium or low maximum diameter.	CN2008

Type	Example
Type 3 - Deep bowl. Slightly distinct and spreading rim. Body with vertical or slightly inturned wall, rectilinear or slightly concave profile. Low maximum diameter.	T, *MGMM*1, tav. XXVI:5
	A14
	A36
	BT, Bettelli 2002, cat. 145
	AN31?
	TM1?
Type 4 - Deep bowl. Slightly distinct rim, spreading wall.	T9
	AN14
	AN30
	TOL5
Type 5 - Deep bowl. Large spreading rim, slightly convex wall.	T, *MGMM*1, tav. XXV:2
	T, *TMM*, fig. 9
Type 6 - Deep bowl. Slightly spreading rim, rounded body. Maximum diameter at the middle.	A16
	TM8
	SV3
	T, *MGMM*1, tav. XXVI:3
Type 7 - Bowl or cup. Body with straight or slightly convex wall, in most cases spreading. Short, distinct and spreading rim.	
7A - Linear pattern.	A46
	BT, Bettelli 2002, cat.134
	RO, Pagliara *et al*. 2007, X, III.44, fig. 16
7Aa - Monochrome interior.	TOL6
7Ab - Vertical strips inside the rim.	AN15
7B - Minor dimensions, body decorated with wavy line pattern.	PM22, Benzi, Graziadio 1996, fig. 4
	TOL8
7Ba - Interior and exterior decorated.	TOL7
7Bb - Very shallow rounded body, slightly spreading rim.	AN13
Type 8 - Bowl or cup. Body with straight or slightly convex wall. Same diameter at the rim and at the body. Short, distinct and spreading rim.	
8A - Very distinct rim.	RO74
	TCA22
	AN2
	AN7
	AN56
8B - Slightly distinct rim.	TM2
	TM61
8a - Vertical strips inside the rim.	AN60
attributable to type 8 (uncertain).	TM44

TYPE	EXAMPLE
Type 9 - Shallow bowl or cup. Body with convex and turned inwards wall. Short, distinct and spreading rim.	T, *MGMM*1, tav. XXV:4
	LUN4
	FRA1
	ST29
9a - Plain	CN2011
Unicum - Small carinated cup with short, vertical rim.	A19
Type 10 - Carinated cup with biconical body. Distinct and spreading rim.	
10A - Monochrome	RO282
10B - Linear pattern	A6
Type 11 - Carinated cup. Body with turned inward wall and straight, or slightly convex, profile. Linear pattern.	BT, *EMS*, tav. 40:1
	BT, Bettelli 2002, cat.146
11a - Decorated wall between rim and carina.	RO, Pagliara *et al.* 2007, X, III.45, fig. 16
Unicum - Shallow carinated bowl. Body with straight wall. Distinct and spreading rim. One or two horizontal handles.	T41
Type 12 - Carinated cup. Body with sharp carina and concave wall. Distinct and spreading rim. Decorated body.	PP21
	PP22
	TM83
12a - Large rim. Linear pattern.	A38
12b - Monochrome interior.	BT, Bettelli 2002, cat.49
12c - Plain.	RO, Pagliara *et al.* 2007, X, IV.50, fig. 16
Type 13 - Carinated cup. Body with very sharp carina and slightly concave, spreading wall. Zig-zag pattern.	RO, Pagliara *et al.* 2007, X, IV.48, fig. 16
	BT, Bettelli 2002, cat.54
Type 14 - Mug. Cilindrical body, with slightly convex wall.	TM72
	BT, Bettelli 2002, cat.126
	BT, Bettelli 2002, cat.160
14a - Conical body.	A28
Type 15 - Kylix.	T, *MGMM*1, tav. XX:2
Type 16 - Basin FS 294.	
16A - Distinct and rounded rim.	TSS9
16B - Short, distinct and spreading rim.	TOL3
Type 17 - Krater with rounded, shallow, body. Short, distinct and rounded rim, decorated on top with vertical stripes. Large or medium size.	AN4
	AN8
	AN17
Type 18 - Krater or large deep bowl. Slightly rounded body. Distinct and spreading rim. Antithetic spirals pattern.	RO101
	TM6
Unicum - Krater or large deep bowl with a short straight neck.	ST51
Type 19 - Krater FS 285.	PM14, Benzi, Graziadio 1996, fig. 3
	PM15, Benzi, Graziadio 1996, fig. 3

Type	Example
Type 20 - Amphoroid krater.	A17
	TOL2 ?
Type 21 - Piriform jar.	ST28
	A22
Type 22 - Alabastron.	TM21
	LUN1?
	TOL10?
	ANC1?
	FP1?
Type 23 - Stirrup jar.	TM9
	TM22?
	TM43
	A41
	CNU9
Type 24 - Jar FS 77.	A3
Type 25 - Jar (coarse?). Globular body. Distinct, rounded rim. Similar to BT707, not local Coarse ware jar.	A45
Type 26 - Closed vessels attributable to collar-necked jar FS 63 or belly-handled amphora FS 58.	PM1, Benzi, Graziadio 1996, fig. 2
	PM5, Benzi, Graziadio 1996, fig. 3
	PM6, Benzi, Graziadio 1996, fig. 3
Type 27 - Necked jar.	
27A1 - Short, straight neck, plain. Distinct, horizontal rim. Horizontal handles. Large size.	A9-A65-BT705
	A13
	A30
27A2 - Short, straight or conical neck, plain. Distinct, horizontal rim. Horizontal handles upright on the shoulder, large/medium size.	A1
	A8
27A2a - Slightly distinct, very short rim.	A25
27A2b - Large mouth.	A4
27A3 - Same shape as variety A or B, but smaller size.	A27
	BT701
27B1 - High neck with a cylindrical or conical shape, plain. Distinct, horizontal or spreading rim.	CN2001
	CN2007
27B2 - High neck with a cylindrical or conical shape, decorated with a horizontal band in the middle. Distinct, horizontal or spreading rim. Large size.	CN2002-2003
	A32
27B3 - High neck with a cylindrical or conical shape, decorated with a horizontal band in the middle. Distinct, horizontal rim. Medium or small size.	CN2004
	A5
	BT713
27B3a - Neck decorated with wavy line pattern in the middle. Several vases similar to this one come from Rocavecchia, but they are not analysed (cfr. Chapter 3).	A73

Type	Example
Type 28 - Jug or small amphora with globular body. Slightly concave neck.	
28A - Vertical rod-shape handle from rim to shoulder.	PT2
	PP8
28B - Strap handle from rim to shoulder.	PM2, Benzi, Graziadio 1996, fig. 2
	T, *MGMM*1, tav. XIX:1
28a - High and narrow neck.	LOV2
Attributable to Type 28.	ANC2
Type 29 - Jug or small amphora with globular body. Spreading neck. Vertical rod-shape handle from rim, or just under it, to shoulder. Small size.	A74
	BT711
	A44?
Type 30 - Amphora with high neck and piriform body. Slightly everted rim. Vertical handles from under the rim to shoulder. Medium size.	RO, Pagliara *et al.* 2008, IX, II.2, fig. 14
	T 143
Unicum - Amphora with high, straight, neck and narrow mouth. Vertical rod-shape handles from rim to shoulder. Large size.	MIL56
Type 31 - Amphora FS 70.	PM3, Benzi, Graziadio 1996, fig. 2
	RO48
Type 32 - Amphoriskos with shallow globular body.	TOL9
	MON1?
Type 33 - Narrow-necked jug (Lekythos).	TOL1

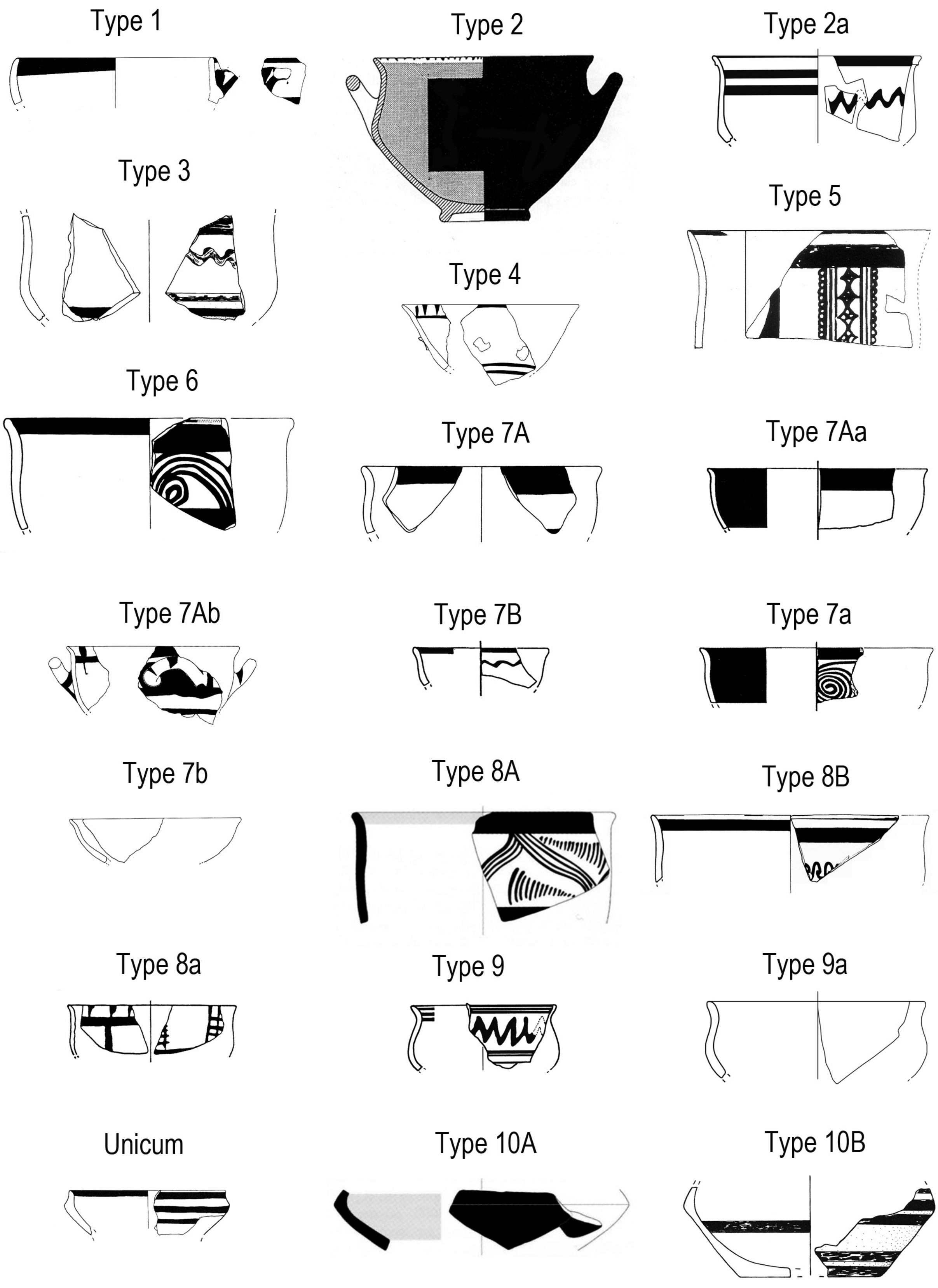


Fig. 6.12. Types of Italo-Mycenaean bowls and cups (1:4); *unicum* (1:6); 8a (not to scale).

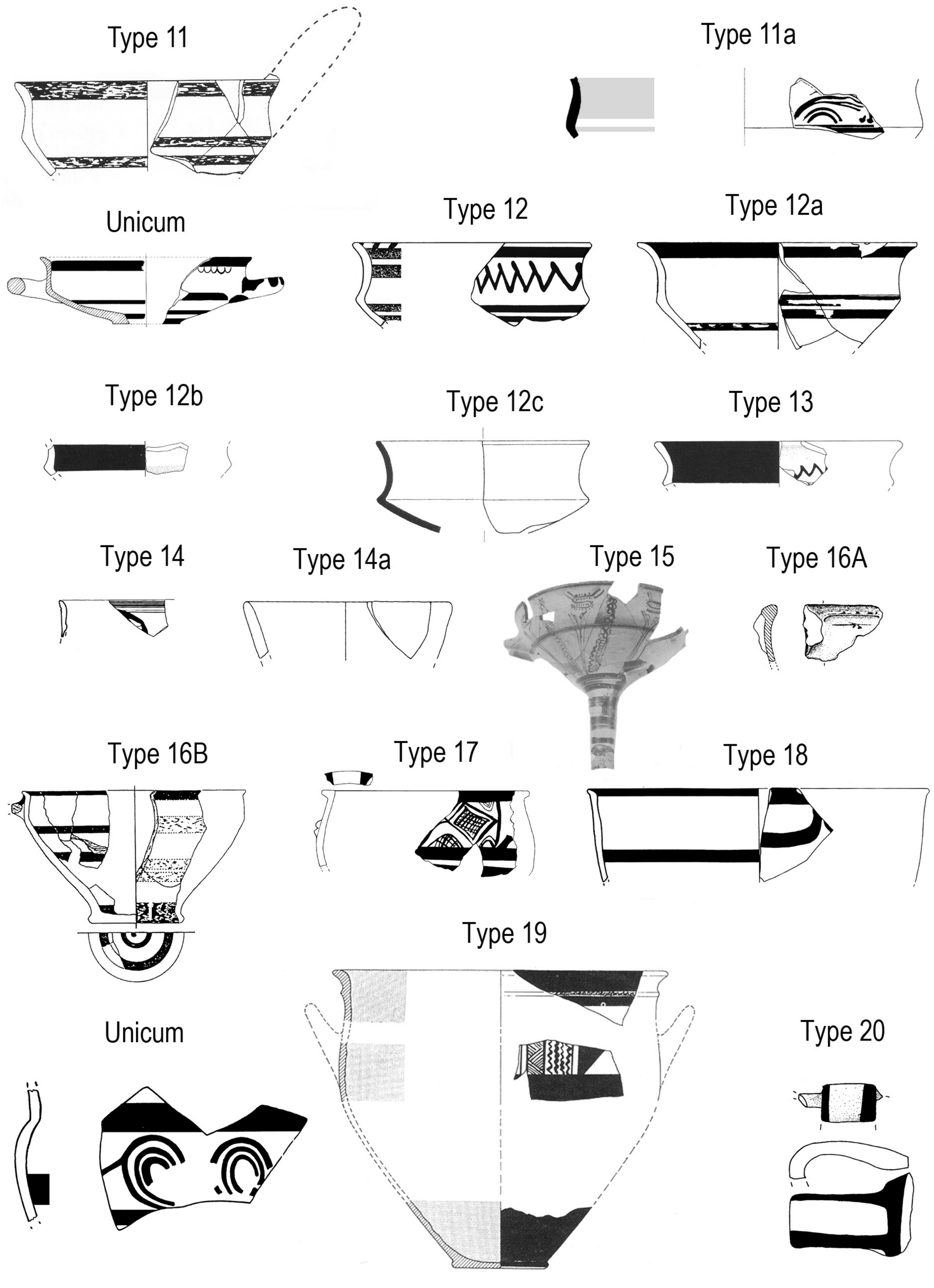


Fig. 6.13. Types of Italo-Mycenaean cups, mugs, kylikes, basins and kraters (1:4); *unicum* (1:6); 19 (1:8); 15 (not to scale).

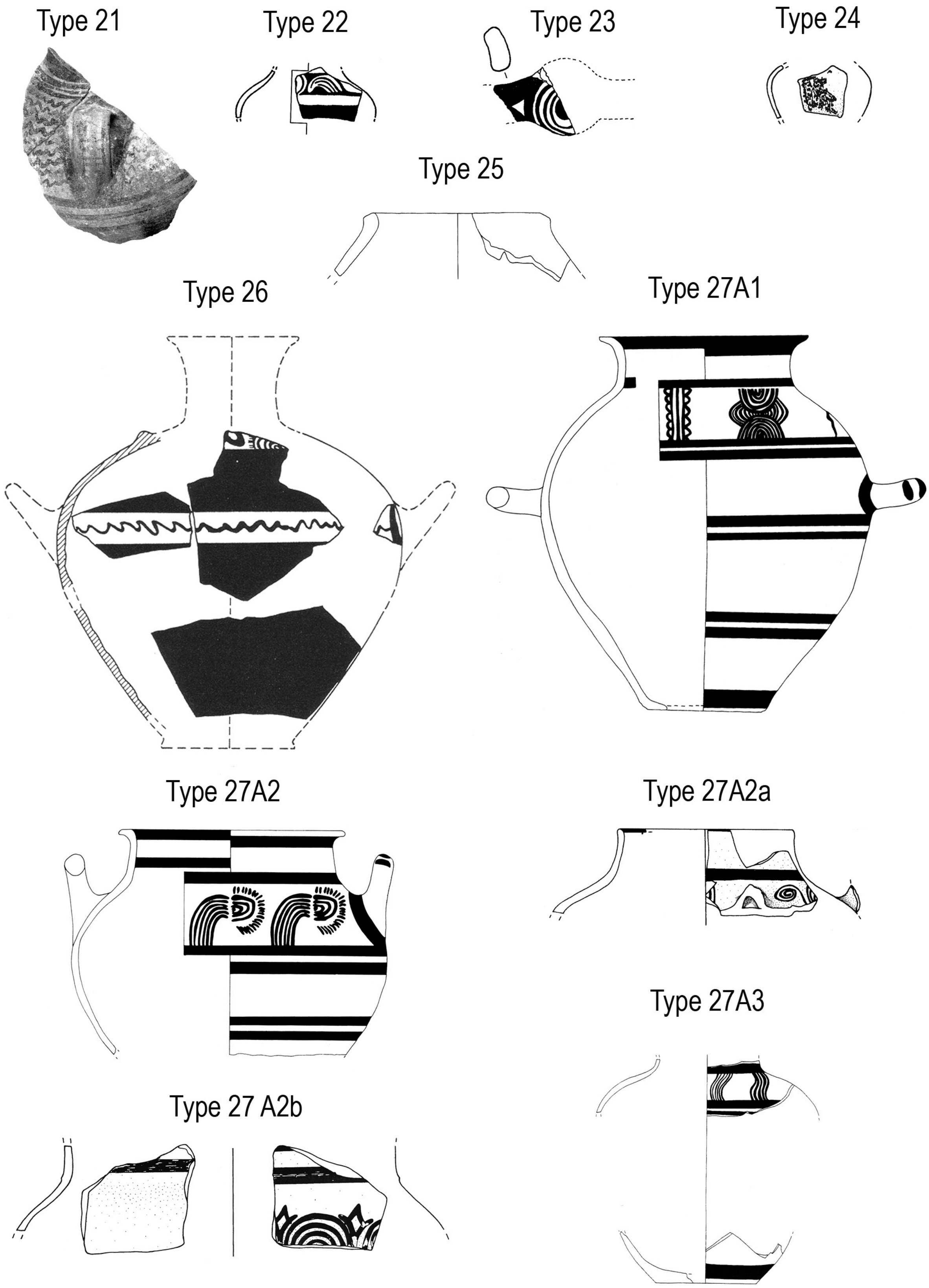


Fig. 6.14. Types of Italo-Mycenaean piriform jars, alabastra, stirrup jars, jars and necked jars. 22-25, 27A2a, 27A2b (1:4); 27A1, 27A2, 27A3 (1:6); 26 (1:8); 21 (not to scale).

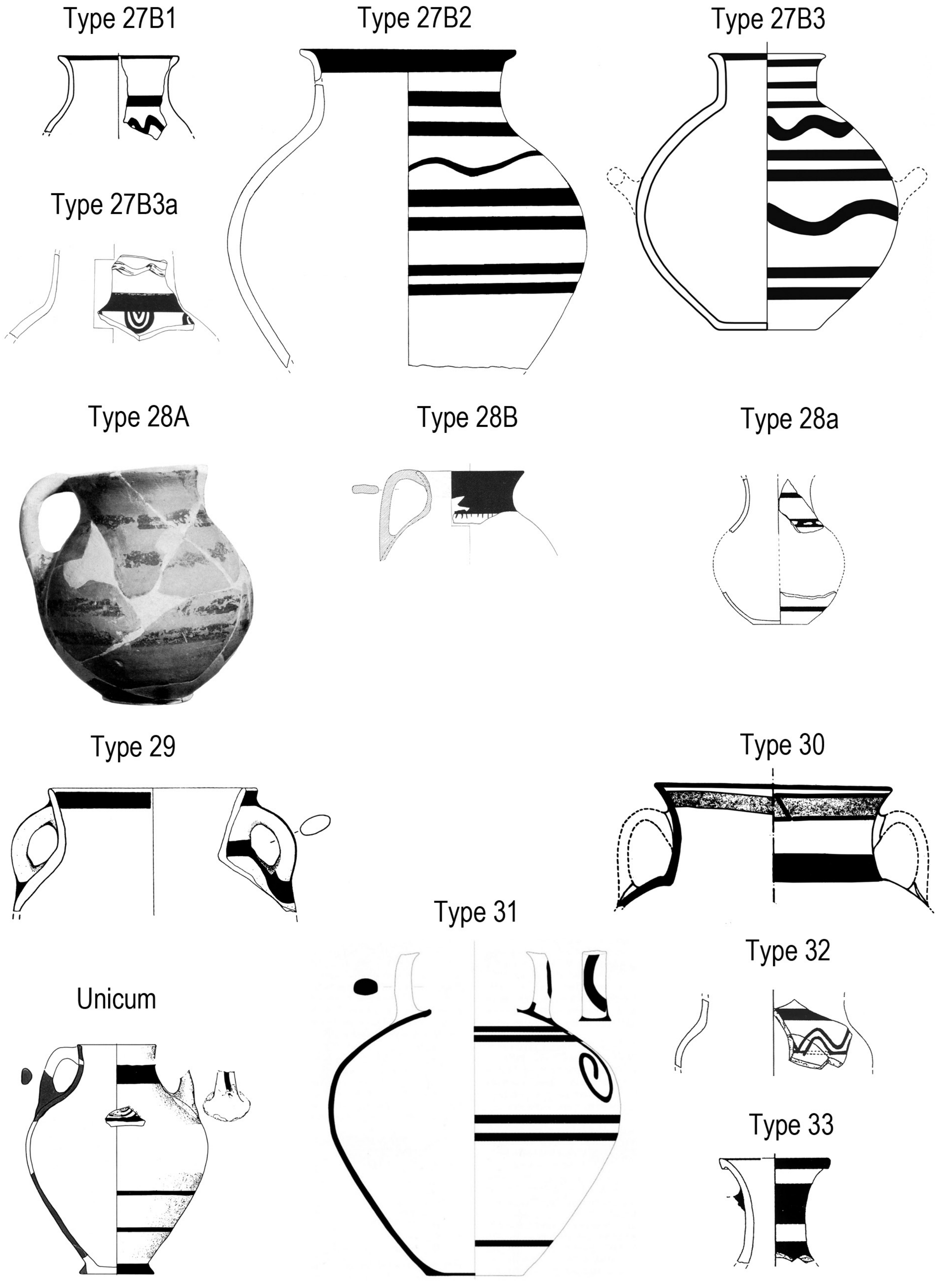


Fig. 6.15. Types of Italo-Myceanaean necked jars, jugs, amphorae, amphoriskoi, lekythoi. 27B1, 27B3a, 28A, 29, 32, 33 (1:4); 27B2, 28B, 30, 31 (1:6); 27B3 (1:3); *unicum* (1:16).

6.2.2. Decorative motifs

	CN	TSS	RO	S.M. Leuca P. Meliso	TC	PP	ST	SV	T	BT	TM	PZ	PON	ROD	CNU	MRO	LUN	TO	JES	ANC	FRA	LOV	FDS	FPA	BOV	MON	ANT
FM 1 Man									T39																		
FM 3 Bull									T39																		
FM 7 Bird									T40	A20?																	
FM17:25 rosette									T38																		
FM 17:23,28							ST24																				
FM 18 Mycenaean III Flower							ST37																				
FM 18:27,28							ST24																				
FM 18B:37,42										A18																	
FM 19:17 Multiple Stem																											
FM 19:26-31																											
FM 19:41,43						PP15																					
FM19:53											TM8																
FM 19:56										BT709																	
FM 42:4 Joining Semicircles									T41																		
FM 43 Isolated Semicircles		TSS12				PP26	ST11-12		T43															FPA1			
FM 43:22								SV3																			
FM43i											TM61																
FM 43p				PM1, PM7,PM29																							
FM 43:34										A9																	
FM 44:2,8 Concentric Arcs			RO47							A35?																	
FM 46 Running Spirals											TM1, TM12,TM73, TM79			ROD1			LUN1, LUN4?			ANC1			FDS1				
FM 46:59	CN7337									A29	TDM1-2							TO7?									
FM 48:5 Quirk											TM2											LOV1+3					
FM48:8											TM44?																
FM48:24											TM11, TM24																
FM 50 Antithetic Spiral pattern						PP3																					
FM 50:29										A47	TM89																
FM50:32											TM6?																
FM 50:32+FM 75			RO101																								

	CN	TSS	RO	S.M. Leuca P. Meliso	TC	PP	ST	SV	T	BT	TM	PZ	PON	ROD	CNU	MRO	LUN	TO	JES	ANC	FRA	LOV	FDS	FPA	BOV	MON	ANT
FM 51:5,6 Stemmed Spiral																	LUN3										
FM 51:21										A25																	
FM 51:23																											
FM 51:27			RO48							A41																	
FM 52:4, 6 Isolated Spiral															CNU1												
FM 53 Wavy Line							ST28	SV3																			
FM 53:4,5										A22																	
FM 53:18	CN2007			PM1		PP8				A16, A36																	
FM 53:19				PM22														TO8									
FM 53:20	CN2002-2003, CN2004		RO151							A32												LOV1+3					
FM 53:21,22	CN2010																	TO9									
FM 53:35				PM14																							
FM53:38									T9																		
FM 57:2 Diaper Net																MRO1											
FM 60 N pattern						PP11																					
FM 61 ZigZag	CN2008		RO33			PP21-22				A43											FRA1					MON1	
FM 61:13						PP24																					
FM61:14												PZ1?															
FM 61A:5 Triangle						PP10																					
FM 62 Tricurved Arch - Net																									BOV1		
FM 64:21,22 Foliate Band						PP4?					TM21																
FM 67:6 Curved Stripes										A50																	
FM 70:1 Scale pattern										BT714																	
FM 70:7											TM70																
FM 72 Tassel pattern																											
FM 72:7				PM8																							
FM 72:13,14				PM2															JES1								
FM 73 Lozenge				PM25					T43									TO12									
FM 74 Triglyph + Half Rosette													PON1														
FM 75 Panelled patterns				PM14			ST45		T38		TM88							TO5									

	CN	TSS	RO	S.M. Leuca P. Meliso	TC	PP	ST	SV	T	BT	TM	PZ	PON	ROD	CNU	MRO	LUN	TO	JES	ANC	FRA	LOV	FDS	FPA	BOV	MON	ANT
FM 75:2						PP4?, PP27				A9																	
FM 75:5,18													PON1														
FM 75:16																											
FM 75:20																											
FM 75:22-38																											
FM 75:26									T40																		
FM 75:27									T43																		
FM 75:10						PP18																					
FM 77:2 Stipple pattern										A3																	
MINOAN																											
FM 62 Tricurved Arch or FM 24 Linked whorl-shell pattern (Minoan version)			RO74																								
Linked fishes			RO55																								
Alternating Arcs					TCA 22					A9, A15, A30, A35?, A37																	
Minoan flower										A1, A8																	
Linked spirals with iris buds										A4																	
Lozenges and loops																											AN17
Concentric semicircles																											AN2, AN7?, AN8, AN30?
Network																											AN31?, AN60
Vertical chevrons																											AN4
Linear	*	*	*		*	*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*
Monochrome			RO282, 353	PM19, PM20, PM24							TM20?																

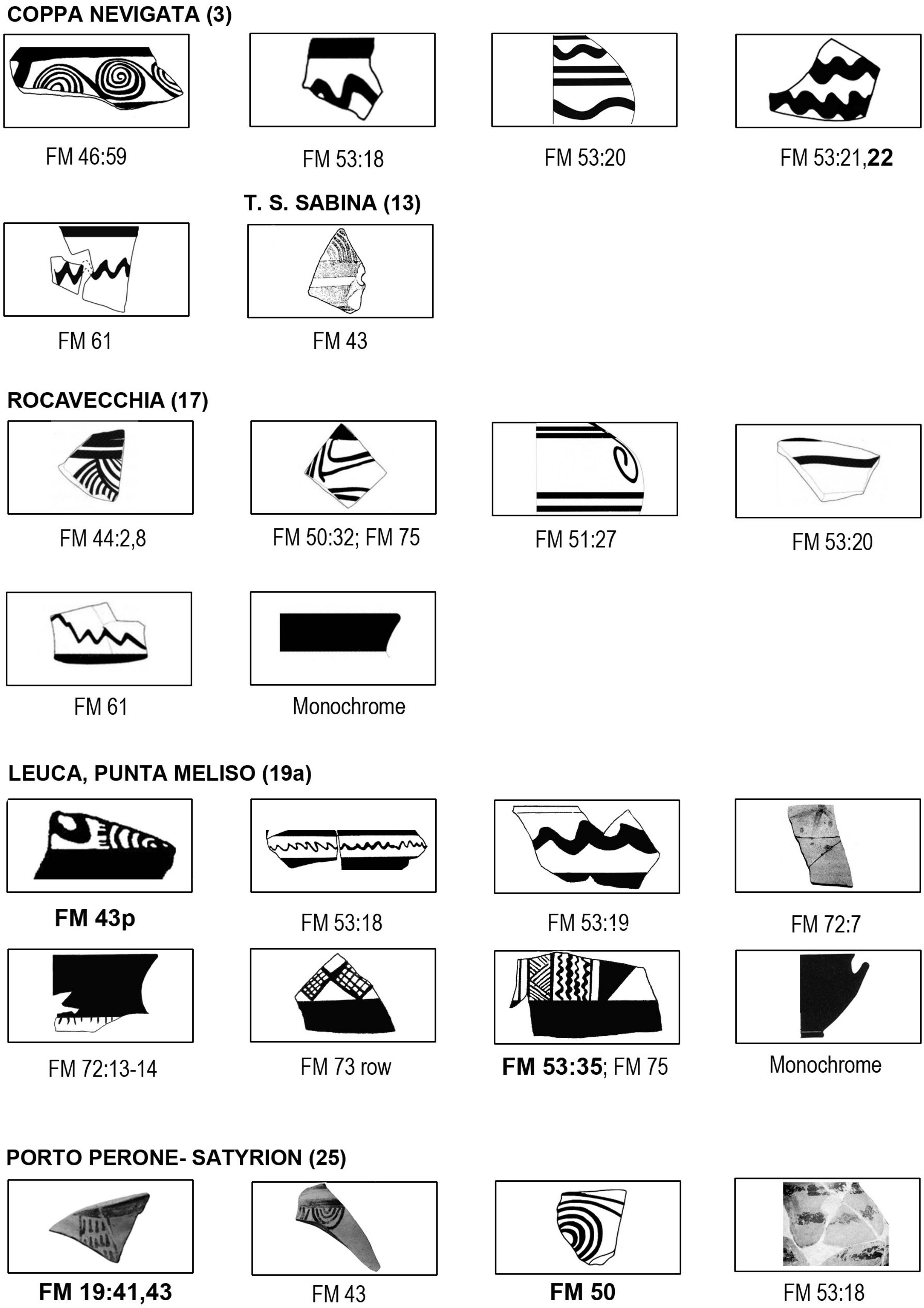


Fig. 6.16. Patterns of decoration of Italo-Mycenaean pottery.

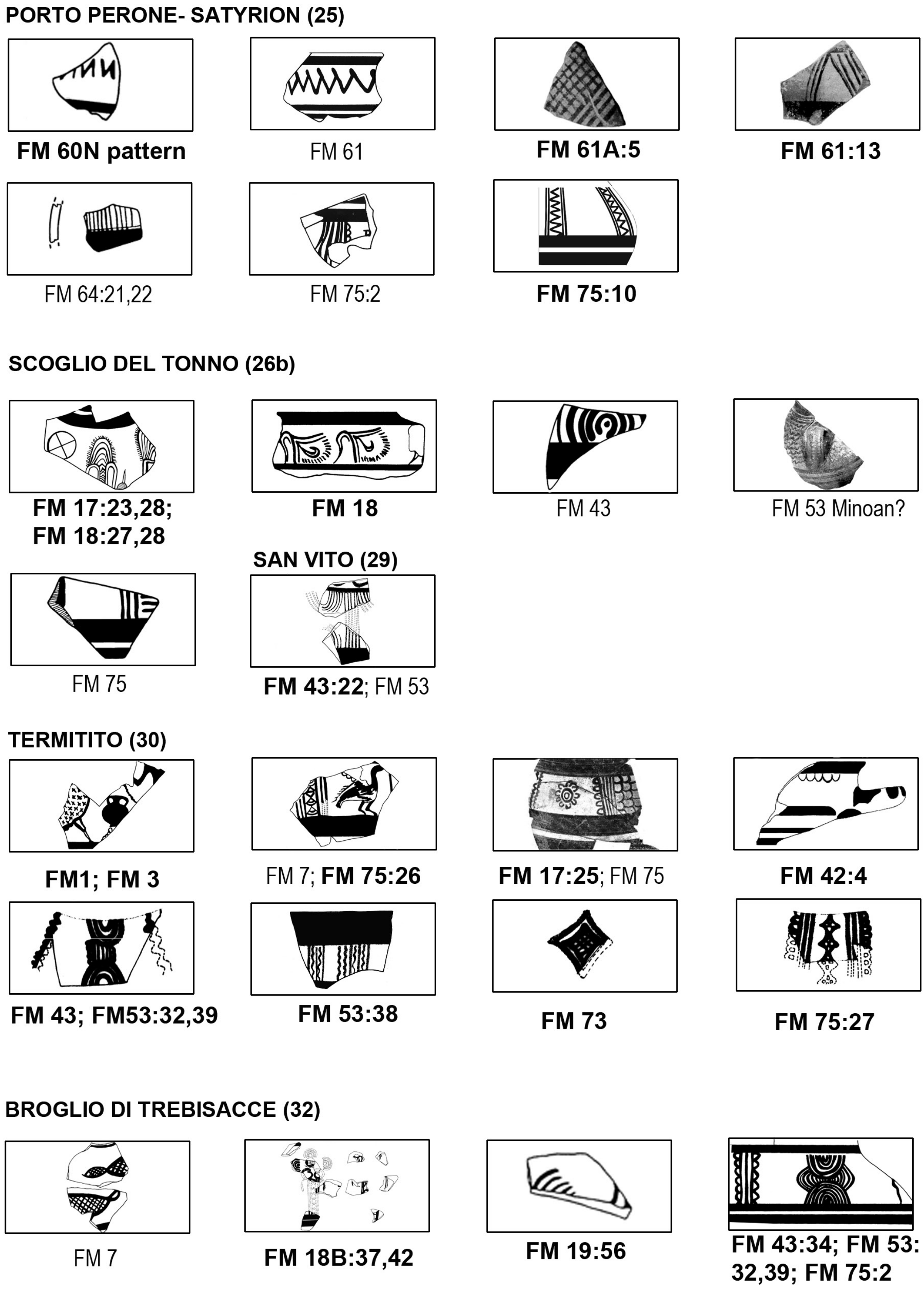


Fig. 6.17. Patterns of decoration of Italo-Mycenaean pottery.

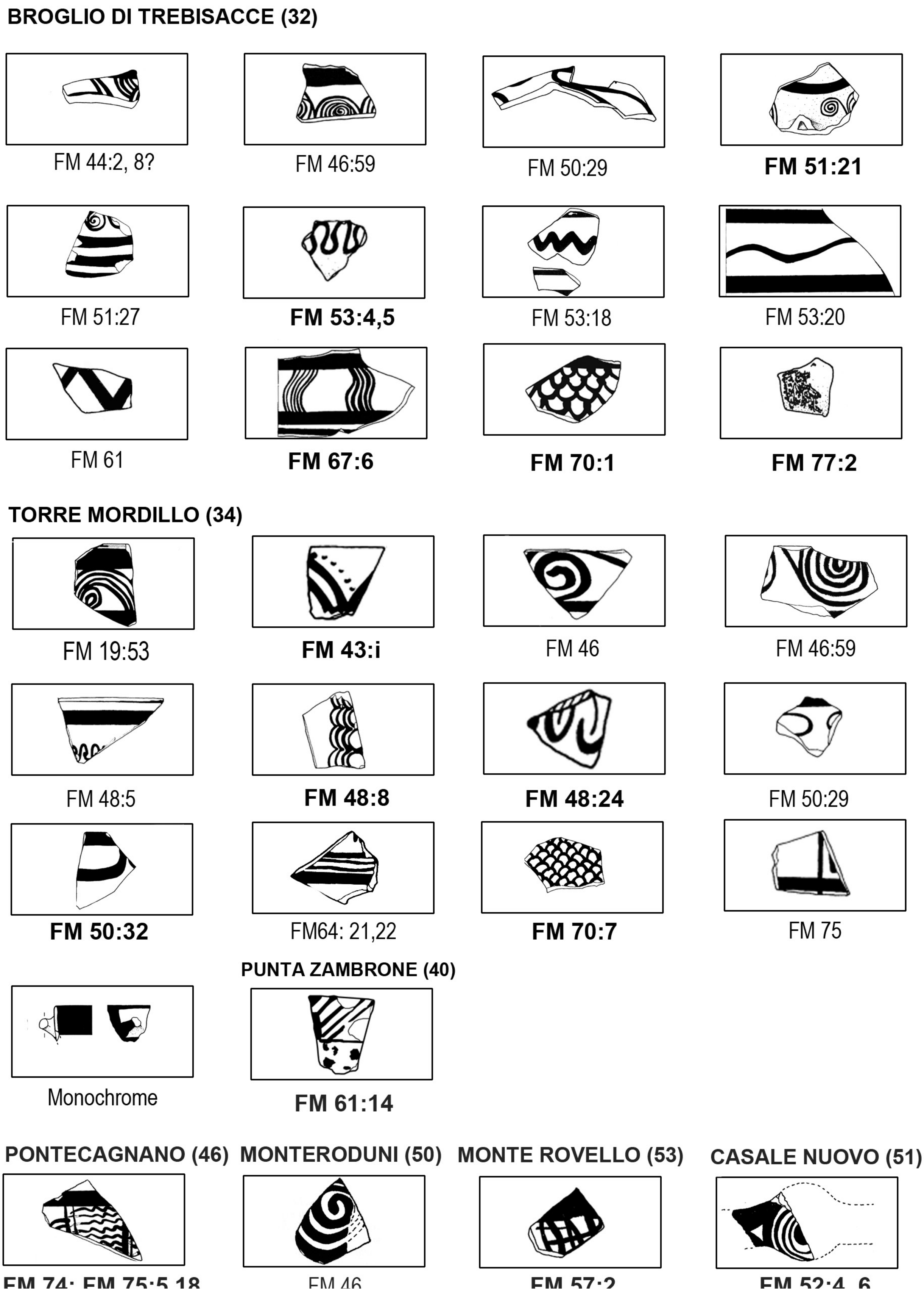


Fig. 6.18. Patterns of decoration of Italo-Mycenaean pottery.

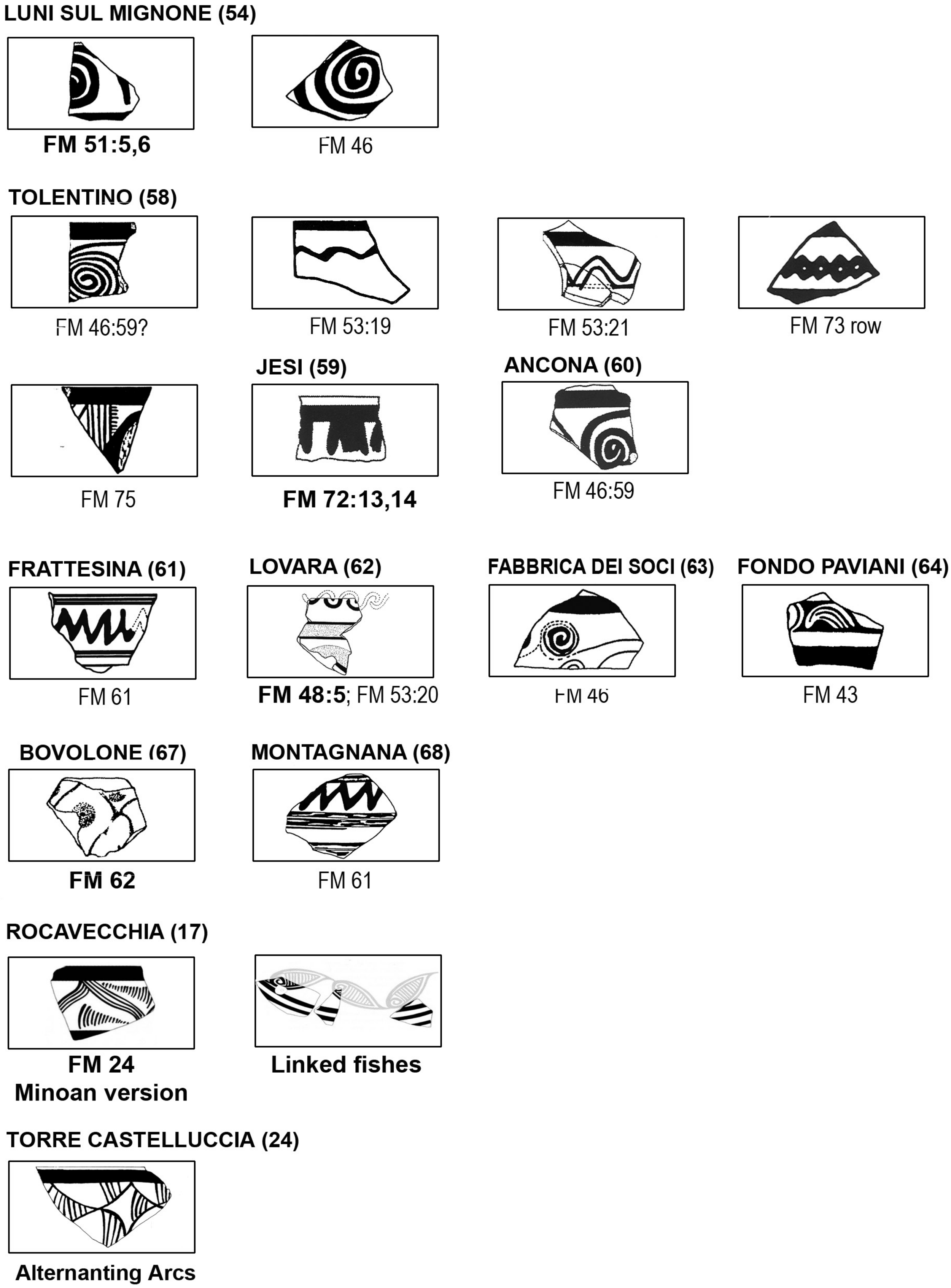


Fig. 6.19. Patterns of decoration of Italo-Mycenaean pottery. Rocavecchia and Torre Castelluccia, Minoan motifs.

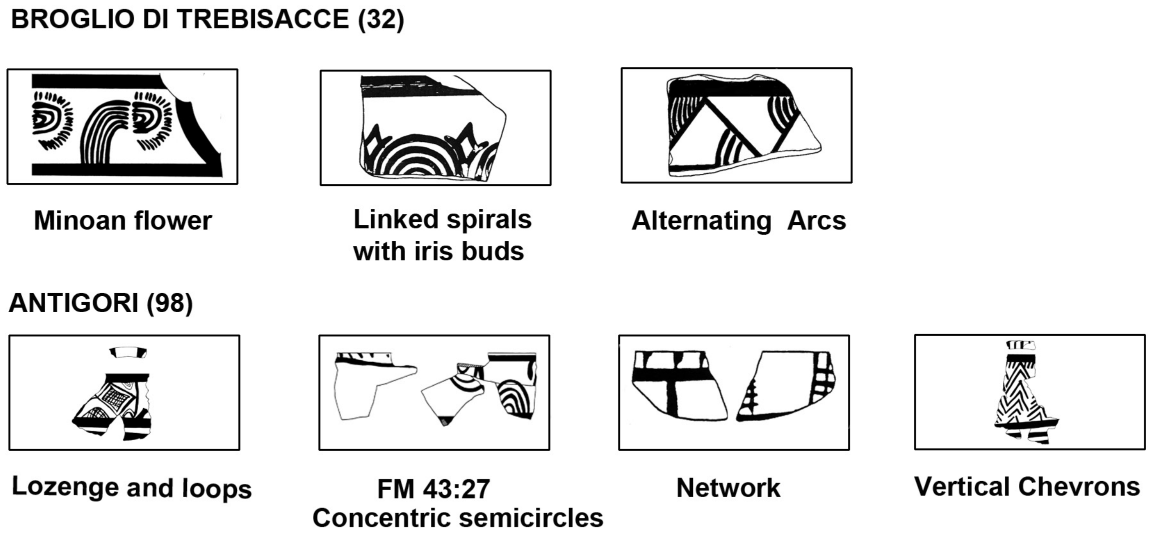


Fig. 6.20. Patterns of decoration of Italo-Mycenaean pottery, Minoan motifs.

6.2.3. Comment

As regards the open shapes, there are both types which are properly Aegean – deep bowls FS 284 or kraters FS 282 – and shapes deriving from the local repertoire, such as some types of rounded bowls or carinated cups (Types 1 and 10-13). Some of these latter shapes appear to characterise only particular areas or sites, for example the rounded bowls that seem to be attested only in the Plain of Sybaris (Type 1). As is known, the carinated cups are widespread also in the Mycenaean ceramic assemblage (FS 240). This typological classification shows that the Italo-Mycenaean carinated cups have a formal variability which coincides perfectly with that of both the local *impasto* as well as the Grey ware types (Bettelli, De Angelis 2002). Thus it is reasonable to consider the Italo-Mycenaean carinated cups as the transposition of a true local form in an exotic technology and style. This observation is further supported by the fact that, while the different types of carinated cup are widely distributed, in terms of decoration it is possible to detect purely local choices. For instance, at Broglio linear decoration is preferred (Types 10B, 11, 12a), while at Rocavecchia the monochrome decoration or some motif on the upper zone of the wall (Types 10A, 11a) seems prevalent. There are also more widespread types, such as the little carinated cups with sharp carina and everted wall, usually decorated with FM 61 zig-zag (Type 13). It is also important to stress that these cups are absent in those regions, such as Sardinia, where this form is not attested in the traditional local ceramic repertoire.

Looking in more detail at the Aegean shapes, some of them seem to be produced only in certain areas, such as mugs in the Plain of Sybaris (Type 14). Even kylikes do not appear too widespread: at Termitito there is a peculiar version with horizontal handles (Type 15); very few specimens are attested at Broglio, probably local but not confirmed by analysis. Regarding the different versions of deep bowls FS 284, we note that there is much variability in shape, but only in some cases does this correspond to local preferences. This is the case of bowls with biconical body, apparently attested only at Santa Maria di Leuca-Punta Meliso (Type 2) or bowls with wide, distinct, everted rim which may be typical of Termitito (Type 5). A version with vertical walls and a slightly concave profile appears to be most commonly attested in the Plain of Sybaris and possibly at Termitito (Type 3). Of course this formal variability can also include a chronological dimension given that the specimens at Termitito date to LH IIIB2 or IIIC early, while those at Santa Maria di Leuca-Punta Meliso are LH IIIC late. In these cases, decorative choices seem to be less important in characterising single centres, although one exception is Antigori, where in these and other open shapes the rim is always decorated with vertical strokes, a decoration very rare elsewhere (Ferrarese Ceruti *et al.* 1987, 19-20) .

The situation is different for certain types of cups, for which a Cretan influence is easily detectable both in shape and decoration. These types are distributed from the southern Adriatic and Ionian arc to Sardinia and cover a rather long time span. The oldest is represented by a cup from Rocavecchia **RO74** (Type 8A) which reproduces Cretan prototypes dated to LM IIIA. To the same type belongs Torre Castelluccia **TCA22**, easily datable to LM IIIB and also quite faithful to Aegean models. In this series can also be mentioned a number of examples from Antigori, but less accurately from a technological point of view. This diversity in assimilation and reproduction of the same model at different sites or areas in Italy also accounts for the variability in the transmission of style and technology from Crete. The Cretan influence in Italo-Mycenaean production at Antigori is also reflected in the adoption of particular shapes of deep bowls or small kraters popular on the island (Watrous 1992, fig. 56:1482; Hallager, Hallager 2000, pls. 37:70-P0153, 41:71-P0947; Rutter, Van de Moortel 2006, Pl. 3.62:56f/1); also in this case with the rim decorated with vertical strokes, according to the style developed at this Nuragic centre.

Elsewhere are present kraters closer to shapes typical of mainland Greece, as is the case at Santa Maria di Leuca-Punta Meliso where such a shape is well represented in FS 282 (Type 19). Two open shapes from Termitito, not included in the present typology because of the incomplete state of their preservation (**T39**, **T40**), can be classified as large deep bowls or small kraters, both decorated with pictorial scenes of a certain conceptual complexity (Vagnetti 2000-01). The local production and the wide distribution of these containers, medium to large in size, suitable for collective consumption and probably ceremonial in nature, may have important socio-cultural implications. It reinforces the idea that this specialised ceramic production of exotic ancestry may have been directed towards *élite* members of local communities.

Closed shapes account for both storage/transport pottery and tableware. Among the former (Types 21-24) their fragmentary state prevents a more precise classification. Tableware is very well attested everywhere with a high degree of typological variability. There are types of closed vessels reproducing very closely those of the Aegean repertoire (Types 26, 31, 33), as well as types which are possibly the result of local innovation such as necked vessels which are especially widespread in the Plain of Sybaris (Type 27, divided into several varieties). As already stressed, although this shape demonstrates Cretan influence both in shape and decoration, a role played by the local tradition in the development of this form cannot be excluded. In the present state of knowledge it is important to observe that, while some varieties seem to have a limited circulation in the Plain of Sybaris, others have a wider distribution, as is the case of necked jars, sometimes decorated with a horizontal or wavy line in the middle of the neck (Types 27B1, B2, B3); in several examples of these varieties the wavy line is also used as the main decoration on the body.

The presence of specific motifs can be detected at certain sites which may argue for the existence of local styles. For instance, at Coppa Nevigata FM 61 zig-zag and various versions of FM 53 wavy line are well attested; at Termitito the decoration is very often organised within different versions of FM 75, and a local pictorial style seems well developed. Mention has already been made of the preference for linear decorations on open shapes at Broglio, even on carinated cups, and the systematic use of painted strokes on lips of open shapes at Antigori.

Returning to the issue of Minoan influence on Italo-Mycenaean pottery, variability in the acceptance of Late Minoan decorative motifs can be observed. Chronological variability apart, as in the case of the cup from Rocavecchia (**RO74**), which is probably the earliest local product in LM style, major differences can be observed between the ceramics from Broglio and Antigori. At both sites Minoan-type pottery was locally produced, yet at each site one can detect specific local preference in terms of decoration.

The taste for certain decorative motifs, either Late Minoan or Mycenaean, seem to characterise only those sites having an extended local production, while sites with a majority or a large presence of imports show greater variability in the style of local productions; Antigori, as we have seen, may represent an exception.

6.3. Implications

Having assessed the results that have derived specifically from the present study, this chapter needs now to consider some of the issues, listed (a) to (d) below, that have been raised in the course of recent studies dealing with interconnections between different components of the Mediterranean during late prehistory. Notwithstanding the enormous attention that this topic has attracted and continues to attract, a number of these issues remain controversial and/or intractable, whether they apply to the East or Central Mediterranean, or both. In this discussion which naturally focuses on the Central Mediterranean, awareness of the corresponding situation in the east will surely be valuable (Balensi *et al.* 2004). To enter the discussion, two well-known but fundamental points can be kept in mind: one is the timescale spanning the earliest Aegean contact with Italy to the end of the Italian Bronze Age, a period of at least half a millennium. This point is simply made as a corrective to any temptation to treat Aegean/East Mediterranean contact with Italy as a single chronological phenomenon. The other is the large physical size of the Central Mediterranean – peninsular Italy, Sardinia and Sicily – which cannot be treated as a single, let alone a uniform cultural unit. It is not possible to make over-arching generalisations. A further matter is a reminder of the present authors' decision to adopt the term Italo-Mycenaean to describe the decorated pottery made in Italy in Aegean style (see Foreword).

a. Structure of Italian society

b. Mycenaean traders

c. Chronological reconstruction

d. Pottery making in Italy
- Technology transfer
- Style
- Other mixed Italian products
- The outcomes of technology transfer

a. Structure of Italian society

The beginning of the establishment of ongoing relations between the Aegean and the Central Mediterranean can easily be dated to a period in which we can see not only a sort of gestational phase for the palatial civilisation of mainland Greece, but also a new historical cycle characterised by both its exceptional duration and the diverse developments seen in the Italian peninsula until the dawn of the Iron Age. The intent of this observation is not to allude to some fatal coincidence, but rather to highlight how, both in the Central Mediterranean and in certain areas of the Aegean world, new players and new socio-economic factors were being formed during more or less the same period. The economic demands and strategies of the new Mycenaean society could now find interlocutors in the stable communities to be found in the vast areas of the Italian peninsula and its islands. The local communities were well-structured and enjoyed an organic relationship with the territories which yielded the resources systematically exploited by their inhabitants (Peroni 1996, 3-43). Many fortified sites of south-eastern Italy, such as Coppa Nevigata, Rocavecchia, Torre Mordillo, and Broglio di Trebisacce, begin their cycle of life in this period.

Starting from the MBA, we can observe a certain 'regionalism' in terms of archaeological 'cultures'. There is the main, well-known difference between Palafitte-Terramare in the Po Valley and Protoapennine and Apennine aspects of peninsular Italy. However, the apparent cultural uniformity of the Apennine pottery style, widespread from regions south of the Po Valley to Calabria at the end of the MBA, shows a number of regional characterisations (Macchiarola 1995). Furthermore, during the last phase of the MBA in Apulia it is possible to observe the rise of a local pottery style very different from the Apennine one (Recchia 2010). Of course it is not possible to interpret this difference in material culture as clear evidence for differences in such other aspects of culture as economic or socio-political organisation. From the MBA onwards an almost generalised emergence of naturally or artificially fortified settlements is attested. The evidence from necropoleis of this period, in northern as well as southern Italy, converges towards the increasing competition among kinship groups and the early formation of social *élites* within the local communities, even if it is not yet clear at which levels of social stratification and organisation they were (Peroni 1999; Vanzetti 1999; 2002; Cupitò, Leonardi 2005; Cardarelli *et al*. 2006; Cupitò 2006; Cazzella 2010).

The so-called Subapennine facies of the RBA also shows much regional differentiation (Damiani 2010). During the 12th century cultural differences within mainland Italy became more apparent, at least in terms of pottery styles. The end of the Terramare around the end of 13th century may have caused people to move south, as evidenced, for example, by certain features of material culture at Afragola and Rocavecchia that are similar to Terramare (Bettelli 2008; Cardarelli 2009; Bettelli *et al.* in press). In this period a strong difference between the Adriatic and the Tyrrhenian sides is evident, but also among the Tyrrhenian communities it is possible to observe local developments, as in the case of the Middle-Tyrrhenian coast (Damiani 2010). The most important fortified settlements of the previous period continue their life, and they flourish in many cases. In the Po Plain it is possible to see an increase in population and settlements starting from the MBA, with the formation of complex landscapes of power and the emergence of central places (Balista, De Guio 1997; Di Renzoni 2006; Cupitò, Leonardi 2010). Even after the fall of the Terramare system south of the River Po, this settlement organisation continues and develops in the Veneto region, up to the foundation of the big centres of Frattesina and Montagnana (Bietti Sestieri 1997, 2008, 2010).

In large areas of peninsular Italy from the Middle to the Final Bronze Age a process of selection and concentration of settlements develops. This is evident in southern Etruria, where local communities adopt a system of settlement on large plateaus up to 15 hectares in area, very well defended. An analogous system also characterised the communities in the Plain of Sybaris. In both regions there was a process of selection and concentration of settlements, with the emergence of central places, even though this process had different results in the two regions in the EIA. Local developments apart, it is possible to outline some common aspects. There is a clear tendency to occupy fortified settlements; whether they were also 'seats of power' where social *élites* lived is under discussion. It is possible to note the same emerging groups in the cemeteries starting from the MBA (see above). In the LBA, when the rite of cremation spread, it is worth emphasising the use of different funerary rituals in the same communities, possibly to be linked to different social groups, as in the case of Torre Castelluccia (Gorgoglione 2002b; Vanzetti 2002). One of the most relevant points is the continuity of settlement in the majority of the areas studied, and, even in the regions where major changes happened, they led to more complex levels of socio-political and socio-economic organisation.

The complex societies on Sardinia and Sicily evolved separately and differently from each other as well as from the mainland, and those differences are reflected very adequately in the ceramics. On both islands the ceramic repertoire is stylistically well characterised and defined, with shapes and decoration very different from peninsular Italy. About Sardinia, scholars debate the evolution of Nuragic society in the Bronze Age (Lilliu 1982, 1988; Lo Schiavo 1981; Lo Schiavo *et. al* 2004; Perra 2009, with bibliography). The models proposed range from an egalitarian view to a more differentiated and ranked society. An increasing complexity in the territorial organisation can be observed with the establishment of a settlement hierarchy during the RBA. It is also important to stress in the same period the development of architectural models and technologies and specialised craft production, especially in metallurgy. All these elements, together with the promotion and management of long-distance exchanges not only with the eastern Mediterranean (i.e. the Iberian Peninsula), speak in favour of a well organised society probably with specific systems of internal ranking, despite the apparent uniformity displayed in the funerary rituals, starting at least from the RBA.

Sicily and the Aeolian Islands are very much connected in the early stages of the Bronze Age until the RBA, when the Tyrrhenian archipelago and northern Sicily become more closely related to the Italian peninsula. The history of research on the island, especially regarding the territorial organisation and its development over time, does not allow an accurate outline in this field. Nevertheless, it is possible to see the establishment of a number of relevant coastal sites, starting from the MBA (Albanese Procelli *et al.* 2004; Tusa 2004; Nicoletti, Tusa 2012; Martinelli *et al.* 2012). Some of them, located in the southern and eastern sides of the island, managed long-distance trade with the Aegean, the Levant and also Sardinia. They show a high degree of skill in architectural features related to Aegean or Levantine models, as in the case of Thapsos. Even the tomb architecture and the funerary rituals of the Thapsos *facies* seem, to some extent, influenced by their Mycenaean counterparts (Bietti Sestieri 1997a; Alberti, Bettelli 2005; Procelli *et al.* 2004). In Sicily, differently from the peninsula and Sardinia, a large number of Aegean vases are part of the funerary goods. This could signify a major degree of acculturation on the part of the local communities, which was probably operating only at the *élite* level (Bietti Sestieri 1988, 1997a). In the subsequent phase (RBA-early FBA), the continuity of contacts with the Aegean is not witnessed by an abundance of imported ceramics. At the emergence of relevant inland centres, such as Pantalica (Tusa 2004), a hierarchical organisation of settlements is probable, with central places and a network of minor centres around them (Bietti Sestieri 1997a). The continuity of contacts with the Aegean becomes more random and changes in nature. A number of pottery shapes closely imitate Aegean prototypes, and the use of the potter's wheel is adopted for the production of local *impasto* fabrics (Bietti Sestieri 1988, 1997a; Tanasi 2004, 2005; Nicoletti, Tusa 2012, 119). All this evidence, together with the well-known *anaktoron* at Pantalica, points towards the existence of a well differentiated and probably ranked society in the Sicilian Middle and Late Bronze Age (Bietti Sestieri 1997a).

The concept of an *élite* class was already in place throughout peninsular and insular Italy by the time of the first contacts with the Aegean. Society then was already in a state of some flux when Aegean contacts became well established in LH IIIA. The impact of the arrival of traders and other groups from the east was probably considerable, if very localised, but rather than being a cause of societal change it helped to catalyse the change which occurred in a localised, perhaps even undramatic manner. That change had a number of facets that included infrastructure. The arrival of Aegean people did not in itself create the need for changes in agriculture, such as the introduction of the olive and vine which was already taking place, but the presence of Aegean craftsman, conveniently and opportunely, facilitated that adoption by making available the technology for making large storage jars. In essence, Italy was becoming more receptive to outside influence, but the way it manifested that 'receptivity' varied considerably over space and time.

Regarding the perception of Mycenaean pottery in Italy, Sherratt (1999) is surely right that this pottery was exploiting a rather different set of values from those in the Mycenaean homeland, unlike the corresponding situation of Mycenaean Pictorial Style's export eastwards to "a society with common values and expectations". Thus in Italy Mycenaean pots were perceived as coming from a distant and exotic world. It is possible that local people understood the socio-cultural and socio-political imbalance with the groups of foreigners, and associated the new pots with a sophisticated lifestyle that included the wine drinking ritual (Sherratt 1999, 194). The *élites* of Italy were attracted to Mycenaean pottery; its status was partly associated with the arrival via long-distance contact of new ritual behaviour patterns. But, in marked contrast with the comparable situation in Egypt and the Levant in LH IIIA-B, it was also connected with owning something made with a new technology.

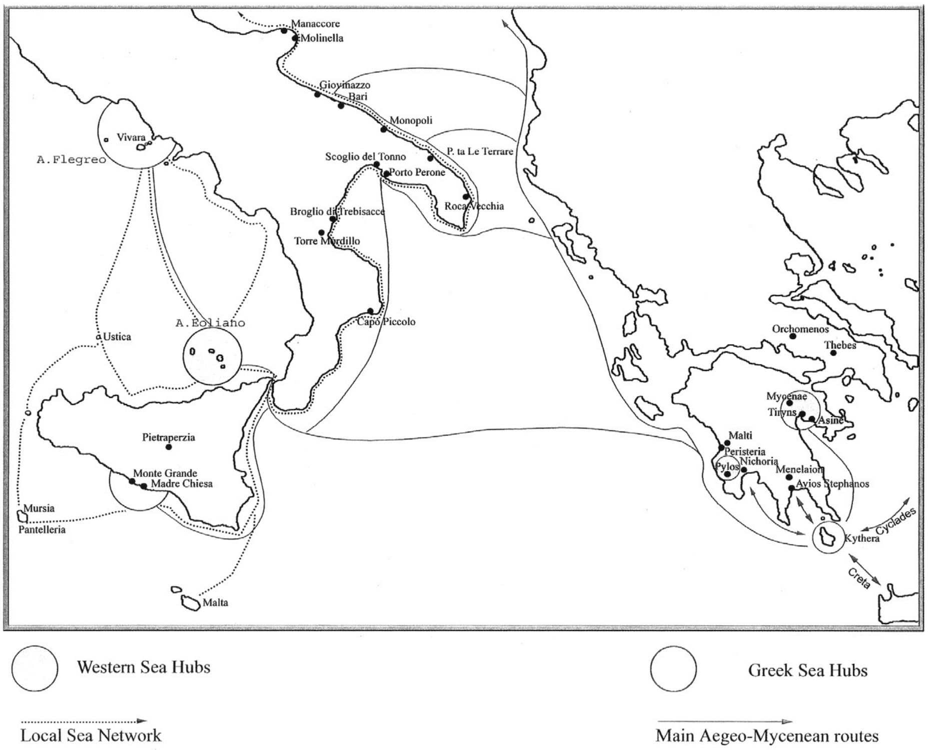


Fig. 6.6a. Sea routes in late MH-LH I proposed by Marazzi, Tusa (2005, pl cxlii).

b. Mycenaean (or Aegean?) traders

Occasional trading ventures probably reached the lower Tyrrhenian archipelagos (Aeolian and Phlegrean) of southern Italy and southern Sicily during the later MH/LH I period. Contact with south-eastern Italy (mainly Apulia) also occurred but it was apparently more sporadic and small scale. The former route involved traversing the 500 km of sea from the west coast of the Peloponnese to the east coast of Sicily or more circuitously 200 km up the west coast from the Patras region to Corfu, 100 km of open sea to the first land fall in Apulia and from there down the coast to the Straits of Messina (Fig. 6.6a).

The object of the exchange at this early time, although not yet understood, may be linked to the search for strategic raw materials such as metals by the emerging Mycenaean warrior *élites*. This need is well documented by the sharp increase of metal weapons in the shaft graves at Mycenae and other centres, but it does not necessarily imply a direct involvement of the aristocracies in the organization of the trade. In exchange we may speculate the Mycenaeans brought decorated pottery (the open shapes being a product of value in their own right, and the closed shapes carrying a desired product such as an oil), and plain storage vessels carrying some precoius commodity. The interest towards the Central Mediterranean was probably due to intense Minoan presence at this time in the eastern Mediterranean. However, the main metalliferous areas in Italy (such as Tuscany[1] and Sardinia) do not show any evidence of Mycenaean presence at that time, nor is there any lead isotope data for LH I-II Mycenaean bronzes from Aegean contexts which is consistent with a Tuscan or Sardinian copper

[1] Pearce (2000) makes the interesting point that cassiterite, tin oxide, is present in the metalliferous region of Tuscany but again there is a lack of archaeometallurgical evidence for its extraction at that time. In this regard, Valera and Valera (2003) propose the possible use of tin from Tuscany for some tin scraps from the Nuragic sanctuary at Villagrande, of uncertain dating between the RBA and EIA.

source (Stos-Gale 2000). Instead, the volcanic archipelagos and the raw materials associated with them such as alum and sulphur may have attracted those who led the early ventures into the Central Mediterranean; these archipelagos represented an environment to some extent familiar to Aegean sailors (Bietti Sestieri 1988), allowing navigation by constant reference to visible land.

Regarding the potentially desired functions/properties of the minerals, alum and sulphur, the ability of the latter to act as a fumigant was surely appreciated at the time of which Homer was writing: in the *Odyssey*, following the killing of Melanthius, Odysseus had his house fumigated and purified with sulphur (Book XXII, 481). Associated with sulphur as an efflorescence in fumaroles is alum, a white mineral, whose major role in later antiquity in the tanning and textile industries is well known (Pliny Book XXXV, 183-190) but whether those functions extended to prehistory either in Italy or in the Aegean, although likely, are not confirmed. In drawing attention to the term *tu-ru-pte-ri-ja* appearing as an item of exchange in a few Linear B tablets, notably two from Pylos **PY Un 443** and **PY An 35** which seemed to concern the exchange of this material, Perna (2005) equated *tu-ru-pte-ri-ja* with alum. But it is the association of that term with *styptiria* that links alum/alunite to its medical function as an astringent. In the Aegean the prime source was undoubtedly Melos as the geoarchaeological investigations of Photos-Jones and Hall (in press) have shown. A case can be advanced for supposing that the multiple beneficial properties of alum/alunite would have been known in prehistory, especially on Melos where cuts from using obsidian blades would have been remedied with alum, that mineral being a general band aid!

The problem is the invisibility of alum and sulphur in the archaeological record, owing to their solubility. Nevertheless, the proposal can be entertained that the Mycenaeans' access to both minerals on Melos was restricted in LH I-II as the island at that time lay very much within a Minoan orbit. That led Mycenaeans to locate alternative sources which, more by chance than by design, they came across in the course of exploratory journeys, even journeys of adventure, to the West. In the Aeolian Islands, where sulphur and alum can best be seen today in the fumarole at 'La Pozza dei Fanghi' on the island of Vulcano, and in the Phlegrean fields in the Bay of Naples they encountered plentiful and high quality deposits of these minerals.[2] But as access to the source closer to home, that is, Melos, became available after the Thera eruption so the need to maintain the supply line with the West became progressively less important.

The presence of sulphur, but significantly not alum, at Monte Grande on the south coast of Sicily is potentially important in this discussion, yet any proposal that it was exploited by Aegean or other traders is problematic. First, the current archaeological evidence points to its exploitation much later in time, and second the inhospitable coastline and lack of any secure harborage near Monte Grande would not have aided the transferring of the quarried/mined mineral to a ship. Third, there is the potential difficulty that Aegean contact with southern Sicily may have ended at the start of LH I (Militello 2005, 588) just at the time of the Theran eruption, although it resumed in some form in LH IIIB further along the coast at Cannatello.

A mineral that surely was exploited on Sicily from the Eneolithic onwards was amber (simetite) found south of Catania, but, as Cultraro (2007) has shown, despite its vivid red colour it was the poor relation of Baltic amber and was exported very little outside the island. The two amber sources' chemical differentiation (by gas chromatography) allowed Beck *et al.* (2003) to separate the two simetite beads from the very large majority of Baltic amber beads found in LH I-II tholos tombs in Messenia.

In LH IIIA-B there was a marked increase in the level of Aegean contact with the West. The Mycenaeans were operating in the West in different modes, some new and others that were a continuation of the previous period. Mycenaeans alone were no doubt responsible for some trade

[2] See also on this issue La Rosa 2005, 577.

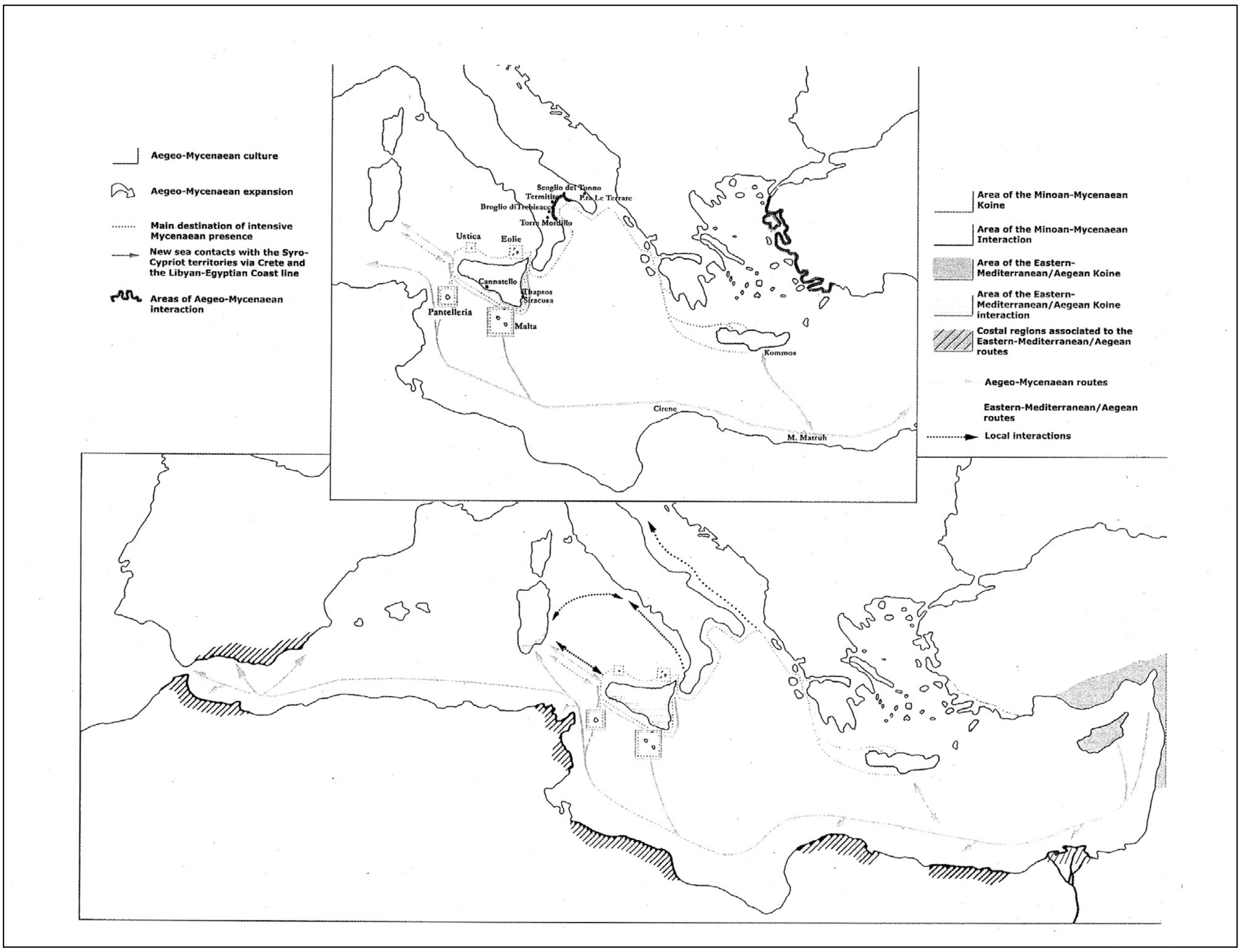


Fig. 6.6b. Sea routes according to Marazzi, Tusa (2005, pl. cxlviii) during the 14th century BC.

activity, but there is a distinct Minoan element to some Aegean presence in Italy. And it is now generally acknowledged that a broader eastern Mediterranean effort, dominated by Cypriots, was in operation which, by LH IIIB, was an aspect of the 'international era' linking the Central and East Mediterranean. The maritime routes at this time, graphically visualised in Fig. 6.6b, consist of a combination of those that followed the coast where possible – *cabottage* – and those involving stretches of open sea, for instance from Sicily to Sardinia as well as the 100 km crossing from Corfu to Apulia. The former were surely the norm, the latter only carried out 'in season'. This south Adriatic route is under discussion because of the apparent lack of Mycenaean presence in coastal Albania and also on Corfu (Onnis 2008; Souyoudzoglou Haywood 1999, 11-13). However, the abundance of pottery of Middle Helladic tradition in many MBA contexts of Adriatic Apulia (i.e. Bari, Giovinazzo, Monopoli, Egnazia, Rocavecchia) and the scarcity of Mycenaean lustrous ware dating to the early phases of LH make it likely that a connection between these sites and regions in western Greece were not yet 'Mycenaeanised' at that time.

These different levels of involvement in trade have important consequences because they force a rethink about who in the Aegean had control over the exchange missions and what their motives were. We accept that the palatial economy of the Aegean which began in LH IIIA surely played a role but did not fully control long-distance trade activities. The situation is complicated: the palaces were not all operating in unison, in fact they may have been acting unilaterally; Mycenaean trade was not entirely in private hands, but the palatial economy had devolved some responsibility for procuring goods and materials to the private sector. We concur with Blake's statement (2008, 8): "Overall, a more complex interaction between palatial and non-palatial sectors of the economy is posited, with varied modes of production in effect for different categories of materials, along with a more circumscribed, though none the less significant, economic role for the palaces overall".

Within the frequently multi-national cargo going westward were Mycenaean pots whose type/function have been discussed above and which were acquired for their own intrinsic value. Other possible export goods were organic and have not survived: textiles, luxury foodstuffs and wine. In exchange, the first candidate are metals: notwithstanding the undoubted potential attraction of Sardinian copper ores becoming available at this time as well as the enigmatic Cypro-Sardinian connection (Lo Schiavo *et al.* 2009), there is negligible convincing evidence that Mycenaean presence in Italy was motivated by gaining access to copper or other metal ores. Lead isotope analysis of LH III bronzes from Aegean contexts have failed to identify any that were made of Sardinian or even Tuscan copper[3] (Stos-Gale 2000), if we exclude a foliate-bow fibula, possibly of Italian type, from Chania (Stos-Gale *et al.* 2000; Bettelli 2009, 99). Instead we are forced back to organic goods which have not survived; sulphur and alum, which were candidates in the earlier period, should no longer be so because of their potential availability closer to home on Melos. This assessment may be dispiriting but it does temper our estimate of the level of Aegean contact in Italy. Whatever the products were, they and artisans were circulating in different ways, not necessarily overlapping. For instance, in the Plain of Sybaris it is possible to observe a deep influence of LM III styles in the Italo-Mycenaean production, both in vase shapes and decoration, but the few imports do not show the same link with Late Minoan Crete. In LH IIIC, after the collapse of the Mycenaean palaces, exchange between the Aegean and the Central Mediterranean continues. Imports are distributed throughout Italy, and some new and peripheral areas are involved, such as Rhodes.

c. Chronological reconstruction

Phase 1 (LH I-II)
During this phase, traders from the Aegean made occasional ventures to the Central Mediterranean probably in connection with the search on the part of the emerging Mycenaean warrior *élites* for strategic raw materials. Notwithstanding the difficulty in identifying the nature of those materials, the level of Aegean contact with the West, based on the ceramic evidence, was on a very small scale. How those commercial ventures were initiated and by whom is not known.

Phase 2 (LH IIIA-B) The increase in the level of Aegean contact with the West in LH IIIA-B was introduced in the previous section (b). While this increase represented a marked expansion of activity by comparison with the previous period, the contact was still modest in scale, even if in some cases it is possible to see a specific trend in imported goods, such as at Scoglio del Tonno (see 6.1). This can reflect two complementary issues:

- First, as already explained, the Aegean was not a uniform, monolithic state which had an over-riding need for contact with Italy in order to gain supplies of a vital commodity. Instead there were groups or regions within the Aegean who saw exchange opportunities with Italy, and they made their own arrangements; they made perhaps personal contact with particular settlements in particular locations in Italy. The emphasis then is on small rather specific networks of connections, some of which would have made use of centralised facilities at *emporia* (see below).

[3] On the other hand, the point mentioned in the section above on LH I-II about the presence of cassiterite in Tuscany may still stand.

Conversely it can be accepted that some districts or regions, certainly in inland Italy, had very little, if any contact with Mycenaean 'things' or people.

- Second, the consumers in Italy were not passive recipients, rather they had their own tastes, demands and expectations; some of these were shared across much of coastal Italy, but others were culturally and spatially specific. As traders or craftsmen, Mycenaeans who had contact with the consumers had some understanding of that diversity of response of local people to foreign goods and people. Those Mycenaeans were able to identify and follow up the opportunities for themselves, and as such Mycenaeans were actors, more by chance than design, in the social transformations taking place in the Italian LBA.

The pattern of distribution of Aegean products had changed from the previous period; on the one hand they were now reaching new areas such as Sardinia, Basilicata and Calabria, on the other they were tending to concentrate at a few 'gateway' locations or *emporia*, of which Rocavecchia, Scoglio del Tonno, Thapsos and Antigori are the most well-known examples. And a new class of location for imports was emerging that reflected the dynamics of connectivity at this time: the LH IIIB fortified site of Cannatello in southern Sicily, located away from the coast and containing storage space where Mycenaean, Cypriot, Sardinian and Maltese imports were found. Here the sense is that Mycenaean pots were present as part of a package, not requisitioned alone or in their own right. But this need not argue that Mycenaean contact was at a minimalist level, as Blake (2008) sees it, for the very good reason of the phenomenon of Italo-Mycenaean, in effect the other side of the coin. More to the point is the nature of Aegean presence in this period: was it transient, seasonal or permanent? The simple answer is that all three applied; we can suppose that some traders were entirely transient, some craftsmen and other traders were seasonally present, and it is not unreasonable to propose that *emporia* and centres like Broglio di Trebisacce included a small, more permanent foreign element in their populations. In any case, as Vagnetti (1999) has shown at this site, *continuity* of contact seems to have been maintained because of the way the Italo-Mycenaean at Broglio followed the changes in style that were occurring in the Aegean from LH IIIA to C. Overall, the point comes across again and again: there are few generalities, each occurrence of imports reflects a specific set of circumstances.

Phase 3 (LH IIIC) The involvement in the Central Mediterranean was no longer linked to the interests of the palaces' *élites*. The continuity of interaction is also shown by the presence of a large amount of Handmade Burnished Ware (HBW) and Grey ware in the LH/LM IIIC levels at Tiryns and Dimini as well as in Crete, Cyprus and the Levant (see Chapter 3). It could also testify, among much other evidence, to the vitality of some Mycenaean centres following the socio-economic changes in the post-palatial period.

To introduce and contextualise Italo-Mycenaean production into this discussion, the crucial point is its gradual increase from at least LH IIIA (Fig. 6.2); during this period Italo-Mycenaean is attested in different areas of the Italian peninsula, particularly along the southern Adriatic and Ionian coasts: Rocavecchia, the area of Taranto and Porto Perone, the Plain of Sybaris. This phenomenon continues and increases progressively over time, although its precise evaluation is hampered by the difficulty in many cases of distinguishing LH IIIB from IIIC sherds (see 6.1.1, Fig. 6.1a). In any case, while we can see the high level of local production in LH IIIC, there is the same proportional increase between LH IIIA, IIIB and IIIC: *c.* 20% (Fig. 6.1b). Such a gradual progressive increase from the time of its first appearance undermines the traditional view that sees the increase in local production during LH IIIC as a direct consequence of the collapse of the Mycenaean palace economy, but rather links to the dynamics of what was taking place within Italy. Thus the interests of the palatial *élites* may have played a role in the earliest phase of local production, but over time other different actors sought to expand their spheres of action. It also seems clear that the importance of the role of local communities and their demand for specialised and valuable ceramics increased over time, from an advanced stage of the Bronze Age. This need seems more related to social representation within individual communities that do not trade in these long-distance prestige goods, considering the strong local-level stylistic features encountered at individual sites or areas (van Wijngaarden 2002; Jung 2006a).

d. Pottery making in Italy

We have shown the relevance of the Italo-Mycenaean production in terms of quantity, geographical distribution and chronological span, so who were the artisans? In Italy there are different opinions about their origin. There is the hypothesis discussed in Chapter 5, but formulated already many years ago, that craftsmen from the Aegean transferred the new technologies of pottery production into the Central Mediterranean. Other scholars, according to models created through economic anthropology, believe that the different socio-economic and socio-political development between the Mycenaeans and the local populations could not have permitted peer relationships, and the same with the exchange of specialised craftsmen (Cazzella *et al.* 2006, 153-155; Cazzella 2010). In this view the Mycenaean-type pottery was produced by local artisans 'copying' the imported vases. This pattern, however, does not take into consideration that where local production of Mycenaean-type pottery is most developed, imports are usually almost completely absent. Of course in some cases it is possible that these specialised artisans were native, but the new technologies were complex enough surely to require the presence in Italy, if only temporarily, of experienced potters who were in a position to offer training. That was surely the case in contemporary Macedonia (Kiriatzi 2000; Buxeda i Garrigos *et al.* 2003; Andreou 2009) and, as regards Cyprus, Crewe's study (2007) of the introduction of the potter's wheel from the Levant to Cyprus at the beginning of the LBA is relevant: "Both wheel-throwing and wheel-shaping technology require a lengthy apprenticeship in order to gain proficiency. The need for an apprenticeship highlights the fact that a change from handmade to wheelmade pottery, particularly in the contexts of technology transfer, requires extensive interaction between potters". Crewe's observation is important because it implies some form of stable relation between artisans. On the Italian peninsula we can imagine the collaboration of local artisans with those who had arrived from the Aegean, assuming that these groups also used the practice of apprenticeship at some point. Furthermore, "the transmission of the fast wheel technology cannot be explained by occurrences of imported vessels but must have occurred through the interaction of potters"; and also "the introduction of wheelmade pottery requires a considerable investment on behalf of the potter and implies a ready market for their goods". Thus as more fully explained in Chapter 5, it is clear that a period of training and interaction is necessary in order to learn a new, complex and sophisticated ceramic technology.

It is difficult to say at what level of social interaction the transfer of potters from the Aegean to the Central Mediterranean occurred. At the beginning probably not at the *élite* level; but if there was a socio-political gap between the Aegean and the Central Mediterranean during the pre-palatial and palatial periods, the same situation is difficult to establish for the subsequent period when the socio-political system in post-palatial Greece itself is not fully understood. What we do know is that it would have been different from before, probably characterised by a less centralised economic and political organisation (Deger-Jalkotzy 2006; Maran 2006). As regards the Central Mediterranean, especially in southern Italy and in Sicily, the RBA and FBA were periods of flourishing activity for the local communities, with the establishment of a stable social differentiation and a general growth in socio-political complexity (Peroni 1996, 228-407; Bietti Sestieri 1997a; Belardelli *et al.* 2005; Vanzetti 2006, 621-623).

Furthermore, according to the revision of the chronological relationship between the Aegean and the Central Mediterranean, the RBA in Italy lasted up to an advanced phase of LH IIIC, a fact that would indicate how this period of strengthening of the relationship between the local population and the Mycenaeans was strongly developed in the post-palatial period. Significantly it is during LH IIIC that local production of Mycenaean ceramics soars, even though, as we have already seen, the phenomenon began earlier. Furthermore it is also the period in which HBW and Grey ware with Italian connections are well attested in Greece, Crete and further east. Therefore, it should not be discounted that, after the collapse of the palaces in Greece and the deep socio-political change that followed, there might be the foundations of a 'political' relationship, characterised by a certain reciprocity, which could be complicated in its early stages by a socio-economic and cultural imbalance between the two areas (Eder, Jung 2005).

Beyond this possibility, it is important to stress the initiative of individual entrepreneurs, who could operate outside the strategic economic constraints of the central *élites*, and who could always hope to expand the horizons of their particular 'market', both before and after the catastrophe of the palaces (Borgna, Cassola Guida 2004, 154). Other scholars have recently proposed that Mycenaean-type pottery in Italy was produced only by Aegean people who moved to the Central Mediterranean and settled in the local communities, just for their personal consumption (Bietti Sestieri 2008). This view fails to explain why in so many cases the Italo-Mycenaean pottery is stylistically very different from the homeland repertoire, introducing a number of novelties in shapes and decorative patterns. Moreover it does not account for the strong variability observed among the ceramic *corpora* of the various sites where local production is predominant. We have also to consider that in their use context Italo-Mycenaean and Mycenaean pots are always mixed with the local traditional pottery. We can mention, for instance, the cases of Broglio (Central house and other unpublished contexts) and Aeolian Islands (huts of Lipari, Filicudi Montagnola and Panarea) (see Chapter 2).

Technology transfer

Italo-Mycenaean production as defined in this work implies the existence of the circulation of craftsmen and a certain degree of technology transfer. The latter can be defined at several levels, according to the different Italian mixed products, chronology and geographical areas, involving various levels of interaction between Aegean and Italian potters (Italo-Mycenaean, *dolia*, Grey) or native potters inheriting specialised techniques during the FBA (south-Italian PG).

The specialised 'Mixed Italian products' display a package of technical traits (see Table 1.2 and Levi 2010, 201-213). In the case of Italo-Mycenaean the whole set of Aegean characteristics appears: the use of fine clay, the wheel and painted decoration. There is much evidence attesting the presence in Italy of Aegean potters, at least at the beginning. For instance, the technological investigation comparing pottery at Broglio and sites in central Macedonia (Buxeda i Garrigos *et al.* 2003) showed that production at the former was more organised and closer to the Mycenaean model, while in central Macedonia production was probably more varied, being based in part on the technology of the local tradition. At Broglio the potters, who were either Mycenaean or at least familiar with the Mycenaean tradition (see Chapter 5.5.3), were successfully producing pottery in an Aegean-influenced manner. Italo-Mycenaean and other mixed wares were produced using calcareous clays on the wheel and fired in kiln structures. The ability to produce black decoration indicates knowledge of kiln firing and the ability to control the oxidising–reducing–oxidising episodes during firing. The red and black decoration of both imports and products of the Plain, comprising the finer fraction of an illitic clay, resembles better the corresponding decoration on pottery from Mycenae than that of local Mycenaean in Macedonia. Furthermore, the experiment at Broglio (Chapter 5.4) shows that good quality decoration requires a specific skill, suggesting the presence of expert potters. Italo-Mycenaean vessels were shown to have been fired at a wide range of temperatures, which indicates that control over their firing was not as good as that of the likely imports, but, although the range of firing temperatures is wide, a relatively high proportion of the pottery was fired typically in the range 850-950°C.

Sites	Techniques	Shapes	Decoration
Rocavecchia, Torre Castelluccia, S. Maria di Leuca ?	Aegean	Aegean	Aegean (with pictorial); good quality
Coppa Nevigata, Cisterna di Tolentino	Aegean	Aegean	Aegean and Aegean reinterpreted; good quality
Broglio, Termitito, Porto Perone, Scoglio del Tonno	Aegean	Aegean and Italian	Aegean (with pictorial) and Aegean reinterpreted; good quality
Antigori	Coarse raw materials, surfaces frequently burnished	Aegean	Aegean; low quality

Table 6.6. Schematic description of Italo-Aegean wares from various sites according to the standards achieved in terms of technological and stylistic (both morphological and decorative) aspects.

Style

The combination of techniques and styles of Italo-Mycenaean pottery is significant for understanding the identity of the potters concerned. The choice of adopting new technologies implies the linked skill to obtain a good result, but there was also a stylistic adaptation of canonical Mycenaean in Italo-Mycenaean and the extent of that adaptation varied significantly (Table 6.6). At one end of the scale is the good quality of the Italo-Mycenaean repertoire at Rocavecchia where the local products appear consistent with the Aegean products: in this case the presence of Aegean potters is highly likely. Then there is an intermediate level, for example the presence in quality and quantity of Italo-Mycenaean products at Broglio di Trebisacce whose Cretan stylistic influence is well known (Vagnetti 2003, 56, fig. 3), but the LM III motifs and shapes are reinterpreted (for example **A1, A13, A30**). Whether this combination of Aegean tradition and local innovation (including some cases of burnishing) reflects the work of either a local, well trained potter or an Aegean potter or both cannot be resolved at present. At the other end of the scale is the potter at Antigori frequently imitating Cretan shapes and motifs (**AN4, 8, 17, 30**), whose lack of familiarity with either the wheel or the painting technique suggests an occasional and much looser connection between local and Aegean potters.

Italo-Mycenaean pottery from MB3 shows both a Mainland Greek and Cretan stylistic influence. LM IIIA2 taste is manifested in different ways at Rocavecchia and Broglio di Trebisacce. At the former, a locally produced cup from layers dated to MB3 (**RO74**) is very similar to Cretan specimens of the same period (see Chapter 3). At Broglio, a necked jar (**A30**), typically local in shape decorated with a LM IIIA pattern, comes from a RBA context; it could be a product of a lingering style (due to its local production) or it was a vase that survived a long time. Of course the two cases appear to be different. The first witnesses that not only did Aegean craftsmen introduce production of their pottery at Rocavecchia, but also these craftsmen could also have originated in Crete. The second could testify that either Cretan craftsmen altered the traditional shapes and decoration introducing some innovative traits according to local taste, or technology transfer took place very early involving local potters at that time. Of course potters not only from Crete were present in this period in the Central Mediterranean; there are also vessels of strictly Mycenaean style which were locally produced, as is the case of some sherds from Torre Mordillo, Broglio di Trebisacce and also Bovolone (taking into account the results of the analysis of **BOV1**). To sum up, these examples point to technology transfer from the Mycenaean areas of the Aegean and Crete to the Central Mediterranean in the field of ceramic production during MB3.

Local production increases during LH IIIB and IIIC. At many sites the introduction of new Aegean-inspired shapes and new combinations of motifs and shapes testify to the great creativity of the craftsmen but also, possibly, the strong influence of the local clientele. This aspect is evident in the very local characterisation of the Mycenaean-type vases: we can speak of a 'Broglio style', a 'Termitito style', an 'Antigori style' and, to some extent, a 'Coppa Nevigata style'. The limited sharing of these shapes or decorative patterns among the different areas is also linked to the vases' similarly limited circulation. The existence of multiple production centres is further suggested by the variability in style and technology (see Table 6.6), and is strongly supported by the results of chemical analysis. The pots were evidently destined for use primarily within the communities which produced them.

The 'Other Mixed Italian' products (as defined in Table 1.2)

The new techniques were also applied to other ceramic classes of Aegean tradition with different social-economic relevance. The first is the so-called Grey ware (or Pseudo-Minyan), a ceramic class of Aegean origin, from a technological point of view very similar to the Minyan pottery of Middle Helladic tradition (Belardelli 1994, 1999; Bettelli 2002, 72-95, 126-130, 198-243). This kind of wheel-made grey pottery, imitating both Mycenaean and more commonly local *impasto* shapes, found an enthusiastic indigenous appreciation (Belardelli *et al.* 2005), as is shown also by the multiplicity of production centres in south-eastern Italy (Jones, Levi 2002a). An analysis of the Grey pottery from Broglio di Trebisacce, the settlement where a large number of sherds was discovered, shows that there was a strong preference for open drinking shapes, mostly in an indigenous style (carinated cups and bowls). Like the Italo-Mycenaean pottery, items of Grey ware were considered luxury goods, and probably used as display vessels. Castagna's (2002, 2004) study of Grey ware from a LBA hut at Broglio di Trebisacce revealed that the large quantity of Grey ware carinated cups and bowls recovered can be organised into sets with constant and recurring dimensions. Moreover, these kinds of open shapes are often associated with Italo-Mycenaean closed vases used as tableware, which themselves were very standardised in shape and decoration. This study of Italian Grey ware shows, on the one hand, the high degree of standardisation in specific types of pottery production, and, on the other, the strong interrelation between the indigenous handcraft tradition (i.e. the vase shapes) and the exotic technology and style (i.e. the control of firing conditions to obtain a homogeneous, lustrous grey colour). Of course the role of the local clientele in introducing and promoting cultural innovations must be stressed (Bettelli, Levi 2003): local *élites* displayed their social relevance and power using a particular type of table ware, of exotic origin, which looked completely different from the local hand-made pottery from a technological point of view, but at the same time could satisfy the indigenous taste also reproducing traditional shapes.

Besides the Italo-Mycenaean and Grey wares that were used for social display, there is a third category more closely linked to economic needs. Bronze Age *dolia* were discovered for the first time in the Plain of Sybaris (Broglio di Trebisacce and Torre Mordillo), but are now known over a large area of southern Italy (Levi 1999; Levi, Bettelli 2002; Bettelli, Levi 2003; Levi 2004; Levi, Schiappelli 2004; Schiappelli 2006). The use of these large containers begins in the RBA, the period of intense interaction with the Aegean world, and continues into the FBA and the EIA when the relationships with the Aegean were interrupted. There are few doubts about the influence of the Aegean Bronze Age technology on this kind of container, usually made of fine levigated clay or with carefully selected tempers, partially made on a (fast) turntable (Christakis 2005, 78), and fired in complex kilns (see Chapter 5.4). The general shape is new, but broadly Aegean-inspired. In the later types some Cypriot influence on the decoration of the body, with horizontal and parallel grooves, can be observed (Vagnetti 1998a, 72-73; Bettelli 2002, 106-112). In this case we can therefore talk of a true hybrid production that includes exotic technologies and style, but also local taste, in the same way as in the case of Grey ware. These

<table>
<tr><th>Class</th><th>Raw materials</th><th>Manufacturing technique</th><th>Surface treatment</th><th>Firing atmosphere</th></tr>
<tr><td>Italo-Mycenaean</td><td>Fine calcareous clay</td><td rowspan="3">Wheel</td><td>Light slip, burnished, lustrous painted</td><td rowspan="2">Oxidising</td></tr>
<tr><td>Dolia and Basins</td><td>Fine calcareous clay, sometimes tempered</td><td>Slip, burnished (some basins are matt painted)</td></tr>
<tr><td>Grey</td><td rowspan="3">Fine calcareous clay</td><td>Burnished</td><td>Controlled reduction</td></tr>
<tr><td>South-Italian Protogeometric</td><td>Hand and wheel</td><td rowspan="2">Light slip, burnished, matt painted</td><td rowspan="2">Oxidising</td></tr>
<tr><td>South-Italian Geometric</td><td>Mainly wheel</td></tr>
</table>

Table 6.7. Summary of the main technological aspects of the Mixed Italian products (see Table 1.2).

large containers probably had two main functions, both archeologically attested. Firstly they were used to keep foodstuffs inside storage rooms, as in the case of Broglio di Trebisacce and Rocavecchia (Guglielmino 1999; Schiappelli 2006; Bettelli 2011). Second, *dolia* have also been used as containers for the transport of foodstuff or other kind of goods. This function is clearly archaeologically attested: analysis of a large group of samples from south-eastern Italy shows that a good percentage of the *dolia* in use were in circulation. For example at Broglio di Trebisacce 30% of *dolia* in the RBA and 20% in the FBA were imported from the southern Plain of Sybaris (Levi 1999, 106-108, 146). In two recent papers Elisabetta Borgna and Paola Cassola (Borgna, Cassola Guida 2004, 2005) suggest that such specialised pottery was used simply to transport goods, in particular olive oil or other perishable goods from Italy to the Aegean, and that the socio-economic organisation of the local communities in southern Italy was insufficiently complex to allow the presence of a redistribution system, similar to the Minoan-Mycenaean palatial organisation. That local communities were organised in a way similar to the Aegean palatial society is not entertained, but we know that there was a certain degree of social complexity, with the presence of *élites* who were able to control long-distance exchanges and perhaps internal distribution of particular kinds of goods (see above). Thus, it is possible to suppose that both of these hypothetical functions of *dolia* are correct, even if their circulation appears to be limited to a regional scale and, at the moment, there is no archaeological evidence of their transport from Italy to the Aegean.

The outcomes of technology transfer

It may seem ironic that after all this debate about the arrival of the new technology in later Bronze Age Italy, there still remains the idea that it markedly declines at the end of the Bronze Age, only for it to be reintroduced with the arrival of the Greeks in the 8th century. In reality the situation is much more complex and differentiated. If this is true for central and northern Italy, in the south-eastern areas of the peninsula the use of the wheel, fine calcareous clay and painted decoration for pottery production was able to take root and grow. It is important to stress that in the regions where local production developed in the Middle and Recent Bronze Age, pottery made from wheel-thrown (and/or wheel-formed), levigated clay continues into the EIA, with no discernible gap. During the FBA and EIA production of South-Italian (or Protogeometric and Geometric) pottery is a local phenomenon (in the south east), having its roots in the Bronze Age technology transfer from the Aegean, and it has nothing to do with the contemporary Greek Protogeometric and Geometric pottery (Bettelli, Levi 2003; Bettelli 2008). Such continuity is evidenced by the production even in the FBA of Grey ware[4], *dolia*[5] and, to some extent, Italo-Mycenaean ware alongside a new type of fine ware decorated with painted geometric patterns: the *figulina* as defined in Table 1.2. Even though this new Protogeometric[6] ware is not always wheel-thrown, it is clear that it shows some of the main technological innovations introduced in those areas of the Italian peninsula some centuries previously by the Aegean craftsmen. It is also necessary to emphasise the diversity of effects of such a transfer of technology from the Aegean on various areas of the Central Mediterranean. While, as already mentioned, the production of specialised 'Mixed Italian products' encountered no interruption in large areas of southern Italy up to the Iron Age, in central and northern Italy, as well as Sardinia, their production was of very short duration, mostly limited to the RBA. It began again vigorously as part of a completely different historical cycle, namely that of the relations between Etruscan and Latin communities and the first Greek colonists in the Central Mediterranean. Again it was the stimulus of the arrival of attractive *élite* pottery into Italy that will have encouraged the re-adoption of the wheel in those areas.

How to explain such a phenomenon? Having reviewed the history of research in the various regions, the gap found remains evident. It should be noted that in south-east Italy at the end of the Bronze Age, the use of the wheel is mainly concentrated in the production of Aegean-inspired large containers for food – the *dolia* –, which began as early as the RBA. As already mentioned, they were often collected in storerooms linked to specific houses within the settlements, as happens at Broglio di Trebisacce, Rocavecchia and Santa Maria di Leuca (Peroni 1994; Levi 1999; Vanzetti 2000; Bettelli 2011). Thus, in these areas, there seems to be a direct link between a specific socio-economic organisation and the establishment and development over time of a particular ceramic technology (Peroni 1983, 250-251). In no other area where local production of Aegean-type ceramics was taking place were there storage practices within large containers of this type. Regardless of the complexity that they represent, they had to be representative of specific economic practices probably related to certain social figures. If these social figures correspond to the *élites* of the communities, it could be argued that the continuity of use of Aegean-inspired ceramic technology has occurred because they were essential to the socio-economic system managed by these social groups.

As we have seen, the *élites* of the communities living in central Italy and the Po plain also used specialised ceramics of exotic ancestry for social display purposes. They probably based their distinction on socio-economic structures different from their apparent parallels in south-eastern Italy. For instance, it is important to stress the connections of the sites situated in the Monti della Tolfa area and along the valley of the Fiora river, both regions with important metal resources. As pointed out by several scholars, the period between the Recent and Final BA is crucial for the development in the area of an increasingly intense exploitation of those resources and flourishing metal-based crafts (Bietti Sestieri 1981, 1988, 2008; Peroni 1983; Giardino 1995). At Scarceta in southern Etruria, both fragments of Mycenaean pottery have been found in levels related to a

[4] Grey ware during the FBA is attested at several sites in the Plain of Sybaris (Belardelli 1994; Buffa 2001, fig. 89D; Belardelli, Capoferri 2004); Rocavecchia (Guglielmino 2005a, tav. CLXV:d,1-3) and Otranto (Orlando 1996, fig. 19,15).

[5] Levi 1999; Levi, Schiappelli 2004; Schiappelli 2006; Levi 2010, 210-212.

[6] Yntema 1990; Levi 2010, 212-213.

large hut of the RBA, a direct antecedent of a FBA dwelling, where a metallurgical workshop is also attested. In both these structures, larger than the others in the settlement, craft activities and in particular metallurgy were taking place (Poggiani Keller 1999,129-132). Probably this entire area constituted a sort of metallurgical district. With regard to southern Etruria, strategic economic activities therefore seem to focus on the exploitation of metal resources, accompanied by other types of specialised crafts. Scholars agree that at least in the Recent-Final BA, there were specialised craftsmen who worked no longer at a household level but probably for the entire community (Peroni 1983, 251-262; Bietti Sestieri 1999). According to the indicators of prestige concentrated in the big house of the RBA at Scarceta, it is possible that this role was relevant and symbolically recognised by other members of the community. In southern Etruria during the RBA those who were responsible, directly or indirectly, for the metallurgical activities probably occupied a role in the community, whose importance was determined by the strategic centrality of this economic branch (Barbaro *et al.* 2012).

Here it is noted that the settlements in the Veneto region and some of those in Marche, including the site of Tolentino, were sites of specialised craft activities, probably to a greater extent focused on bone and ivory, glass and amber production, togheter with metalwork. The development of these activities in the settlements of the Veneto area is evident at the important site of Frattesina towards the end of the Bronze Age where a number of specialised crafts – in metals, glass and exotic materials – are attested, which were then distributed over a wide area (Bietti Sestieri 2008, 13, 30-34, 2010). The analysis of the FBA necropolis at Frattesina has highlighted how a well structured *élite* was recognisable by cremation burials of warriors with swords[7] (Bietti Sestieri 2008, 14-15, 31, fig. 4). Even if, hypothetically, the management of such activities can be traced back, in whole or in part, to these social categories, the following can be proposed at Frattesina and the communities of north-eastern, possibly middle Adriatic Italy and southern Etruria: a relationship between *élite* status and management of certain types of specialised crafts that was considered strategic for the community, beginning probably from the RBA. Such a hypothesis would help explain, in these areas, the more limited, and eventually the disappearance of use of fine clay and the wheel, technologies that were previously intended mainly for the manufacture of vessels aimed at social display. On the one hand, during the FBA the loss of contacts with Mycenaean craftsmen and traders, or at least their strong contraction, led to a loosening of technological and stylistic know-how. On the other hand, such a technology transfer will not be rooted in those communities and social classes that did not consider it economically practical or convenient for activities in which they were involved. In these cases the indicators of prestige will be focused on different categories of products most closely linked to a specific type of productive economy (Barbaro *et al.* 2012).

The continuity of the use of fine clay and the wheel, however, occurred in just those areas of south-eastern Italy where certain types of farming and processing of agricultural products had found great development, as in the case of tree crops and large-scale production of olive oil or other valuable commodity (Peroni 1994). These activities, as already mentioned, had need of efficient ceramic containers for the collection, storage (Bietti Sestieri 2008, 26) – and possibly the distribution within limited distances (Levi 1999, 106-108, 146) – of the goods produced. The commonly adopted ceramic technology and its specialised organisation of production in these regions also continued to be directed towards the manufacture of fine ceramics, as witnessed, albeit in a discontinuous manner, by the Protogeometric ware and by the circulation, even in these late stages, of Grey ware.[8] It is

[7] See also the appropriate comparisons proposed by B. Eder and R. Jung between the two graves with swords from Frattesina and corresponding warrior graves dating to LH / LM IIIC from various areas of the Aegean (Eder, Jung 2005).
[8] See *supra*, note 4.

also possible that the new technologies were able to take root and prosper in areas where the local communities apparently show greater continuity of settlement, in turn, likely indicative of a certain, greater socio-economic and socio-political stability. This is what seems to occur in the Plain of Sybaris, at least in part in the coastal eastern Basilicata – with the settlement of Termitito and others – and in some areas of Adriatic and Ionian Apulia, for instance at Coppa Nevigata, Rocavecchia, Scoglio del Tonno, Porto Perone-Satyrion and Torre Castelluccia. In all other cases, however, an equally uninterrupted settlement continuity does not seem to exist. Between the end of the RBA and an advanced stage of the FBA, the settlement systems of the eastern Po plain and southern Etruria undergo severe restructuring. Even Tolentino, as well as Moscosi di Cingoli in Marche, do not seem to go too far beyond the end of the RBA. The crisis that those systems underwent and their reorganisation on a different socio-economic and socio-political level might have played a role in the progressive but rapid lack of interest in that particular type of ceramic technology specialising in the production of prestige goods (Barbaro *et al.* 2012).

The relationship with Greek prospectors and colonisers triggered a new and similar technology transfer for pottery production. Immediately before Greek colonisation, a technology transfer comparable to that in the Bronze Age can be observed in mid-Tyrrhenian Italy and Campania (Bartoloni 2005). In a very short time, probably decades, the use of the wheel, fine clay and painted decoration spread over a wide area, involving the local communities of southern Etruria, Latium and some areas of Campania. Scholars agree that this technology transfer to Italy happened thanks to the presence of Greek potters in the Villanovan and Latin communities from the first decades of the 8th century BC, in terms of traditional chronology (Bartoloni 2005). Mössbauer spectroscopy (Ridgway *et al*. 1985) and chemical analysis (Jones 1986a, Table 8.12) have confirmed the presence of local products, as well as (Euboean) imports at the Veientine cemetery of Quattro Fontanili; local production starts from the phase IIA of the cemetery. Difficult though interpretation of the results was (Jones, Buxeda i Garrigos 2004, 90-94), they were able to show that some vases, previously considered by Descoudres and Kearsley (1983) to be imports on stylistic grounds, were in fact locally made. Evidence from other mid-Tyrrhenian contexts dating to the EIA suggests that both local and Greek shapes were immediately produced together. In the Esquilino cemetery at Rome Geometric-type pottery reproducing local shapes is present in burials dating to the first decades of the 8th century BC (Gjerstad 1956, figs. 187:5, 188:3; Müller-Karpe 1962, tav. 23B:6; La Rocca 1974-75; Bettelli 1997, tav. 69:6; Bartoloni 2005, 348). In the current state of knowledge it is difficult to say if and when local potters with Greek training could also be at work. Scholars usually only consider the presence of Greek potters who produce these exotic and sophisticated vases for the local *élites* (Bartoloni 2005, 346). However, judging from the production of painted, wheel-thrown vases reproducing local shapes, it can be assumed that novice local potters could also be present in these workshops trained by Greek potters (Nizzo 2005, 354:3.28). Of course, it could be argued that comparison of two apparently analogous phenomena developed in two different socio-economic and socio-political environments is inappropriate. Yet it is undeniable that looking at technology transfer in the Iron Age could inform us about what happened in the Bronze Age. In particular it becomes more and more plausible not only that potters came from the Aegean and settled within the local communities, but also that local people could soon be involved in the production of Aegean-inspired vases.

6.4. Looking ahead

In assessing the contribution in this work of chemical analysis, this has been capable of making a broad classification of what was imported to Italy and what was made in Italy, but this process has not been a straightforward exercise as some samples have been determined to be of uncertain origin. Certain regions in the Aegean, for example West Crete, seem to have compositions overlapping with those of parts of southern Italy. However as chemical databases for the Aegean and further east expand and the analytical methodologies become more refined, more precise definitions of origin of imports should be expected (Hein, Kilikoglou 2012). Top of the list should be elucidation of whether the apparent uniformity of compositions among imports found in Italy which are consistent with sources in the Peloponnese are indeed consistent with the north-east of that region. It is striking that so much of the decorated LH IIIA-B Mycenaean pottery found in Cyprus, the Levant and Egypt which has been analysed by INAA conforms to the Mycenae-Berbati (MYBE) composition type (see, for example, sites in N. Israel: Zuckerman *et al.* 2010) with important implications for the organisation of the pottery industry in LH IIIA-B at Mycenae and nearby Berbati (Galaty 2010). At present the presumption is that the Argolid in LH IIIB was supplying the West, but other exporting centres were also involved especially after the collapse of the palace economy; some of these were probably located in Achaea, a region for which, as already mentioned, chemical differentiation from the Argolid is, on previous evidence, very weak. Although Laconia and Messenia are considered possible sources for some of the LH I-II imports found at Vivara, these assignments require further elucidation. Moving beyond the Peloponnese, differentiation of products from Central Greece (notably Boeotia) and Central Crete, which has been a long-term problem for chemical analysis irrespective of the technique used, is another priority. The potential of expanding composition databanks applies as much to petrography. Such analyses of pithoi and coarse ware stirrup jars found on Sicily, the Aeolian Islands and Sardinia have yielded decisive results, but more routine use should be made of this approach in relation to identifying potential imports and sourcing them with greater precision.

However, in light of the principal finding of this study – the relative size and extent of Italo-Mycenaean production – the greater priority in future work should lie in Italy itself. The progress made to date has demonstrated that chemical analysis is capable of differentiating production of Italo-Mycenaean (Chapter 4.5) in some regions of Italy (notwithstanding the difficulties of wide composition ranges encountered in the Po Valley) and, in the case of Apulia, *within* a region; this inter-regional discrimination seems to apply also to *dolia* in southern Italy. The petrographic approach however comes into its own in the case of production of coarser wares at the *intra*-regional level. Levi's largely petrographic study of *dolia* and *impasto* in the Plain of Sybaris identifying production loci within the plain remains the best example (Levi 1999).

But the stage has been set and the scope is wide for further work of this kind elsewhere. For a start, there is the issue of the definition of local vs. regional production, one that has been largely side-stepped in this study because of either insufficient data or the occurrence of a natural uniformity of clay composition within a given region which prevents the isolation of local variants within that region. Thus far, 'local' has been taken loosely to mean 'within the locality' but it is likely that at least in some cases the 'local type' composition extends further into the region. A suitable region for such an in-depth investigation would be Apulia where progress has already been made; with regard to Fig. 4.39 showing the differentiation of productions at Torre Santa Sabina, Rocavecchia and Coppa Nevigata, the questions are first does differentiation extend to the sites at Taranto (Scoglio del Tonno, Porto Perone, Torre Castelluccia), and second can the extent of each or any of the local productions be defined in terms of geographical area? Another candidate would be the Aeolian Islands where a large investigation is already underway (Chapter 4: Aeolian Islands; Williams, Levi 2008). However, elsewhere in Italy the strategy would be better directed towards individual sites which are currently lacunae on the analysis map and would benefit from a programme of sampling: Afragola (NA), Vaccina (RM), Fondo Paviani (VR);[9] the emphasis should be on (a) maximising the number of sampled sherds/vessels for analysis and (b) including a range of wares that would allow comparison of, for example, Italo-Mycenaean or Grey ware to be made with other likely local fine wares, even of later date such as PG; *impasto* would also be sampled as a local reference point but not for direct comparison with Italo-Mycenaean/Grey. Aside from these sites, there are others that have already featured in this volume but should claim more attention; a good example is Vivara where, as mentioned above, the focus should turn from the imports to the local production, using analysis and radiography to ascertain whether production of wheel-made pottery was occurring in the Bay of Naples in LH I-II. The present data set for Vivara remains notably ambiguous in its interpretation. Another example could be Grotta del Pino, where matt-painted pottery of MH tradition, but possibly locally produced, was found.

On Sicily a focus on the 'local' products would be desirable in order to expand first the chemical and petrographic database for the island as a whole and second to determine their construction methods and how they were finished. The latter in particular should in turn shed light on first the local *impasto* at Thapsos and Pantalica that reflects morphologically and stylistically at least some Mycenaean influence, and second the deep bowls and jugs from the same site which have received recent attention; Tanasi (2005, 2009, 52, fig. 7.11) sees them as Mycenaean imitations and as such within an acculturation context, whereas, as mentioned in Chapter 5.5, Russell (2011, 234f, fig. 3.13) has argued persuasively in favour of their status as a deliberate merger of local and imported features to create a hybrid.

While the needs of sampling for characterisation purposes have to date received paramount attention, they have tended to overlook the requirements of investigations into technology and function, often resulting in three separate, usually independent lines of investigation, each requiring specialised skills and instrumentation. Certainly the case is strong for sampling for characterisation and technology purposes at the same time as the demands on sample type and size may be similar. As regards function, identification of the original contents of pottery by organic residue analysis has made great advances (Evershed 2008; Colombini, Modugno 2009), yet it cannot be regarded as a routine, straightforward procedure. A measure of those advances can be gleaned from the progress made in determining olive oil traces, traditionally a difficult task using gas chromatography-mass spectrometry (GC-MS) owing to the decay of its potential biomarkers; however, using reversed-phase liquid chromatography coupled to MS with atmospheric pressure chemical ionisation, Kimpe *et al.* (2001) were able systematically to detect olive oil in Roman lamps. The available GC data for *dolia* is at present restricted to Coppa Nevigata (Evans, Recchia 2001-03) and Broglio di Trebisacce (*EMS 2*, 855-6, fig. 231), in both cases the results pointing to probable presence of olive oil. Rocavecchia and the FBA site of Archi-Fonte Tasca (Abruzzo) offer suitable material for future GC analyses: at the former site Guglielmino (1999, 2002) has observed greasy traces on *dolia* sherds that he has related to olive oil, and at the latter *dolia* in *figulina* were found together with cultivated olive stones (Di Fraia 2000). Organic residue analysis is usually best carried out on a range of wares from a given site and with a good number of examples of each ware being available for sampling to allow for cases whose yield of organic extract is too low for analysis to proceed; specific questions should be asked of the analysis of each ware type.

The excavations at Broglio di Trebisacce have set the standard for technological enquiry as the entries in Chapter 5 indicate, making the point that laboratory analyses/examination are insufficient on their own and should be supplemented where possible with experimental work. In view of the debate regarding how Italo-Mycenaean was fired (Chapter 5.2-4), the objective estimations of firing

[9] Results of INAA (by H. Mommsen) of pottery from Punta Zambrone are forthcoming.

temperature range and atmosphere obtained from sherds need to be placed in a context derived from more controlled experimental firings. The further investigation of the possibly very early local production of Aegean pottery, as some results at Vivara and Grotta del Pino seem to indicate, has already been mentioned. Also deserving a wider enquiry are the questions of the origin and spread of *dolia*, in particular the route by which way they derived from Aegean and Cypriot pithoi. The latter were imported into Sicily and Sardinia from Crete and Cyprus starting from the MBA, as in the case of Salina, but there is no trace of them in those regions where in RBA and FBA the *dolia* are attested, such as Apulia, Basilicata and Calabria. Instead in Apulia are examples of very large containers possibly of Aegean type, in particular a huge transport/storage amphora **PP23** resembling Cretan prototypes, that are probably locally made. Local production applies as well to some coarse ware cooking pots of Aegean typology found at Scoglio del Tonno. Since this is indicative of the presence of a foreign element in the population at this site, it would be of interest to establish whether the same applies to the corresponding cooking pots recovered at other *emporia*.

Turning finally to data storage and handling, this field of study needs to move rapidly towards a digital management system, deploying electronic databases for all archaeological and archaeometric data, possibly to be published on-line. Furthermore the databases should be linked to a GIS platform in order to undertake efficient quantitative and spatial analyses. Last but not least and in a different vein, a thorough comparison between the phenomenology of technology transfer from the Aegean to the Central Mediterranean and to the Levant would be worthwhile. New discoveries and recent studies in these regions surely offer manifold ideas and opportunities for future research (van Wijngaarden 2002; Balensi *et al.* 2004; Venturi 2010; Pedrazzi, Venturi 2011; several papers in Killebrew, Lehmann 2013).

DATABASES

Database 1: AAS data (% age element oxide)

CC Central Crete; CG Central Greece; P Peloponnese; WC West Crete; R Rhodes; S Cy South Cyprus; IMP import; L Local (or regional)												
Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
			Alumnium	Calcium	Magnesium	Iron	Titanium	Sodium	Manganese	Chromium	Nickel	Potassium
APULIA												
Torre Castelluccia												
TCA1	M	CC/CG	14,4	9,1	7,5	7,6		0,13	0,116	0,056	0,039	2,83
TCA22	IM	L	14,2	13,7	2,2	5,2		0,54	0,092	0,02	0,013	2,89
TCA23	G	L	15,5	8,7	3,7	6,7		0,43	0,111	0,028	0,014	2,23
TCA24	G	L	16,4	5,2	2,5	6,7		0,35	0,12	0,028	0,014	1,81
Porto Perone-Satyrion												
PP16	MP	P	12,1	14,0	3,2	6,0	0,67	0,5	0,099	0,041	0,02	3,01
PP17	P	L?	12,3	10,2	2,5	5,4	0,62	0,19	0,219	0,027	0,018	3,74
PP2	IM	L	10,8	15,4	2,3	4,9	0,62	0,42	0,101	0,027	0,012	2,89
PP3	IM	L	10,0	16,1	2,5	4,3		0,36	0,071	0,018	0,014	2,23
PP4	IM	L	10,0	16,8	2,7	4,2		0,46	0,077	0,02	0,011	2,35
PP5	IM	L	12,3	9,5	2,3	5,0		0,71	0,075	0,018	0,013	2,77
PP8	IM	L	12,1	11,9	2,2	5,1		0,61	0,094	0,015	0,013	2,65
PP10	IM	L	11,0	16,1	2,0	4,4		0,27	0,072	0,018	0,011	2,35
PP11	IM	L	13,2	12,3	2,3	5,3		0,47	0,093	0,015	0,013	2,59
PP15	IM	L	11,0	14,7	2,0	4,6		0,27	0,075	0,018	0,013	2,29
PP18	IM	L	12,9	14,4	2,7	5,0		0,58	0,088	0,011	0,011	2,71
PP20	IM	L	11,3	21,0	2,7	5,1		0,24	0,056	0,02	0,013	2,29
PP21	IM	L	14,9	13,2	3,4	5,6		0,67	0,075	0,018	0,011	2,89
PP22	IM	L	14,2	15,9	3,5	5,5		0,52	0,075	0,017	0,012	3,08
PP1	IM-PG?	L	13,4	12,3	2,5	4,4		0,65	0,075	0,02	0,011	2,41
PP12	D	L	9,8	20,3	2,2	4,3	0,5	0,53	0,065	0,027	0,012	2,59
PP6	G	L	12,5	12,5	3,7	5,5		0,27	0,075	0,023	0,017	2,35
PP7	G	L	12,9	13,7	3,4	5,2		0,43	0,085	0,018	0,013	2,47
PP9	G	L	11,3	14,3	2,7	4,3		0,18	0,084	0,015	0,011	2,59
PP13	G	L	11,3	16,1	2,3	4,4		0,31	0,09	0,018	0,011	2,23
PP14	PG	L	11,3	14,2	2,2	4,7		0,13	0,079	0,019	0,009	2,04
PP19	PG	L	11,5	16,1	2,5	4,3		0,54	0,072	0,018	0,011	2,53
PP29	PG	L	10,8	23,1	2,3	4,7	0,62	0,32	0,075	0,023	0,012	1,99
PP30	Greek PG?	IMP	15,3	8,5	2,9	6,7	0,9	0,65	0,128	0,041	0,018	3,13
Scoglio del Tonno												
ST1	M	P	14,0	13,2	3,2	6,4	0,9	0,35	0,108	0,034	0,02	2,83
ST2	M	P	12,7	16,8	3,5	6,3		2,16	0,127	0,034	0,017	1,27
ST3	M	P	14,0	14,0	3,8	6,9		1,37	0,108	0,034	0,02	1,21
ST4	M	P	13,4	16,8	3,5	6,3	0,83	0,31	0,136	0,031	0,018	2,23
ST7	M	P	13,0	9,0	3,3	6,2		0,96	0,093	0,039	0,02	2,59
ST21	M	P	14,2	14,7	4,2	5,9	0,78	0,58	0,089	0,038	0,018	3,98
ST23	M	P		15,6	3,3	4,9	0,69	0,83	0,079	0,033	0,072	2,98
ST25	M	P	12,1	13,3	3,7	5,6		1,08	0,079	0,031	0,017	2,53
ST26	M	P	13,6	13,9	3,8	5,6	0,62	0,58	0,088	0,031	0,015	3,25
ST30	M	P		14,0	3,7	5,0	0,9	0,91	0,145	0,042	0,051	3,71
ST31	M	P		10,0	3,9	6,7	0,87	0,62	0,128	0,042	0,029	2,87
ST33	M	P	13,4	15,0	3,7	6,3		1,29	0,115	0,034	0,014	2,05
ST35	M	P	13,6	12,3	3,7	6,7		0,81	0,115	0,034	0,02	3,01
ST27	M	CC/CG		11,4	4,8	5,4	69	0,86	0,098	0,046	0,033	2,86
ST5	M	R	8,0	10,1	11,6	6,4		0,97	0,121	0,108	0,076	1,57

Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
ST6	M	R	6,4	18,2	10,5	6,3		0,35	0,155	0,096	0,102	0,78
ST8	M	R	8,9	10,4	14,3	8,7	0,62	0,19	0,148	0,098	0,13	1,51
ST9	M	R	9,1	13,3	8,0	6,7		1,02	0,103	0,099	0,067	1,21
ST10	M	R	8,3	9,4	12,3	8,2		0,62	0,133	0,118	0,15	1,33
ST32	M	R	7,4	14,3	12,6	7,9	0,55	0,09	0,194	0,088	0,13	0,92
ST34	M	R		11,5	12,8	5,6	0,44	0,5	0,013	0,126	0,117	0,96
ST36	M	R		9,1	13,9	8,0	0,46	0,42	0,019	0,113	0,153	1,11
ST92	M	R		5,0	10,1	>15	0,78	0,7	0,111	0,08	>0.2	2,21
ST11	IM	L	14,7	10,4	3,7	6,3		1,15	0,125	0,022	0,014	2,89
ST12	IM	L	15,7	10,2	3,3	6,3	0,9	0,43	0,124	0,023	0,028	2,89
ST22	IM	?	15,5	14,3	3,2	6,1	0,62	0,2	0,061	0,038	0,012	2,89
ST24	IM	L	13,4	20,3	3,2	5,4	0,67	0,27	0,083	0,031	0,012	2,47
ST28	IM	L	18,9	4,6	2,2	5,9	1,08	1,55	0,054	0,031	0,018	4,58
ST29	IM	L	12,1	15,7	2,2	4,7	0,83	0,67	0,09	0,023	0,01	3,01
ST13	G	?	13,0	12,6	3,5	5,2		0,96	0,077	0,028	0,014	3,13
ST30	G	L	11,3	15,4	3,2	4,9		1,35	0,127	0,02	0,009	2,83
ST39	G	L	11,7	14,7	2,7	4,7		0,28	0,08	0,015	0,013	2,59
ST14	I	L	17,4	2,0	2,0	6,1	0,78	0,61	0,194	0,019	0,008	4,76
ST15	I	L	21,4	1,5	2,0	7,3	0,9	0,46	0,168	0,023	0,008	4,34
ST16	I	L	14,0	1,3	1,8	4,7	0,55	0,46	0,09	0,019	0,006	3,13
ST17	I	L	17,6	0,2	1,7	6,2	0,67	0,39	0,099	0,019	0,006	3,37
ST18	I	L	16,4	1,4	2,2	6,2	0,62	0,34	0,168	0,023	0,01	3,74
ST19	I	L	17,4	0,9	2,0	6,1	0,73	0,71	0,116	0,019	0,01	3,74
ST20	I	L	17,2	3,1	2,3	6,4	0,62	0,57	0,112	0,019	0,018	3,98
ST37	figurine	L	14,4	2,0	1,9	5,6		0,94	0,125	0,015	0,006	4,22
BASILICATA												
San Vito												
SV3	IM	L	17,0	13,3	1,8	5,2	0,58	1,19	0,115	0,026	0,01	3,25
SV1	PG	L	18,0	1,6	0,1	4,6	0,55	1,62	0,084	0,023	0,01	3,49
SV2	PG	L	14,6	19,6	2,7	4,4	0,47	1,25	0,187	0,026	0,01	3,13
Termitito												
T37	M	P	18,1	18,2	2,2	5,2	1,05	1,46	0,114	0,023	0,009	3,19
T1	IM	L	12,3	8,5	2,3	3,7	0,65	1,02	0,093	0,015	0,01	2,65
T2	IM	L	15,3	7,8	2,3	5,4	0,65	0,97	0,076	0,015	0,01	2,83
T3	IM	L	15,9	8,0	2,2	5,4	0,65	0,97	0,114	0,015	0,01	2,41
T4	IM	L	17,4	8,5	2,1	6,0	0,65	0,97	0,099	0,017	0,01	2,39
T5	IM	L	14,4	9,4	2,5	4,5	0,65	1,02	0,107	0,017	0,01	2,77
T6	IM	L	16,1	9,9	2,4	5,6	0,65	1,02	0,096	0,018	0,01	2,89
T7	IM	L	16,6	6,7	2,4	5,3	0,65	1,01	0,08	0,018	0,01	2,89
T8	IM	L	17,6	9,9	2,6	6,0	0,62	1,08	0,103	0,02	0,01	2,95
T9	IM	L	13,6	10,4	2,7	4,6	0,67	1,02	0,112	0,018	0,01	2,77
T10	IM	L	16,3	9,2	2,8	5,4	0,63	1,21	0,097	0,02	0,01	3,74
T11	IM	L	16,4	12,5	3,0	5,7	0,65	1,35	0,119	0,02	0,01	2,75
T12	IM	L	16,6	8,9	2,7	6,0	0,63	1,21	0,116	0,02	0,01	3,31
T13	IM	L	14,2	10,1	2,6	4,8	0,63	1,13	0,105	0,022	0,01	2,83
T14	IM	L	11,5	10,1	2,3	3,6	0,62	0,98	0,101	0,02	0,01	2,77
T15	IM	L	14,4	9,5	2,5	4,9	0,62	0,97	0,103	0,022	0,01	2,75
T16	IM	L	15,3	8,5	1,8	4,9	0,67	0,86	0,106	0,022	0,01	2,39
T17	IM	L	15,3	9,7	2,7	5,3	0,72	0,97	0,103	0,023	0,01	2,77
T18	IM	L	13,2	11,1	2,7	4,6	0,72	1	0,092	0,022	0,01	2,77
T19	IM	L	13,6	9,1	2,5	4,7	0,72	1	0,101	0,022	0,01	2,77

Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
T20	IM	L	14,0	10,6	2,6	4,6	0,72	0,97	0,114	0,022	0,01	2,71
T21	IM	L	12,1	9,2	2,3	3,9	0,75	0,97	0,103	0,023	0,01	2,53
T22	IM	L	14,4	7,1	2,9	5,2	0,75	1,02	0,107	0,026	0,01	3,19
T23	IM	L	14,4	9,2	2,6	5,0	0,72	1,08	0,111	0,023	0,01	2,99
T24	IM	L	14,9	9,8	2,4	5,0	0,98	0,82	0,099	0,016	0,007	2,83
T25	IM	L	15,7	9,8	2,5	5,5	0,93	0,93	0,105	0,019	0,007	3,13
T26	IM	L	17,8	9,9	2,6	6,4	0,95	1,23	0,119	0,019	0,007	3,19
T27	IM	L	16,6	7,6	1,8	5,9	0,98	0,97	0,129	0,016	0,007	2,95
T28	IM	L	16,6	9,4	2,4	5,9	0,93	0,98	0,115	0,016	0,007	3,01
T29	IM	L	15,1	9,5	2,0	5,5	0,93	0,86	0,107	0,016	0,007	2,83
T30	IM	L	16,0	10,1	2,6	4,3	0,85	1,25	0,089	0,023	0,01	3,05
T31	IM	L	18,1	18,2	2,2	5,2	1,05	1,46	0,114	0,023	0,01	3,19
T32	IM	L	22,6	27,3	3,2	6,4	0,92	1,71	0,096	0,023	0,01	3,86
T33	IM	L	21,7	10,2	2,5	6,1	0,85	1,89	0,112	0,023	0,01	3,86
T35	IM	L	18,9	9,2	2,5	6,4	0,95	0,73	0,115	0,016	0,01	3,13
T38	IM	L	14,7	11,3	2,5	5,6	0,72	0,92	0,099	0,019	0,006	2,63
T39	IM	L	14,4	12,6	2,5	5,5	0,72	0,85	0,115	0,016	0,007	2,65
T40	IM	L	13,2	12,0	2,4	4,9	0,68	0,67	0,119	0,019	0,006	2,23
T41	IM	L	16,8	11,1	2,5	6,2	0,93	1,02	0,131	0,019	0,007	2,89
T42	IM	L	20,4	11,5	2,8	5,9	0,58	1,62	0,112	0,023	0,007	3,25
T43	IM	L	18,9	8,8	2,7	5,6	0,85	1,35	0,096	0,026	0,009	3,25
T34	PG	L	18,9	9,2	2,5	6,4	0,95	0,73	0,115	0,016	0,01	3,13
T36	PG	L	16,1	10,1	2,6	4,3	0,85	1,25	0,089	0,023	0,009	3,05
T44	PG	L	15,5	13,3	3,5	6,6	0,81	1,46	0,131	0,035	0,013	1,38
T45	I	L	15,1	2,7	1,2	5,0	0,62	0,86	0,093	0,013	0,007	3,43
T46	I	L	15,3	2,2	1,3	5,6	0,55	0,67	0,129	0,02	0,007	3,01
T47	I	L	15,1	1,8	1,2	5,3	0,68	0,69	0,145	0,016	0,009	2,65
T48	I	L	15,1	2,4	1,2	5,0	0,62	0,82	0,115	0,023	0,007	3,43
T49	I	L	14,0	3,2	1,7	4,2	0,63	1,02	0,09	0,015	0,01	2,41
T50	I	L	16,6	6,3	2,3	5,3	0,67	0,7	0,103	0,015	0,01	2,59
T51	I	L	16,6	1,5	1,2	5,4	0,62	1,23	0,092	0,015	0,01	2,95
T52	I	L	10,6	2,1	1,0	2,4	0,39	0,89	0,081	0,017	0,01	2,29
T53	I	L	14,0	1,8	1,1	4,2	0,57	1,02	0,116	0,017	0,01	2,71
T54	I	L	12,5	1,4	1,1	3,3	0,47	1,08	0,161	0,018	0,01	3,49
Metapontum												
MP1	PG	L	17,8	10,6	4,8	6,3	0,92	1,48	0,155	0,039	0,02	2,89
MP2	PG	L	14,9	10,5	1,8	5,7	0,65	1,08	0,129	0,019	0,007	2,47
CALABRIA												
Broglio di Trebisacce												
A23	M	P	15,7	13,3	3,8	8,0	0,82	0,67	0,106	0,034	0,020	3,13
A24	M	P	15,9	14,1	4,0	8,0	0,80	0,61	0,120	0,031	0,020	3,47
A40	M	P	12,5	8,1	3,9	7,0	0,65	1,08	0,142	0,041	0,023	2,77
A51	M	P	13,2	10,4	4,5	7,6	0,90	1,23	0,161	0,042	0,019	3,19
A53	M	P	17,6	10,7	4,4	9,3	1,14	0,97	0,189	0,044	0,021	3,82
A54	M	P	17,2	15,4	4,4	9,0	0,93	1,15	0,120	0,039	0,017	3,25
A48	M	CG/CC	13,2	11,9	5,6	8,0	0,90	1,19	0,145	0,048	0,023	3,25
A49	M	CG/CC	13,0	11,9	5,6	7,7	0,90	1,20	0,142	0,051	0,023	3,19
A56	M	CG/CC?	14,2	10,3	5,1	7,9	0,95	1,29	0,176	0,045	0,019	3,05
A1	IM	L	16,1	4,3	2,2	5,7	0,87	0,88	0,076	0,022	0,010	2,53
A2	IM	L	13,4	7,3	2,5	4,7	0,73	1,11	0,070	0,019	0,010	3,01
A3	IM	L	16,8	8,0	3,7	7,3	0,83	0,88	0,101	0,022	0,015	2,95

Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
A4	IM	L	19,3	5,9	2,8	7,4	0,90	1,05	0,084	0,022	0,010	2,92
A5	IM	L	14,0	5,5	2,1	4,3	0,73	0,86	0,065	0,019	0,010	2,77
A6	IM	L	14,7	7,0	2,5	5,0	0,73	0,92	0,061	0,019	0,010	3,13
A7	IM	L	15,9	7,6	3,2	5,7	0,83	1,16	0,089	0,022	0,010	3,25
A8	IM	L	13,8	6,3	2,7	4,7	0,87	1,08	0,079	0,022	0,010	3,04
A9	IM	L	13,2	11,2	3,2	4,5	0,73	1,01	0,084	0,022	0,010	3,04
A10	IM	L	15,1	9,2	2,8	5,2	0,73	0,92	0,075	0,019	0,010	2,89
A12	IM	L	20,8	5,5	2,8	6,0	0,90	0,74	0,108	0,023	0,010	3,31
A13	IM	L	18,9	6,6	2,8	6,4	0,78	1,02	0,061	0,023	0,010	3,37
A14	IM	L	17,4	9,8	2,4	6,3	0,65	0,73	0,090	0,023	0,012	2,65
A15	IM	L	14,9	9,9	2,9	5,3	0,68	0,80	0,083	0,019	0,014	2,77
A16	IM	L	18,3	6,3	2,2	6,7	0,93	0,85	0,085	0,016	0,008	2,89
A17	IM	L	16,1	8,8	2,5	6,3	0,90	1,05	0,076	0,015	0,006	3,49
A18	IM	L	17,2	11,2	3,1	6,8	0,90	1,15	0,120	0,016	0,010	3,43
A19	IM	L	14,6	8,7	2,2	6,0	0,77	1,27	0,075	0,013	0,006	3,25
A20	IM	L	13,2	8,7	2,2	5,4	0,73	1,00	0,068	0,015	0,008	3,01
A21	IM	L	17,1	13,7	3,0	7,0	0,87	1,01	0,111	0,017	0,011	3,30
A22	IM	L	17,8	14,0	3,7	7,6	0,83	1,29	0,120	0,018	0,008	3,43
A25	IM	L	16,3	9,0	2,1	6,8	0,80	1,27	0,071	0,018	0,008	3,62
A26	IM	L	17,8	6,4	2,7	6,8	0,83	0,84	0,111	0,020	0,012	3,49
A27	IM	L	16,3	9,0	3,1	7,0	0,80	1,28	0,103	0,023	0,008	3,52
A28	IM	L	15,1	12,7	3,0	5,9	0,68	1,35	0,071	0,018	0,008	2,71
A29	IM	L	15,3	10,8	2,7	6,4	0,65	1,15	0,088	0,018	0,008	3,37
A30	IM	L	14,4	13,3	2,7	6,3	0,58	1,05	0,097	0,020	0,010	2,89
A31	IM	L	14,9	9,7	2,3	6,7	0,58	0,69	0,132	0,022	0,012	2,71
A32	IM	L	14,4	6,0	2,2	5,9	0,48	1,02	0,079	0,020	0,010	3,19
A33	IM	L	17,8	9,8	2,8	7,6	0,52	1,35	0,093	0,022	0,010	3,74
A35	IM	L	15,1	11,2	2,8	6,3	0,47	1,20	0,079	0,022	0,012	3,37
A36	IM	L	16,3	8,7	2,3	6,7	0,47	0,92	0,093	0,025	0,012	2,89
A37	IM	L	12,5	10,9	2,6	5,3	0,65	0,84	0,067	0,018	0,010	2,77
A38	IM	L	15,7	6,7	2,4	6,8	0,68	1,09	0,070	0,022	0,010	3,62
A39	IM	L	14,9	8,5	2,7	6,8	0,73	1,17	0,093	0,023	0,012	3,19
A41	IM	L	17,8	6,6	2,8	7,1	0,80	0,96	0,112	0,028	0,012	3,74
A42	IM	L	14,0	6,0	2,5	5,6	0,68	1,13	0,053	0,023	0,010	3,19
A43	IM	L	14,7	14,3	2,7	6,2	0,73	1,15	0,097	0,025	0,012	3,37
A44	IM	L	14,4	9,8	2,5	6,2	0,82	0,98	0,092	0,024	0,010	2,77
A45	IM	L	14,7	5,3	2,8	6,7	0,90	0,89	0,066	0,021	0,008	4,28
A46	IM	L	14,2	9,5	2,8	6,7	0,87	1,20	0,085	0,019	0,006	4,04
A47	IM	L	14,2	11,2	3,0	6,7	0,90	1,15	0,099	0,021	0,008	3,62
A50	IM	L	14,8	9,4	3,2	7,2	1,00	1,42	0,107	0,021	0,008	3,80
A52	IM	L	15,3	8,8	2,6	6,7	0,90	1,43	0,077	0,019	0,008	4,10
A55	IM	L	15,3	9,2	2,7	6,2	0,90	1,13	0,083	0,021	0,006	3,74
A57	IM	L	18,5	13,4	3,3	7,2	0,87	1,56	0,085	0,026	0,010	3,49
A74 (G12)	IM	L	13,6	7,0	4,0	4,4	0,73	0,89	0,054	0,023	0,010	2,65
A11	CW	L?	15,7	7,7	2,5	5,5	0,80	0,81	0,080	0,022	0,010	2,92
A34	CW	L?	14,0	7,6	2,5	5,9	0,43	0,93	0,081	0,020	0,010	3,19
D1	D	L	16,8	11,2	2,5	5,9	0,60	1,16	0,080	0,019	0,010	2,59
D2	D	L	16,3	9,5	2,7	5,9	0,60	1,12	0,081	0,019	0,010	2,92
D3	D	L	15,5	9,7	2,2	5,2	0,60	0,86	0,070	0,019	0,010	3,01
D4	D	L	14,6	13,2	2,7	5,0	0,55	0,89	0,099	0,019	0,010	2,35
D5	D	L	14,4	8,4	2,3	6,2	0,82	1,00	0,102	0,021	0,009	2,77

Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
D6	D	L	13,4	7,8	2,5	5,9	0,78	1,11	0,093	0,021	0,009	2,71
D7	D	L	13,2	9,4	1,9	4,6	0,58	2,00	0,068	0,021	0,008	2,65
D8	D	L	12,3	10,8	2,2	5,3	0,62	1,08	0,065	0,019	0,008	3,01
D9	D	L	12,7	9,9	2,4	5,6	0,73	1,15	0,090	0,019	0,009	3,25
G1	G	L	19,8	7,8	2,8	7,2	0,87	1,15	0,101	0,022	0,010	2,53
G2	G	L	17,5	8,8	3,1	5,7	0,87	1,05	0,099	0,022	0,010	2,89
G3	G	L	16,8	7,7	2,8	5,6	0,72	1,16	0,067	0,019	0,010	3,01
G4	G	L	23,6	6,9	3,1	8,3	1,03	0,86	0,116	0,029	0,014	3,49
G5	G	L	15,3	7,6	2,2	5,3	0,65	0,92	0,080	0,022	0,010	2,35
G6	G	L	18,9	8,4	2,5	5,7	0,78	1,24	0,063	0,023	0,012	2,77
G7	G	L	15,7	6,7	2,3	6,3	0,73	0,86	0,065	0,022	0,010	2,71
G8	G	L	14,6	8,3	2,4	4,8	0,68	0,96	0,061	0,019	0,010	2,92
G9	G	L	12,5	7,0	1,9	4,4	0,80	0,71	0,089	0,023	0,010	2,29
G10	G	L	19,3	6,4	2,6	6,7	0,80	0,80	0,161	0,023	0,012	3,13
G11	G	L	11,7	8,0	2,4	3,9	0,65	0,96	0,072	0,019	0,010	2,83
G13	G	L	12,9	4,4	1,7	3,8	0,65	0,90	0,067	0,022	0,010	2,63
G14	G	L	16,4	9,5	3,2	6,3	0,97	1,15	0,101	0,023	0,009	3,55
G15	G	L	16,6	11,7	3,0	7,0	0,91	1,42	0,112	0,025	0,010	3,34
G16	G	L	14,7	9,1	2,5	5,8	0,90	0,96	0,089	0,021	0,008	3,25
G17	G	L	18,3	9,4	2,9	7,0	0,93	1,38	0,113	0,024	0,009	3,49
G18	G	L	17,2	10,8	3,5	6,3	0,93	1,19	0,103	0,023	0,009	3,49
G19	G	L	14,0	9,5	2,3	5,5	0,82	0,85	0,096	0,019	0,008	3,13
G20	G	L	17,2	8,0	3,3	7,1	0,89	0,81	0,120	0,024	0,007	3,42
G21	G	L	19,7	7,0	3,0	7,4	0,99	0,90	0,142	0,029	0,013	3,93
G22	G	L	16,8	8,6	2,9	6,4	0,90	0,62	0,093	0,026	0,009	3,77
G23	G	L	17,3	10,8	3,3	6,5	0,85	1,19	0,104	0,022	0,010	3,45
G24	G	L	13,8	2,1	1,0	6,4	0,92	0,84	0,121	0,026	0,008	2,05
G25	G	L	13,0	6,9	1,4	4,4	0,77	0,69	0,066	0,021	0,010	2,07
G26	G	L	18,1	7,7	2,0	6,2	0,77	1,16	0,056	0,018	0,008	3,55
G27	G	L	16,6	7,6	2,0	6,1	0,80	1,52	0,056	0,018	0,008	3,74
G28	G	L	18,3	9,5	2,6	6,7	0,87	1,25	0,086	0,026	0,010	3,37
F6	PG	L	12,3	13,0	2,7	5,4	0,71	0,85	0,089	0,019	0,008	3,43
F7	PG	L	14,7	8,3	2,3	6,2	0,82	1,11	0,085	0,019	0,008	2,83
F8	PG	L	12,5	9,1	3,6	4,5	0,75	1,00	0,148	0,023	0,010	2,77
I1	I	L	18,3	1,2	1,1	6,2	0,62	1,59	0,061	0,018	0,008	3,92
I2	I	L	11,3	5,4	1,3	3,7	0,50	1,12	0,043	0,019	0,008	2,65
I12	I	L	19,5	4,9	1,5	5,7	0,57	0,81	0,050	0,019	0,010	2,59
I13	I	L	17,0	2,9	1,3	5,2	0,55	0,93	0,044	0,016	0,014	2,71
I14	I	L	16,8	2,7	1,4	5,7	0,52	0,73	0,036	0,019	0,012	2,95
I15	I	L	17,0	2,6	1,4	6,1	0,55	1,25	0,049	0,018	0,008	3,43
I16	I	L	15,1	2,7	1,2	6,1	0,65	0,88	0,077	0,018	0,008	2,71
M1	Waste?	L	13,6	12,0	3,0	5,2	0,73	1,55	0,067	0,019	0,008	3,68
MC2	Brick	L	17,4	8,8	3,0	6,4	0,83	2,02	0,088	0,026	0,008	3,49
MC3	Brick	L	20,4	10,2	3,0	7,3	0,80	2,43	0,090	0,026	0,008	3,93
ARG1	Clay	L	14,0	7,8	2,6	5,2	0,48	1,21	0,067	0,022	0,066	2,71
ARG2	Clay	L	14,6	6,3	1,8	4,9	0,48	1,05	0,057	0,019	0,008	2,71
ARG3	Clay	L	16,4	12,7	2,9	6,4	0,48	1,42	0,089	0,025	0,008	2,71
Torre Mordillo												
TM10	M	IMP	12,9	11,5	4,2	6,3	0,82	0,85	0,161	0,028	0,012	2,17
TM15	M	IMP	10,4	7,3	3,2	6,0	0,62	1,37	0,053	0,037	0,012	1,99
TM45	M	IMP	12,5	8,0	3,0	5,7	0,68	0,94	0,054	0,041	0,013	2,05

Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
TM56	M	IMP	14,1	6,9	3,2	6,1	0,68	1,78	0,077	0,039	0,011	2,53
TDM1	IM	L	20,8	7,7	2,9	8,3	0,87	0,73	0,103	0,026	0,010	3,04
TDM2	IM	L	16,3	11,5	3,0	7,3	0,65	0,84	0,102	0,022	0,008	3,55
TM1	IM	L	14,1	8,5	1,8	5,4	0,72	0,74	0,085	0,016	0,007	2,45
TM2	IM	L	15,0	5,6	2,2	6,4	0,72	1,04	0,110	0,014	0,006	2,56
TM6	IM	L	15,6	6,6	2,4	6,0	0,82	0,94	0,119	0,014	0,007	2,77
TM8	IM	L	15,4	5,0	2,3	5,7	0,72	1,21	0,096	0,014	0,007	2,77
TM9	IM	L	14,1	7,4	2,2	5,4	0,72	0,82	0,119	0,014	0,007	2,35
TM11	IM	L	17,4	5,9	2,3	5,8	0,85	1,05	0,093	0,016	0,007	2,82
TM12	IM	L	13,5	5,6	2,3	4,9	0,68	0,85	0,096	0,012	0,007	2,29
TM18	IM	L	15,8	7,0	2,4	6,5	0,82	0,71	0,161	0,016	0,008	2,75
TM20	IM	L	16,4	7,3	2,5	6,2	0,78	0,89	0,103	0,016	0,008	2,75
TM21	IM	L	16,5	7,3	3,0	6,7	0,87	0,82	0,114	0,016	0,008	2,89
TM22	IM	L	20,4	6,4	3,3	7,1		0,58	0,116	0,018	0,011	3,43
TM43	IM	L	18,7	5,9	2,3	6,6		0,27	0,102	0,018	0,009	3,80
TM44	IM	L	14,1	6,2	2,7	4,7	0,82	1,25	0,086	0,016	0,005	2,11
TM47	IM	L	14,2	7,3	2,5	4,9	0,68	0,70	0,103	0,015	0,005	2,05
TM51	IM	L										
TM61	IM	L	15,4	7,0	2,2	5,2	0,68	0,90	0,107	0,016	0,005	3,01
TM70	IM	L	17,1	8,7	3,2	5,6	0,73	1,13	0,110	0,019	0,005	2,41
TM71	IM	L	13,9	7,8	2,3	5,2	0,73	0,66	0,170	0,019	0,005	2,35
TM72	IM	L	12,9	8,3	2,4	4,7	4,29	0,90	0,114	0,019	0,005	2,29
TM73	IM	L	12,5	13,6	1,9	4,3	0,63	1,32	0,115	0,015	0,005	2,05
TM75	IM	L	10,8	19,6	2,5	5,0	0,60	0,43	0,094	0,026	0,008	1,57
TM78	IM	L										
TM79	IM	L	15,8	5,5	2,5	5,7	0,73	1,23	0,090	0,019	0,005	2,77
TM82	IM	L	15,6	11,5	2,3	5,4	0,63	1,08	0,085	0,026	0,010	2,75
TM83	IM	L	18,9	7,5	3,9	7,9		0,19	0,184	0,020	0,014	3,98
TM84	IM	L										
TM86	IM	L	12,7	10,5	2,2	4,5	0,60	1,28	0,088	0,026	0,010	2,17
TM88	IM	L	18,8	13,4	3,6	7,4		0,29	0,112	0,022	0,015	3,60
TM89	IM	L	16,0	7,0	2,7	5,7	0,73	1,15	0,106	0,019	0,007	2,83
TM91	IM	L	17,3	6,4	3,0	6,1	0,77	1,15	0,103	0,020	0,005	3,01
TM92	IM	L	13,9	5,2	3,5	5,7	0,82	0,69	0,114	0,020	0,005	1,93
TM93	IM	L	15,0	6,2	2,6	5,2	0,68	0,94	0,086	0,022	0,005	2,53
TDM4	D	L	15,9	7,4	2,7	5,4	0,70	1,13	0,096	0,023	0,010	2,65
TM29	D	L	14,1	11,1	2,1	5,1	0,72	0,80	0,093	0,012	0,008	2,27
TM30	D	L	15,2	7,3	2,0	5,5	0,82	0,93	0,094	0,016	0,008	2,81
TDM3	G	L	15,9	7,4	3,3	6,2	0,90	0,58	0,124	0,023	0,009	2,99
TM24	G	L	15,2	6,9	2,4	4,9	0,82	0,69	0,114	0,014	0,008	2,29
TM25	G	L	18,1	7,0	2,7	6,7	0,87	0,98	0,106	0,020	0,008	3,49
TM27	G	L	15,0	6,6	2,7	7,6	0,82	1,09	0,111	0,014	0,007	2,17
TM28	G	L	13,1	8,7	2,5	4,8	0,68	0,74	0,161	0,012	0,008	2,11
TM48	G	L	13,9	11,5	2,5	4,9	0,63	2,70	0,090	0,015	0,005	1,39
TM49	G	L	13,7	9,0	3,1	5,0	0,63	1,36	0,103	0,015	0,005	2,35
TM57	G	L	15,8	9,1	3,0	5,7	0,63	1,13	0,114	0,016	0,005	2,65
TM94	G	L	14,1	12,3	2,8	5,8	0,63	0,86	0,114	0,031	0,011	2,23
TM95	G	L	15,0	3,2	2,5	5,7	0,77	0,90	0,077	0,020	0,005	2,65
TM26	PG	L	16,0	5,2	2,1	5,8	0,78	0,94	0,120	0,012	0,007	2,65
TM31	I	L	15,0	0,5	1,1	4,9	0,72	1,55	0,028	0,012	0,007	2,57
TM35	I	L	16,0	0,5	0,8	5,7	0,97	0,85	0,099	0,012	0,007	2,29

Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
TM36	I	L	15,4	0,8	1,6	5,5	0,72	0,92	0,057	0,016	0,007	1,93
TM37	I	L	18,4	0,7	1,0	6,3	1,02	1,06	0,088	0,014	0,007	2,35
TM38	I	L	16,0	0,8	1,0	6,2	0,87	0,73	0,056	0,014	0,008	1,87
TM39	I	L	16,2	0,6	1,3	6,3	0,92	0,86	0,066	0,016	0,008	3,07
TM40	I	L	21,2	0,7	1,0	5,4	0,92	0,92	0,090	0,014	0,007	2,07
TM41	I	L	16,6	0,7	1,3	6,0	0,82	1,02	0,090	0,014	0,007	2,59
Amendolara												
MC1	Brick	L	18,1	12,0	3,0	6,9	0,83	1,56	0,098	0,021	0,008	3,37
Capo Piccolo												
CP	M	P	15,7	8,0	3,9	8,0	1	0,43	0,094	0,037	0,034	2,29
Punta Zambrone												
PZ1	IM	L	15,0	6,7	2,5	5,4	1,22	0,34	0,065	0,04	0,017	1,56
PZ2	I	L	21,4	1,5	0,8	7,6	0,93	1,01	0,035	0,014	0,006	1,23
PZ3	I	L	18,3	1,3	0,7	7,2	1,05	0,51	0,03	0,016	0,006	0,83
PZ4	I	L	18,9	2,4	1,4	7,4	1,02	1,05	0,142	0,014	0,005	1,39
PZ5	I	L	17,4	2,5	1,0	5,4	0,68	1,42	0,03	0,014	0,006	1,33
PZ6	I	L	21,2	1,5	1,2	5,7	0,58	1,48	0,028	0,016	0,006	1,89
PZ7	I	L	24,2	1,8	1,0	9,2	0,93	1,08	0,052	0,012	0,006	1,87
CAMPANIA												
Vivara												
V39	MP	?	9.45	9.65	4.73	4.43	0.63	0.67	0.062	0.063	0.015	2.05
V40	MP	P	11.15	6.16	2.98	5.29	0.58	1.09	0.061	0.047	0.013	2.17
V48	MP	P	10.4	13.71	3.9	5.01	0.77	1.42	0.139	0.039	0.02	1.42
V54	MP	P	13.04	13.85	3.32	5.36	0.8	1.59	0.155	0.037	0.017	<1
V55	MP	P	13.42	10.77	3.73	5.72	0.67	1	0.155	0.034	0.018	2.35
V56	MP	P	9.26	13.99	2.65	3.86	0.58	0.46	0.161	0.031	0.02	1.69
V62	MP	?	17.2	5.88	1.99	5.43	0.63	1.52	0.125	0.021	0.01	3.86
V69	MP	P	17.01	7.13	1.74	5.95	0.8	0.93	0.148	0.028	0.008	3.21
V70	MP	P	18.9	15.39	2.16	6.58	0.73	1.56	0.112	0.022	0.008	3.86
V71	MP	L	16.63	4.34	1.96	3.58	0.8	2.29	0.155	0.015	0.008	3.98
VD2=R1600	MP	?	12.29	1.68	1.66	6.15	0.75	0.67	0.155	0.027	0.022	3.19
VD7	MP	L	12.47	6.44	2.24	6.58	0.78	1.4	0.112	0.02	0.009	4.7
VD8	MP	P	15.31	12.73	3,0	7.29	0.77	1.89	0.106	0.063	0.024	2.83
VR3220=R8	MP	?	15.9	6.9	2.4	7.9	1	1.89	0.08	0.018	0.01	1.33
VR3224=R7	MP	?	13,0	1,0	1.6	6.7	0.58	0.62	0.161	0.025	0.013	2.41
V59	BU	?	17.58	1.54	1.74	5.29	0.63	1.31	0.125	0.026	0.01	2.95
V61	BU	L	18.9	4.76	2.49	7.58	0.77	2.09	0.194	0.027	0.011	4.58
VD6	BU	L	16.44	5.18	2.12	7.29	0.88	1.91	0.12	0.02	0.009	5
VR3212=R2	BU	?	14,0	1,0	2.1	7.4	0.7	1.21	0.125	0.05	0.019	2.23
V1	M	P	15.88	10.91	3.65	7.15	0.58	0.81	0.194	0.035	0.02	3.25
V2	M	P	14.88	11.01	3.35	6.54	0.57	0.83	0.122	0.033	0.02	2.56
V3	M	P	11.58	11.02	2.8	5.63	0.48	0.66	0.087	0.026	0.014	1.88
V4	M	P	18.9	11.19	4.23	8.15	0.68	0.47	0.168	0.035	0.02	3.49
V5	M	P	15.88	9.65	3.56	7.44	0.72	0.93	0.136	0.026	0.015	3.01
V6	M	P	15.5	12.31	3.4	7.15	0.75	0.89	0.139	0.031	0.022	3.01
V7	M	P	15.75	8.98	2.76	7.09	0.6	0.46	0.089	0.028	0.018	2.71
V8	M	?	15.5	5.46	2.16	5.36	0.58	1.17	0.097	0.015	0.013	2.71
V9	M	P	15.69	12.59	3.23	6.94	0.72	0.66	0.155	0.034	0.025	2.89
V10	M	P	16.82	9.79	3.4	7.29	0.75	0.73	0.139	0.034	0.025	3.25
V11	M	P	17.58	13.15	3.35	5.15	0.72	0.38	0.145	0.041	0.027	3.25
V12	M	P	12.39	7.93	2.62	5.8	0.63	0.81	0.098	0.026	0.015	2.48

Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
V13	M	P	17.01	7.83	2.98	6.44	0.67	0.89	0.107	0.032	0.019	3.25
V14	M	P	15.88	9.23	2.98	6.94	0.75	0.67	0.115	0.034	0.022	3.37
V15	M	P	16.82	11.75	4.06	7.44	0.72	0.58	0.094	0.038	0.022	2.89
V16	M	P	15.05	11.14	3.68	7.21	0.69	0.46	0.117	0.038	0.027	3.1
V17	M	P	16.25	8.81	3.32	7.72	0.78	1.08	0.152	0.034	0.025	3.25
V18	M	P	13.89	10.56	3.05	6.86	0.73	1.72	0.128	0.034	0.02	3.32
V19	M	P	14.4	8,0	2.9	7.4	0.73	0.69	0.103	0.035	0.024	3.37
V20	M	P	13.47	12.2	4.06	6.69	0.69	1.28	0.122	0.044	0.028	1.41
V21	M	P	15.42	8.82	3.46	7.98	0.71	0.61	0.12	0.042	0.033	3.3
V22	M	P	14.79	5.93	2.07	5.6	0.62	1.54	0.102	0.022	0.013	2.95
V23	M	P	14.93	7.69	2.19	6.08	0.62	1.29	0.089	0.022	0.014	3.07
V24	M	P	14.93	8.95	3.65	7.08	0.68	0.67	0.103	0.038	0.025	3.72
V25	M	P	16.49	10.42	3.53	8.21	0.66	0.63	0.13	0.036	0.02	3.19
V26	M	P	18.9	12.73	4.48	9.01	0.68	0.57	0.133	0.042	0.025	3.49
V27	M	P	16.63	12.59	4.15	8.29	0.68	0.74	0.142	0.041	0.019	2.71
V28	M	P	13.04	5.04	2.32	6.44	0.57	0.59	0.092	0.035	0.022	1.93
V30	M	P	14.18	9.37	3.07	6.44	0.75	0.81	0.136	0.034	0.025	3.25
V29	M	P	13.9	4.76	3.95	7.46	0.61	1.17	0.129	0.042	0.019	2.84
V31	M	P	17.01	6.86	4.06	7.15	0.68	0.58	0.099	0.05	0.032	3.74
V32	M	P	10.69	11.23	3.49	4.33	0.77	0.32	0.119	0.036	0.018	1.98
V33	M	P	<9	10.07	4.39	2.57	0.97	0.38	0.12	0.034	0.015	<1
V34	M	P	14.18	7.55	2.98	6.44	0.82	0.58	0.12	0.039	0.027	2.95
V35	M	P	16.25	15.11	3.4	6.72	0.77	1.27	0.181	0.034	0.024	1.69
V36	M	P	15.01	3.7	1.76	5.99	0.74	0.99	0.361	0.04	0.017	3.1
V37	M	P	14.6	6.36	4.52	6.18	0.87	0.89	0.085	0.042	0.02	2.94
V38	M	P	16.44	3.01	1.09	6.79	0.72	0.59	0.168	0.031	0.013	3.13
V41	M	P	13.04	4.76	1.61	5.43	0.58	0.34	0.155	0.037	0.011	2.77
V42	M	P	13.35	0.75	2.31	6.06	0.6	0.5	0.181	0.04	0.009	2.23
V43	M	P	13.42	8.67	3.32	5.58	0.63	0.53	0.089	0.039	0.011	2.65
V44	M	P	11.91	3.5	1.62	5.36	0.63	0.26	0.101	0.037	0.033	2.83
V45	M	P	16.54	7.24	3.85	6.38	0.69	0.47	0.076	0.044	0.027	3.44
V46	M	P	12.85	3.36	2.65	4.79	0.82	0.96	0.049	0.027	0.011	1.99
V47	M	P	15.12	6.86	3.07	6.59	0.85	0.62	0.121	0.031	0.02	3.16
V49	M	?	10.58	3,0	1.56	13.46	0.5	0.33	0.061	0.059	0.033	2.22
V50	M	P	13.8	8.53	3.23	5.72	0.82	0.54	0.127	0.034	0.031	2.95
V51	M	P	15.88	9.79	2.62	6.86	0.82	0.7	0.132	0.034	0.022	3.01
V52	M	P	14.18	14.69	4.15	6.29	0.77	1.89	0.129	0.034	0.02	1.04
V53	M	P	12.66	13.71	3.48	4.72	0.72	0.55	0.132	0.034	0.031	2.63
V57	M	P	13.61	6.44	2.5	4.72	0.72	0.6	0.12	0.044	0.036	2.89
V58	M	P	16.07	10.07	3.81	6.15	0.63	0.74	0.152	0.034	0.02	3.55
V60	M	P	16.07	8.11	2.6	6.58	0.72	1.17	0.136	0.037	0.02	3.01
V64	M	P	14.74	12.45	3.15	7.29	0.83	0.92	0.142	0.039	0.017	3.07
V65	M	P	14.36	3.99	1.16	5.93	0.87	0.82	0.139	0.037	0.017	2.29
V66	M	P	15.5	13.99	3.48	7.87	0.83	1.06	0.148	0.037	0.02	3.25
V67	M	P	12.85	7,0	2.12	5.58	0.83	0.96	0.413	0.034	0.02	2.65
V68	M	P	13.23	18.19	3.56	5.79	0.83	0.84	0.174	0.037	0.017	2.63
VD1	CW	L	16.44	4.9	2.07	7.58	0.77	0.61	0.112	0.039	0.019	4.1
VD10	CW	L	13.8	6.16	2.24	6.72	0.77	0.55	0.128	0.02	0.01	4.94
VD11=R1604	CW	?	12.66	11.61	5.31	8.29	0.85	2.02	0.168	0.044	0.017	2.83
VD12	CW	?	13.23	7.55	2.07	6.58	0.97	1.59	0.068	0.02	0.009	0.96
VD3	CW	L	15.69	10.77	2.16	7.01	0.9	1.13	0.054	0.027	0.01	4.1

Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
VD4	CW	?	13.61	7.69	2.98	7.44	1.08	1.48	0.084	0.023	0.01	2.41
VD9	CW	?	15.31	8.81	2.52	8.15	1.08	2.13	0.083	0.023	0.009	2.23
VR3219=R5	CW	?	18,0	5,0	2.8	8.7	0.62	1.27	0.258	0.042	0.024	2.95
VR3222=R4	CW	?	18.9	2.8	1.8	7.7	0.68	0.84	0.053	0.026	0.01	2.89
VR3223=R1	CW	?	14,0	8.4	3.7	8.3	0.67	2.21	0.265	0.039	0.013	1.81
VR3235=R6	CW	?	15.3	2,0	1.4	5.6	0.63	1.81	0.098	0.022	0.01	3.07
VR3242=R3	CW	?	13.2	9.7	3.8	7.9	0.62	2.1	0.161	0.045	0.019	1.93
V63	?	?	17.58	5.95	2.52	7.15	0.82	1.21	0.114	0.034	0.018	3.8
VD5	?	L	19.47	3.22	1.86	8.01	0.85	2.16	0.12	0.02	0.01	5.66
Casale Nuovo												
CNU3	M	P	15,3	14,8	4,0	8,2	0,99	1,25	0,138	0,031	0,017	1,09
CNU1	IM	?	15,9	6,4	3,2	9,7	1,17	0,98	0,148	0,037	0,019	3,01
CNU2	IM	L	13,6	6,1	2,7	6,3	1,01	0,52	0,156	0,028	0,017	2,48
CNU4	IM	L	13,9	6,8	2,4	7,8	1,12	0,5	0,162	0,043	0,019	2,66
CNU5	IM	L	14,0	3,8	3,4	8,7	0,97	0,31	0,181	0,015	0,006	0,71
CNU6	IM	?	11,3	6,4	3,5	7,2	1,25	0,55	0,141	0,044	0,022	2,11
CNU7	I	L	15,1	2,5	1,1	4,4	1,70	0,25	0,044	0,026	0,008	1,57
CNU8	I	L	12,9	1,8	0,5	4,8	0,55	1,35	0,010	0,019	0,006	2,11
CNU9	I	L	11,3	2,8	1,4	6,9	1,08	0,93	0,081	0,026	0,008	1,83
CNU10	I	L	10,2	2,8	1,3	6,1	0,83	0,88	0,056	0,027	0,008	1,57
CNU11	I	L	13,4	2,2	1,1	7,3	0,97	0,96	0,056	0,026	0,006	2,11
CNU12	I	L	15,3	7,7	3,1	6,2	1,00	0,88	0,083	0,026	0,008	2,59
VENETO												
Frattesina												
FRA1	IM	L/R?	14,0	30,0	1,2	2,9	0,6	0,52	0,108	0,01	0,003	1,99
FRA2	IM	L/R	24,2	10,3	2,0	6,2	0,8	1,13	0,079	0,014	0,005	4,16
Montagnana												
MON1	IM	L/R?	13,4	30,0	1,4	2,7	0,63	0,53	0,11	0,012	0,005	2,23
SICILY												
Milena												
MIL57	M	CC/P	15,1	9,7	4,4	6,4	0,58	1,23	0,174	0,056	0,031	2,91
MIL56	IM	L	19,9	8,8	1,9	7,2	0,63	1,21	0,048	0,023	0,009	2,71
MIL	I	L	17,0	6,4	1,8	5,4	0,58	0,84	0,071	0,023	0,009	2,53
MIL	I	L	17,2	8,1	1,7	5,7	0,85	1,05	0,039	0,023	0,007	2,65
MIL	I	L	19,9	11,2	1,7	6,0	0,9	0,43	0,039	0,016	0,007	2,41
MIL	I	L	18,9	11,2	1,3	5,9	0,78	0,7	0,11	0,014	0,007	2,65
MIL	I	L	17,4	8,7	1,5	5,2	0,9	0,53	0,059	0,018	0,007	2,41
MIL	I	L	17,4	12,6	1,4	5,4	0,87	0,39	0,034	0,018	0,007	2,17
MIL	I	L	11,3	15,4	1,3	3,0	0,8	0,42	0,103	0,016	0,006	1,66
MIL	I	L	17,2	14,0	2,0	5,2	0,95	0,51	0,043	0,018	0,006	2,89
MIL	I	L	18,1	12,6	1,6	5,5	0,83	0,61	0,039	0,016	0,007	3,04
MIL	I	L	20,8	11,8	1,5	6,2	0,87	0,59	0,059	0,018	0,006	3,62
MIL	I	L	18,1	12,6	2,2	5,7	0,95	0,56	0,034	0,018	0,007	3,19
MIL	I	L	18,0	8,8	1,6	5,3	0,87	0,67	0,057	0,016	0,007	2,53
SARDINIA												
Orosei Area												
O21	M	P	19,5	14,3	3,9	9,6	0,78	0,59	0,148	0,034	0,011	3,07
O22	M	P	18,7	12,0	4,0	9,2	0,83	0,39	0,142	0,034	0,012	3,13
O23	M	P	17,4	12,2	4,3	8,4	0,8	0,3	0,105	0,039	0,015	3,37
O24	M	P	15,5	14,7	3,6	7,6	0,72	0,44	0,136	0,034	0,024	2,95
O25	M	P	15,1	13,6	3,5	5,7	1,38	0,64	0,132	0,048	0,023	3,93

Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
O26	M	P	13,6	18,4	3,3	5,4	0,94	0,67	0,165	0,05	0,047	3,56
O27	M	P	11,3	13,3	3,2	5,0	0,73	0,54	0,139	0,034	0,012	2,53
O28	M	P	13,2	12,2	4,2	6,0	0,87	0,54	0,136	0,037	0,011	2,05
O29	M	P	14,9	14,4	4,0	6,7	0,78	0,93	0,129	0,037	0,011	2,05
O30	M	P	19,5	7,7	3,8	9,6	0,87	0,66	0,132	0,037	0,012	2,77
O31	M	P	15,1	12,0	4,2	7,6	0,78	0,67	0,129	0,039	0,011	2,95
O32	M	P	16,3	13,2	4,2	7,7	0,83	0,51	0,138	0,039	0,016	3,25
O33	M	P	14,7	12,5	3,8	6,9	0,73	0,61	0,129	0,037	0,027	2,99
Nuraghe Arrubiu												
ORL1	M	P	20,8	16,1	3,2	6,9	0,83	0,58	0,107	0,034	0,012	4,28
ORL2	I	L	14,9	1,3	1,5	5,2	0,93	0,78	0,049	0,016	0,008	1,75
ORL3	I	L	26,5	2,9	1,1	13,2	1,8	1,55	0,297	0,029	0,01	1,45
ORL4	I	L	19,1	2,0	1,4	9,2	1,05	1,2	0,081	0,02	0,01	2,02
ORL5	I	L	19,3	1,3	1,4	6,2	0,73	1,31	0,035	0,012	0,005	2,53
Nuraghe Antigori												
AN1	M	P	10,6	12,5	4,1	3,9	0,73	1,16	0,088	0,04	0,010	2,47
AN5	M	P	12,9	15,0	3,2	5,4	0,67	0,97	0,142	0,038	0,010	2,35
AN6	M	P	8,9	12,0	4,8	4,3	0,67	0,73	0,187	0,028	0,010	1,66
AN10	M	P	12,3	15,0	3,7	6,0	0,73	1	0,136	0,038	0,030	2,65
AN19	M	P	9,6	14,0	3,2	5,0	0,49	1,05	0,077	0,06	0,040	3,74
AN22	M	P	13,8	13,0	3,2	6,2	0,67	1,89	0,142	0,045	0,010	1,57
AN32	M	P	17,4	9,0	4,1	9,2	1,05	1,82	0,165	0,038	0,010	2,29
AN35	M	P	17,0	8,0	2,7	8,6	0,93	0,66	0,096	0,038	0,010	3,01
AN36	M	P	18,5	10,0	2,6	8,3	0,88	1,37	0,129	0,042	0,020	3,25
AN41	M	P	21,2	7,0	3,3	8,2	0,93	1,05	0,094	0,042	0,020	2,35
AN43	M	P	10,2	15,0	3,0	5,7	0,77	0,74	0,077	0,038	0,020	1,93
AN47	M	P	11,9	9,0	5,1	5,8	0,88	0,7	0,181	0,022	0,020	1,81
AN58	M	P	14,4	10,0	4,0	6,3	0,73	2,97	0,108	0,032	0,010	2,87
AN61	M	P	17,0	11,0	3,9	7,2	0,81	1,13	0,132	0,024	0,010	3,09
AN3	M	WC	11,9	1,0	0,5	1,0	1,03	0,65	0,013	0,026	0,010	1,33
AN9	M	WC	12,7	1,0	0,9	2,9	0,82	0,82	0,017	0,026	0,020	2,23
AN18	M	WC	14,2	3,0	1,0	1,7	0,82	0,58	0,018	0,025	0,010	1,69
AN23	M	CC	12,9	13,0	8,2	7,9	0,73	1,44	0,148	0,083	0,030	1,23
AN26	M	WC	19,5	1,0	0,9	2,5	1,22	0,53	0,034	0,023	0,010	1,84
AN27	M	WC	18,9	3,0	1,1	2,4	1,28	0,44	0,025	0,026	0,010	1,78
AN57	M	CC	15,1	13,0	4,7	6,4	0,82	1,29	0,09	0,039	0,020	2,77
AN62	M	WC	15,5	0,0	1,6	6,9	0,82	0,77	0,015	0,022	0,010	1,92
AN54	BR	?	18,7	5,0	3,2	7,6	1,02	0,97	0,189	0,018	0,010	3,3
AN55	BR	?	17,2	4,0	5,4	8,2	0,6	1,75	0,108	0,019	0,010	0,7
AN48	P	L	12,3	12,0	7,8	8,6	0,83	2,43	0,349	0,088	0,010	1,19
AN49	P	S Cy	15,3	10,0	5,6	7,3	0,83	1,91	0,094	0,05	0,030	2,31
AN44	P	CC	19,5	2,0	1,0	6,7	0,73	2,09	0,068	0,014	0,010	2,02
AN2	IM	L	20,4	1,0	1,2	7,7	0,63	1,21	0,028	0,018	0,010	1,87
AN4	IM	L	16,4	1,0	0,9	4,3	0,58	1,28	0,03	0,022	0,010	3,62
AN7	IM	L	18,6	2,0	1,7	6,4	0,89	1,05	0,112	0,03	0,040	1,85
AN8	IM	L	18,0	1,0	1,2	6,7	0,7	0,81	0,219	0,02	0,040	1,81
AN11	IM	L	19,5	1,0	1,4	7,3	0,63	1,35	0,054	0,026	0,120	2,11
AN12	IM	L	15,3	1,0	1,7	10,9	0,82	1,48	0,148	0,023	0,20	2,53
AN13	IM	L	21,7	2,0	1,3	15,0	0,67	0,98	0,112	0,023	0,20	1,59
AN14	IM	L	24,6	1,0	1,3	15,0	0,88	0,94	0,085	0,023	0,20	1,39
AN15	IM	L	24,2	1,0	1,7	15,0	0,73	0,97	0,084	0,023	0,20	1,69

Sample	Ware	Suggested origin	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
AN16	IM	L	14,2	5,0	1,5	15,0	0,82	0,85	0,052	0,038	0,20	2,05
AN17	IM	L	24,0	1,0	0,8	15,0	0,67	0,71	0,075	0,023	0,20	1,21
AN20	IM	L	11,5	4,0	2,5	9,0	0,97	0,85	0,115	0,037	0,20	2,83
AN24	IM	L	26,8	1,0	1,4	9,6	0,72	1,78	0,088	0,016	0,010	1,87
AN25	IM	L	24,2	2,0	1,9	9,4	0,82	0,5	0,045	0,014	0,010	1,14
AN28	IM	L	14,6	11,0	2,2	6,4	0,78	0,86	0,158	0,035	0,010	2,41
AN29	IM	L	21,7	1,0	1,0	7,3	0,67	1,75	0,046	0,014	0,010	2,23
AN30	IM	L	28,4	1,0	1,6	10,4	0,78	0,86	0,114	0,016	0,010	1,9
AN31	IM	L	24,6	1,0	1,4	8,6	0,73	0,98	0,08	0,014	0,000	1,93
AN33	IM	L	19,5	3,0	0,5	7,0	0,6	1,78	0,058	0,016	0,010	2,13
AN34	IM	L	24,6	2,0	1,2	8,4	0,77	1,89	0,074	0,016	0,010	1,75
AN37	IM	L	26,1	1,0	1,3	9,3	0,85	0,77	0,161	0,014	0,010	2,02
AN38	IM	L	26,8	1,0	1,3	9,2	0,85	0,75	0,163	0,016	0,010	2,02
AN39	IM	L	29,3	1,0	1,2	10,4	0,82	2,02	0,155	0,014	0,010	2,35
AN40	IM	L	24,2	2,0	1,1	9,0	0,78	1,78	0,097	0,014	0,010	1,87
AN42	IM	L	25,0	1,0	1,3	9,6	0,78	1,31	0,09	0,014	0,010	1,71
AN45	IM	L	14,0	4,0	1,7	4,4	0,7	1,55	0,076	0,009	0,010	2,95
AN46	IM	L	12,9	11,0	2,4	4,2	0,82	1,64	0,057	0,014	0,010	2,29
AN59	IM	L	24,2	2,0	1,7	9,2	0,78	1,75	0,107	0,006	0,010	2,35
AN60	IM	L	24,6	3,0	1,8	9,6	0,73	1,73	0,068	0,005	0,010	1,66
AN21	I	L	17,6	4,0	2,0	8,9	0,73	3,1	0,139	0,016	0,000	1,27
AN50	I	L	13,8	10,0	1,7	4,3	0,6	1,62	0,085	0,009	0,010	2,95
AN51	I	L	17,2	5,0	2,5	6,2	0,65	2,9	0,106	0,005	0,010	2,02
AN52	I	L	19,3	4,0	2,2	8,3	1	2,02	0,161	0,019	0,010	1,78
AN53	I	L	18,5	5,0	1,8	8,4	0,78	2,7	0,079	0,005	0,010	1,8
Nuraghe Domu s'Orku												
DO1	M	CC	17,0	10,4	5,2	7,9	0,83	2,13	0,103	0,05	0,023	3,31
DO2	M	CC	17,2	9,5	5,0	8,3	0,82	1,95	0,097	0,05	0,020	3,31
DO3	IM	L	20,8	2,1	1,1	7,7	0,68	1,35	0,071	0,003	0,003	1,83
DO4	IM	L	19,9	7,8	2,8	6,6	0,97	1,13	0,121	0,017	0,006	3,04
DO5	IM	L	13,8	6,9	2,5	6,6	0,62	1,05	0,133	0,051	0,023	2,31
Pozzomaggiore												
34	M	P	15,5	9,9	3,2	5,9	0,53	1,13	0,142	0,031	0,011	4,58
San Imbenia												
F131	IM?	L?	17,4	9,0	2,0	4,9	0,78	1,13	0,168	0,012	0,006	2,65
Impasto 1	I	L	16,6	4,1	1,7	4,3	0,68	1,59	0,052	0,014	0,008	1,45
Impasto 2	I	L	15,1	1,8	1,4	4,2	0,83	1,55	0,032	0,02	0,006	1,89
Impasto 3	I	L	14,4	2,5	1,5	5,2	0,77	0,34	0,061	0,019	0,008	1,69

Reference data (AAS) x = mean; s.d. standard deviation; number of samples in brackets										
Sample	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
Mycenae (LH IIIB fine wares)										
mean (18)	16,7	15,6	3,8	7,7	0,72	0,94	0,097	0,035	0,022	3,48
s.d.	0,8	1,9	0,3	0,4	0,03	0,41	0,013	0,003	0,004	0,25
Thebes (LH IIIB fine wares)										
mean (19)	16,3	14,0	4,9	7,7	0,67	0,84	0,089	0,059	0,052	2,97
s.d.	1,7	2,8	1,1	0,5	0,04	0,45	0,013	0,02	0,018	0,49
Knossos (MM-EIA fine wares)										
mean (35)	14,8	8,6	8,5	9	0,84	0,86	0,122	0,076	0,052	2,2
s.d.	1,2	0,21	1,1	0,6	0,09	0,19	0,012	0,008	0,016	0,5
Chania (coarse wares)										
mean (13)	15,4	0,7	0,8	6,0	0,89	0,39	0,034	0,02	0,009	1,83

Sample	Al	Ca	Mg	Fe	Ti	Na	Mn	Cr	Ni	K
s.d.	2,8	0,5	0,3	1,5	0,18	0,11	0,031	0,004	0,002	0,4
Chania (plain wares)										
mean (15)	16,4	5,9	1,6	6,6	1,09	0,78	0,056	0,019	0,011	2,36
s.d.	1,4	3,4	0,4	0,9	0,09	0,15	0,025	0,002	0,002	0,32
Kephallonia, Argostoli (LM IIIC fine wares)										
mean Group A (12)	13,2	7,7	2,0	5,7	1,05	0,98	0,041	0,042	0,013	1,91
s.d.	4,4	1,4	0,5	0,86	0,09	0,23	0,011	0,006	0,003	0,43
Kephallonia, Argostoli (LM IIIC fine wares)										
mean Group B (9)	15,7	5,3	3,8	6,4	1,16	1,24	0,10	0,047	0,016	2,08
s.d.	3,2	2,4	0,5	1,3	0,09	0,51	0,016	0,007	0,002	0,61
Trianda, Rhodes (LB I plain wares)										
mean (10)	11,2	12,6	11,6	8,0	0,81	1,41	0,11	0,105	0,099	2,25
s.d.	1,8	1,7	0,8	0,4	0,05	0,26	0,015	0,02	0,02	0,62
Ay. Demetrios, Cyprus (LC II pithos)										
mean (5)	11,5	17,6	6,0	7,4	0,76	1,41	0,168	0,126	0,013	0,91
s.d.	2,7	5,3	1,4	1,3	0,1	0,25	0,014	0,08	0,002	0,19
Maroni, Cyprus (LC II pithos)										
mean (5)	10,2	21,1	4,7	6,6	0,81	1,0	0,158	0,117	0,012	1,28
s.d.	1,6	4,3	1,0	1,4	0,18	0,36	0,035	0,1	0,001	0,42
Maa, Cyprus (LC II pithos)										
mean (5)	8,5	9,3	3,0	6,3	0,51	0,83	0,135	0,022	0,025	2,47
s.d.	0,8	1,2	0,4	0,2	0,1	0,15	0,003	0,01	0,001	0,18
Cypriot pithos Kommos	14,2	10,0	6,8	9,7	0,96	1,62	0,187	0,19	0,016	1,33
Reference data (OES)										
Knossos (LM IIIB fine wares)										
mean (20)	17,6	13,2	6,4	10,0	0,92	1,23	0,092	0,064	0,058	
s.d.	3,1	4,3	1,6	1,3	0,12	0,34	0,022	0,01	0,01	
Chania (LM White ware)										
mean (10)	15,8	0,5	0,6	1,8	1,02	0,82	0,025	0,015	0,018	
s.d.	2,2	0,2	0,2	0,5	0,15	0,24	0,006	0,004	0,002	
Kommos (LM III fine wares)										
mean (20)	18,8	13,8	5,4	9,9	1,01	1,67	0,098	0,064	0,051	
s.d.	2,7	3,4	1,0	1,4	0,12	0,62	0,022	0,011	0,011	
Routsi, Messenia (LH I-II plain wares)										
mean (5)	15,8	2,0	1,4	9,1	0,75	0,69	0,075	0,046	0,028	
s.d.	1,7	0,5	0,5	0,5	0,04	0,016	0,03	0,006	0,006	

Database 2: INAA data (ppm of element unless otherwise stated)

P Peloponnese; WG West Greece; CG Central Greece; CC Central Crete; R Rhodes; CY Cyprus; IMP Import; L Local; L/R Local/Regional												
Sample	Ware	Suggested Origin	Na	K	Sm	La	Cr	Fe	Co	Rb	Sb	Cs
			Sodium	Potassium	Samarium	Lanthanum	Chromium	Iron	Cobalt	Rubidium	Antimony	Caesium
APULIA												
Manaccora												
MAN1	MP	P	8555	43250	7,86	41,3	227	56617	37,8	145		7,22
MAN2	MP	P	9356,8	40639	6,46	40,2	232	55250	39,0	139		7,48
MAN3	M	P	9722,3	27817	6,21	31,4	347	51168	26,6	137		6,26
MAN4	M	P	11673	36131	6,76	33,3	238	53720	27,8	154		7,44
MAN5	PG	L	11352	36089	4,50	24,7	108	44569	10,6	176	0,5	6,31
MAN426	I	L	5693	21463	16,73	106,4	93	53099	14,9	195	1,2	17,97
MAN431	I	L	8588,1	24206	14,89	95,0	143	58309	19,3	231	1,0	14,55
MAN627	I	L	8107,8	40630	15,79	99,0	139	57416	19,6	199	1,6	16,71
MAN1007	I	L	5605	22225	9,78	69,0	96	48283	13,9	140	1,2	13,09
Coppa Nevigata												
CN303	M	P	6070,8	24009	6,54	32,8	205	53566	26,1	160	0,7	10,90
CN310	M	P	6865,3	25688	9,95	40,8	229	58843	32,3	207	0,8	12,82
CN71	IM	L	6911,4	23576	5,05	29,3	94	32286	10,5	98	0,3	4,18
CN72	IM	L	7582,7	22473	4,78	26,7	82	27792	7,1	100	0,3	3,84
CN301	IM	L	7374,2	19821	4,79	27,8	81	26753	6,3	92		4,11
CN302	IM	L	5862,7	21558	4,99	29,8	108	33860	11,8	91		4,64
CN304	IM	L	6191,3	25447	6,24	37,2	164	53121	17,0	146		7,52
CN305	IM	L	8258,2	22181	5,29	29,8	99	31073	8,9	96	0,3	5,04
CN308	IM	L	9572,7	23472	7,53	32,4	145	43824	15,9	135	0,5	6,24
CN309	IM	L	10903	22411	8,22	35,7	126	42112	14,7	133	0,4	6,33
CN311	IM	L	9941	24092	5,60	32,6	111	33750	9,2	127	0,6	5,58
CN312	IM	L	12722	19258	5,78	27,6	91	29034	7,3	100	0,4	4,13
CNS165	IM	L	11837	19335	5,13	28,7	108	36707	11,1	97	0,2	4,46
CN306	G	L	9016,1	22390	6,21	38,3	125	50638	18,1	121	0,3	5,28
CN307	G	L	11301	24558	6,76	38,6	132	50037	17,8	124	0,6	5,56
CNS125	PG	L	11481	20691	5,18	32,6	121	41117	12,4	109	0,2	5,95
CNS126	PG	L	8838,1	21239	5,49	32,4	128	43051	14,1	114	0,3	5,36
CNS147	PG	L	9264	17683	5,26	30,8	123	41595	12,7	101		5,55
CNS735	PG	L	11296	24852	6,97	31,7	111	35455	9,9	144	0,4	4,96
CNS1265	PG	L	10013	16827	5,48	35,5	132	43016	12,8	102	0,2	6,11
CNS1275	PG	L	9646,6	18249	7,71	34,0	148	45776	15,6	141		6,42
CN2	I	L	10800	23582	4,95	30,5	32	20054	9,0	58	0,2	2,19
CN11	I	L	6854,8	27646	9,56	69,0	104	52995	15,1	160	0,,4	11,74
CN18	I	L	6634,4	21959	5,45	38,5	90	34956	12,1	102	0,3	5,77
CN21	I	L	11804	29690	5,25	41,1	99	39640	13,6	134	0,3	9,94
CN36	I	L	6193,4	23695	8,86	55,1	157	44433	13,3	147	0,5	14,04
CN98	I	L	12564	27807	5,54	38,2	78	32650	12,1	146	0,3	9,71
CN115	I	L	6952,6	28595	7,66	57,3	70	48310	9,1	200	0,4	11,73
PT1	M	P	7870,1	19976	5,75	33,0	226	48151	23,2	112		4,64
PT2	IM	L	7724,2	15535	5,31	31,7	144	35774	13,6	103		5,52
PTI1	I	L	8997,4	15855	10,91	48,1	114	43865	10,2	143		6,45
PTI2	I	L	7026,6	18035	19,10	82,9	135	65343	27,5	197		11,41
PTI3	I	L	6360,2	12109	10,89	66,9	111	50110	14,9	95		6,76
PTI4	I	L	7383,9	14583	8,36	46,8	103	40863	13,2	130		5,92
PTI5	I	L	5865,2	14775	9,22	47,6	123	52034	13,9	146	1,1	7,48
Otranto												
OTR 2	M	P	10600	20645	5,86	32,7	429	56418	27,6	148		7,12
Torre Castelluccia												
TCA13	IM?	L	8005,8	10125	4,52	28,1	149	38359	13,5	47		4,39
TCA2	D	L	10236,0	17117,0	6,61	37,9	128	44672	14,3	129	0,6	6,56
TCA3	D	L	8838	22470	5,79	34,2	129	48179	18,0	139	0,7	6,61

Ce	Eu	Tb	Lu	Hf	Ta	Pa	Sc	Yb	Th	U	As	Ca	SAMPLE
Cerium	Europium	Terbium	Lutetium	Hafnium	Tantalum	Protoactinium	Scandium	Ytterbium	Thorium	Uranium	Arsenic	Calcium	
APULIA													
75,5	1,54	0,8	0,43	4,97	1,5	14,6	22,87	3,93		0,86			MAN1
72,5	1,61	0,7	0,52	4,67	1,4	14,1	22,20			3,38			MAN2
67,2	1,36		0,49	4,18	1,1	12,0	19,32						MAN3
72,4	1,34	0,7	0,57	4,95	1,2	14,0	20,75						MAN4
53,3	1,07	0,8	0,43	4,92	1,3	12,0	12,80	2,61		0,50			MAN5
226,1	3,03	1,8	0,79	9,80	3,1	43,1	14,38	5,67		1,33			MAN426
195,2	2,66	1,7	0,69	9,87	3,1	37,4	17,18	5,20		1,08			MAN431
200,4	3,02	1,8	0,76	9,11	2,8	47,8	16,58	5,28		0,81			MAN627
128,1	2,22	1,2	0,53	8,63	2,6	35,3	14,63	3,82		0,78			MAN1007
84,9	1,66	0,9	0,50	0,50	1,5	15,1	19,81						CN303
83,3	1,71	1,3	0,51	5,31	1,3	17,5	22,11						CN310
59,5	1,08	0,6	0,32	0,50	1,1	10,7	11,74	3,01					CN71
50,7	1,06	0,6	0,31	0,50	1,0	9,9	10,25	2,48					CN72
55,5	1,10	0,6	0,33	0,50	0,9	9,8	10,29	2,81					CN301
63,3	1,15	0,7	0,32	0,51	1,0	10,9	12,45						CN302
81,1	1,56	1,0	0,40	0,56	1,4	15,5	18,76	4,74					CN304
67,4	1,25	0,6	0,32	0,56	1,3	11,8	11,89	3,28					CN305
73,5	1,37	1,0	0,34	4,85	1,3	14,1	17,09						CN308
72,4	1,43	1,1	0,36	6,35	1,2	14,8	15,26						CN309
68,8	1,28	0,8	0,36	5,06	1,2	12,5	13,41	2,69					CN311
59,2	1,22	0,8	0,35	4,88	1,1	10,8	11,70	2,46	0,52				CN312
59,9	1,19	0,8	0,28	0,42	1,1	10,0	13,14						CNS165
81,6	1,38	0,8	0,36	0,62	1,4	13,2	16,12	4,03					CN306
84,0	1,36	0,9	0,56	5,19	1,4	14,1	16,75						CN307
69,7	1,37	0,8	0,34	0,52	1,2	12,7	14,52	3,11					CNS125
69,8	1,29	0,7	0,32	0,45	1,1	10,8	15,19						CNS126
70,9	1,23	0,8	0,29	0,49	1,2	11,6	14,55						CNS147
63,4	1,32	1,0	0,34	5,60	1,1	12,6	13,39						CNS735
65,4	1,34	0,8	0,30	0,45	1,3	12,5	15,17	4,13					CNS1265
79,3	1,43	1,1	0,39	4,82	1,2	14,0	17,57						CNS1275
53,0	0,85	0,4	0,21	0,30	0,7	8,6	5,60	1,72					CN2
174,6	2,22	1,2	0,61	0,97	2,3	33,1	14,76	5,32					CN11
82,0	1,34	0,8	0,34	0,44	1,2	14,3	11,35	2,62					CN18
81,6	1,38	0,7	0,30	0,43	1,4	19,0	13,47	3,00					CN21
211,6	1,70	0,8	0,45	0,87	1,9	34,0	12,38	4,31					CN36
89,7	1,29	0,7	0,28	0,49	1,4	20,2	10,95	2,18					CN98
114,6	1,58	0,9	0,36	0,88	2,2	30,6	12,31	3,67					CN115
64,9	1,29	0,8	0,42	2,79	0,9	9,8							PT1
53,3	1,18	0,8	0,32	3,82	1,1	10,2							PT2
90,7	1,97	1,2	0,38	5,70	1,6	20,7	14,07						PTI1
212,2	3,48	2,2	0,76	7,16	1,7	27,4	18,56						PTI2
138,0	2,48	1,7	0,51	5,34	1,5	20,9	13,83						PTI3
94,0	1,89	1,2	0,41	5,78	1,4	2,0	12,84						PTI4
85,6	2,24	1,4	0,56	7,46	1,4	24,5	16,11						PTI5
79,4	1,45	0,5	0,70	3,94	1,1	11,4							OTR 2
52,4	1,20	0,7	0,35	3,28	0,9	9,6	12,28						TCA13
69,6	1,25	0,9	0,45	5,25	1,3	13,9	16,11	2,87		2,28			TCA2
63,2	1,28	1,0	0,43	5,61	1,3	14,6	17,00						TCA3

Sample	Ware	Suggested Origin	Na	K	Sm	La	Cr	Fe	Co	Rb	Sb	Cs
TCA5	D	L	11199	25899	6,14	35,8	130	50999	16,9	133		6,68
TCA14	D	L	10851	25416	6,28	40,4						
TCA6	B	L	9936,2	25751	6,60	38,2	140	55128	20,2	154	0,7	6,99
TCA7	B	L	10934,0	36638,0	8,24	33,2	129	46992	15,5	148	1,0	5,41
TCA8	B	L	9294	22247	5,92	35,4	137	51536	18,6	139	0,7	6,49
TCA11	B	L	9021,9	21339	6,06	35,6	135	46474	15,2	137		6,78
TCA9	PG	L	6438,9	14554	4,75	28,9	172	38385	14,8	99		5,13
TCA10	PG	L	8669,2	20480	5,86	36,5	128	45414	15,5	143		7,89
TCA12	PG	L	9333,1	22863	7,56	34,5	125	44094	14,7	124		6,28
TCA15	PG	L	10374	23816	7,89	34,0	124	43501	14,2	122		6,13
TCA19	PG	L	3811	14316	4,32	27,1	132	36001	15,2	80		4,38
TCA20	PG	L	9092,1	20688	5,98	38,6	148	40318	12,9	130		5,86
TCA21	PG	L	9233,6	18703	6,04	37,6	130	47690	15,6	111		5,99
TCA16	I	L	6026,8	23047	8,01	50,8	110	47751	13,1	178		10,71
TCA17	I	L	5675,8	20888	7,03	44,2	100	44523	11,9	153		10,31
TCA18	I	L	6297,8	18687	10,30	48,7	118	61133	32,1	129	1,2	8,72
Porto Perone - Satyrion												
PP16	MP	P	9294,4	20059	7,97	37,7	321	73307	23,9	129		7,42
PP17	P		4542,7	20442	6,20	36,0	168	41376	28,0	97		4,72
PP23	P		5211,6	18493	5,22	29,8	276	45656	16,0	97		4,56
PP24	IM	L	9940,4	16924	5,06	35,1	159	59054	15,5	111		5,62
PP25	IM	L	9135,3	16324	5,50	35,0	153	38117	14,3	112		5,44
PP26	IM	L	10681	20470	6,09	36,2	196	41446	16,6	130		6,06
PP27	IM	L	8488	18871	5,15	30,9	198	35816	16,6	103		4,93
PP28	IM	L	11469	19740	5,76	30,9	179	42245	16,5	120	0,5	6,14
PP12	D	L	8320,2	16054	4,54	28,2	144	29577	11,2	92		4,04
Taranto S. Domenico												
SDO2	D?	L	6514,1	26001	6,75	30,1	193	49268	19,2	137	0,8	5,73
SDO1	PG	L	6316,1	20195	5,02	28,6	166	43162	16,9	133	0,7	6,82
SDO3	I	L	9690,5	26455	8,14	39,2	132	53945	19,2	159	1,2	7,47
Lugovivo												
LV2	I	L	10030	25969	7,16	45,1	136	60209	17,4	177	1,2	10,09
Scoglio del Tonno												
ST42	M	P	13016	14614	5,84	32,7	291	61726	30,1	103	0,7	9,34
ST43	M	P	10484	25464	5,54	30,5	285	59206	29,6	157		9,04
ST44	M	P	60415	22753	5,12	31,4	310	58891	26,1	175		8,79
ST47	M	P	6228,9	20131	4,97	27,0	221	51330	25,6	146	0,4	9,78
ST54	M	P	2221,7	16615	11,66	61,8	163	95545	25,5	160	1,5	8,65
ST41	M	CG/A	11240	26228	6,50	34,5	454	56762	34,8	159	2,8	8,20
ST40	M	R	10508	11459	3,81	20,7	1525	54905	40,2	59	0,3	3,38
ST48	M	R	39622	66261	2,51	14,7	1969	52365	60,3	46		2,49
ST50	M	R	6423,4	13041	3,70	19,2	1093	73390	88,3	58	0,4	3,88
ST52	M	R	68394	80381	3,35	17,8	1023	58802	79,0	19		2,59
ST57	M	R	4760,4	6320	3,20	17,4	969	63487	84,5	36	0,5	2,95
ST46	M	CY	5121,4	9216	3,59	19,2	2964	62443	69,0	52		3,30
ST49	M	CY	4410,3	7489	3,82	20,0	3258	57345	72,7	54	0,4	2,62
ST58	M	?	52933	46773	2,71	16,0						
ST55	M?	?	90195	18849	5,46	32,7	230	45627	20,8	124		6,21
ST56	M?	?	73218	8153	2,91	17,3	831			57		1,87
ST28	IM	L	16896	23314	7,38	63,1	218	41656	16,5	158		10,79
ST45	IM	L	15190	31735	8,49	63,5	182	54898	17,5	201	1,4	11,92
ST51	IM	L	10060	21769	5,79	32,0	170	41854	15,6	120	0,4	6,10
ST53	G	L	89336	20695	5,60	32,1	173	40803	16,8	139		6,81
ST14	I	L	10802	29860	9,94	72,7	107	49870	19,1	212		9,90
ST15	I	L	11387	32755	13,61	101,8	123	61798	17,9	251		15,94
ST16	I	L	8828,9	21904	6,74	47,1	83	36870	10,8	177		10,05
ST17	I	L	87689	26386	8,25	53,1	114	49097		203		9,71

Ce	Eu	Tb	Lu	Hf	Ta	Pa	Sc	Yb	Th	U	As	Ca	Sample
66,9	1,45	0,9	0,41	5,59	1,3	15,4	17,92						TCA5
													TCA14
7,2	1,52	1,2	0,42	6,15	1,5	16,6	19,29						TCA6
68,1	1,34	1,0	0,47	5,59	1,3	13,9	16,84	2,80		2,75			TCA7
73,2	1,34	1,1	0,43	6,84	1,3	15,5	17,66						TCA8
73,8	1,24	0,9	0,37	5,44	1,3	14,1	16,26						TCA11
54,8	1,10	0,8	0,31	3,85	0,9	10,5	14,34						TCA9
73,7	1,28	0,9	0,36	4,90	1,2	14,6	16,04						TCA10
68,5	1,38	1,0	0,36	5,23	1,1	13,4	15,23						TCA12
72,1	1,39	1,0	0,39	6,27	1,1	13,8	14,92						TCA15
48,6	0,94	0,6	0,24	2,27	0,8	7,9							TCA19
55,2	1,30	1,0	0,33	3,99	1,2	12,6							TCA20
67,3	1,56	1,3	0,41	5,78	1,5	14,0							TCA21
117,1	1,81	1,2	0,46	7,26	1,9	25,4	13,92						TCA16
103,4	1,48	1,1	0,34	6,27	1,9	23,8	12,95						TCA17
415,1	1,83	1,2	0,44	7,00	1,3	26,9	14,88						TCA18
101,1	1,84	0,8	0,75	3,18	1,0	10,0							PP16
56,3	1,37	0,5	0,54	2,32	0,8	8,5							PP17
69,3	1,05	0,4	0,72	3,61	1,0	10,1							PP23
48,9	1,14	0,5	0,64	3,22	1,0	10,1							PP24
50,0	1,17	0,5	0,64	3,27	1,1	10,2							PP25
51,9	1,28	0,5	0,67	3,85	1,2	11,3							PP26
50,7	1,10	0,4	0,58	3,10	0,9	9,0							PP27
62,1	1,25	1,7	0,23	4,53	1,2	12,1	15,49	4,79					PP28
44,2	1,00	0,4	0,50	2,75	0,8	8,1							PP12
57,0	1,27	0,9	0,40	3,94	1,1	12,1	16,75						SDO2
57,2	1,30	1,1	0,38	3,83	0,9	11,5	15,71						SDO1
79,2	1,50	1,1	0,44	6,49	1,5	16,3	19,14						SDO3
110,3	1,69	1,1	0,47	8,07	2,0	26,5	17,19						LV2
60,1	1,31	1,0	0,35	4,14	1,0	13,9	23,81	3,49					ST42
54,9	1,27	1,1	0,33	3,69	1,0	13,2	23,54	2,89					ST43
4,5	1,17	0,8		3,79	1,0								ST44
47,0	1,07	0,7	0,30	2,82	0,9	11,2	20,65	1,68					ST47
123,0	2,50	1,7	0,62	5,88	1,6	21,3	23,89						ST54
64,8	1,18	1,2	0,31	3,68	1,5	18,6	19,08	4,50					ST41
22,9	0,91	1,1	0,18	2,64	0,8	6,5	19,03						ST40
15,6	0,63			1,78	0,5								ST48
22,4	0,86	0,7		2,41	0,8	7,4	19,19						ST50
8,1	0,82	0,1		1,63	0,6								ST52
17,8	0,75	0,6		1,86	0,6	5,8	16,16						ST57
22,7	0,87	0,7	0,14	2,26	0,7	6,0	17,08						ST46
23,4	0,94	1,0	0,18	2,22	0,8	6,1	15,94						ST49
													ST58
7,9	1,22	0,6		3,40	1,0								ST55
12,9				2,22									ST56
111,5	1,71	1,3		7,52	1,6								ST28
124,8	1,98	1,8	0,36	8,67	2,0	37,4	19,81						ST45
63,1	1,25	1,9	0,24	4,11	1,1	12,2	15,26	5,89					ST51
48,3	1,27	0,9		3,81	1,1								ST53
247,2	2,15	1,0		8,46	2,3								ST14
191,1	2,82	1,9		9,75	2,9								ST15
77,9	1,49	1,0		6,15	1,6								ST16
127,8	0,19	1,5		7,39	0,2								ST17

Sample	Ware	Suggested Origin	Na	K	Sm	La	Cr	Fe	Co	Rb	Sb	Cs
ST19	I	L	10117	28082	8,14	57,1	149	50746	15,0	206		12,43
ST20	I	L	94903	23449	7,91	53,8	136	47640	15,6	185		8,89
BASILICATA												
Tursi Castello												
TUC1	D	L	8870,1	25279	6,24	39,0	163	54673	18,4	169	0,5	8,28
TUC3	D	L	7630	25410	6,44	38,5	158	57356	19,4	151	0,4	6,95
TUC4	I	L	6512,2	21087	6,43	40,4	153	57236	18,6	189	0,6	9,23
TUC2	C	L	9539,6	19565	5,12	29,0	115	43964	13,5	142	0,6	5,72
Tursi S. Martino												
TUM1	D	L	7135	20510	5,99	36,9						
TUM2	D	L	9394,6	22938,0	9,54	38,5	146	51966	18,6	146		6,97
TUM4	D	L	7567,9	17324	8,70	35,8	135	47549	16,6	102	0,4	4,26
TUM5	D	L	9250	25007	9,80	42,6	155	53669	19,1	177		8,01
TUM7	G	L	9761,2	22894	6,60	39,7	196	61255	20,4	173		9,22
TUM6	I	L	7109,8	20386	6,46	37,7	176	61118	21,4	144	0,6	7,96
TUM8	I	L	7234,6	20872	6,66	38,4	138	48363	15,2	148	0,4	7,34
TUM9	S	L	10590	29310	6,95	46,7	157	54592	19,2	152	0,8	9,02
CALABRIA												
Plain of Sybaris												
Broglio di Trebisacce												
BT703	M	P	13141	13573	6,05	38,0	314	64583	34,6	109	1,0	26,24
BT704	M	CG/A	10595	25934	6,63	34,5	503	68853	38,5	152	0,9	8,60
BT707	CW	L	9450,8	32726	7,28	50,1	145	53201	16,4	185	1,0	11,01
BT701	IM	L	8842,9	22730	6,70	41,3	132	48027	15,8	149	0,3	7,18
BT702	IM	L	9752,1	28984	9,21	49,0	212	68752	23,8	196	2,0	9,80
BT705	IM	L	9526	26495	8,04	47,2	148	51442	16,6	185	1,6	11,01
BT706	IM	L	8712,5	24220	6,97	41,3	135	50700	15,3	185	0,7	9,62
BT709	IM	L	10543	31551	8,50	46,2	139	52781	15,6	170	0,9	9,51
BT905	D	L	5198,5	23402	6,55	39,3	141	56319	19,8	151	0,7	6,68
BT921	D	L	8072,5	21523	6,38	36,8	111	41216	13,0	167	0,6	7,47
BT927	D	L	12523	28391	7,76	51,9	111	49640	17,7	150	0,6	5,94
BT932	D	L	14329	25378	5,47	33,4	98	38444	12,7	150	0,4	5,18
BT940	D	L	4510	22141	6,52	45,2	152	50393	17,9	165	0,6	9,39
BT942	D	L	11164	24874	7,79	43,4	125	51063	15,5	161	1,6	8,75
BT943	D	L	11854	29833	8,26	46,7	148	56441	17,5	190		10,45
BT944	D	L	21810	24309	9,04	57,0	130	45247	13,9	148	0,9	7,77
BT945	D	L	9785,7	23150	7,35	40,7	121	47700	15,1	162	1,2	8,21
BT946	D	L	8280,6	23176	7,34	43,4	126	46588	14,9	157	1,2	8,37
BT947	D	L	8551	15312	7,85	43,6	157	70276	23,0	74		2,47
BT948	D	L	13240	17110	8,72	50,5	157	82314	26,9	103	0,3	3,48
BT949	D	L	12267	20359	5,33	32,1	91	35064	10,8	143	0,5	7,09
BT950	D	L	9928,9	19454	5,36	32,1	158	38199	15,0	88	0,7	5,09
BT956	D	L	13641	21542	4,50	29,9	83	35071	15,8	118	0,4	3,76
BT957	D	L	8066,8	23342	5,91	37,3	144	50067	17,7	156	0,7	8,52
BT601	G	L	9090,8	24580	7,65	44,2	161	51023	16,2	153	1,0	8,54
BT602	G	L	8863,9	24633	8,03	45,7	167	56160	19,7	153	1,0	8,28
BT603	G	L	8251,7	23952	10,33	46,5	97	40008	13,2	153	0,5	7,65
BT604	G	L	8695,8	21827	6,62	42,1	109	40945	13,8	149	0,5	7,52
BT605	G	L	10772	28845	7,72	42,5	172	61427	18,8	234	0,9	11,55
BT606	G	L	5728,7	23494	9,49	42,2	185	59049	28,0	179	0,6	8,99
BT614	G	L	7078,4	20864	5,78	37,0	122	44086	14,3	133	0,6	6,72
BT639	G	L	6086,3	24891	8,50	51,7	195	61999	26,4	170	0,6	9,76
BT640	G	L	9364,6	21009	6,74	40,9	136	50329	16,2	118	0,4	6,29
BT708	PG	L	6645,6	34784	8,67	60,2	187	54259	26,1	178	0,7	11,65
BT801	PG	L	8785,5	19192	9,42	52,0	185	53089	16,0	54	0,8	1,42

Ce	Eu	Tb	Lu	Hf	Ta	Pa	Sc	Yb	Th	U	As	Ca	Sample
107,7	1,79	1,8		7,26	1,9								ST19
100,3	0,17	1,3		6,42	1,5								ST20
BASILICATA													
85,2	2,09	1,1	0,54	5,05	1,5	16,7	19,10						TUC1
89,4	2,23	1,2	0,52	5,78	1,8	16,7	18,86						TUC3
93,6	2,23	1,2	0,60	6,24	1,6	18,2	19,02						TUC4
71,6	1,76	1,0	0,60	11,44	1,2	15,2	13,32						TUC2
													TUM1
78,5	1,40	1,1	0,48	5,77	1,5	16,2	17,94	3,06		3,02			TUM2
73,3	1,38	1,1	0,41	6,36	1,2	14,5	16,09						TUM4
82,2	1,75	1,2		6,14	1,7	16,7	19,13						TUM5
97,5	2,35	1,1	0,57	5,29	1,7	18,4	21,38						TUM7
89,2	2,22	1,1	0,56	5,15	1,8	16,3	20,92						TUM6
71,9	1,53	1,0		4,65	1,5	16,0	16,46						TUM8
74,5	1,56	1,1	0,56	4,73	1,5	15,5	19,37	3,48					TUM9
CALABRIA													
84,0	1,41	0,5	0,92	3,66	1,0	14,0	26,62		14,09				BT703
46,7	1,62	0,5	1,10	4,16	1,2	12,8	25,19		0,20				BT704
85,5	1,59	1,2	0,58	6,04	1,7	19,4	19,18	4,09					BT707
87,8	1,43	1,0	0,49	4,90	1,4	17,6	18,04	2,32					BT701
106,4	1,94	1,6	0,55	6,66	1,7	19,7	23,12		21,32				BT702
116,6	1,67	1,2	0,56	5,87	1,7	19,4	19,31		19,50				BT705
90,0	1,51	0,9	0,56	5,80	1,5	18,9	18,31	3,28					BT706
82,3	1,38	1,1	0,57	6,19	1,6	20,0	18,42	3,95					BT709
3,7	1,39	3,9	0,13	5,01	1,5		17,79		15,61				BT905
79,3	1,34	3,8	0,10	5,14	1,3		14,33		15,00				BT921
110,6	1,72	4,8	0,13	6,06	1,1		17,22		18,51				BT927
71,9	1,10	4,7	0,10	3,97	1,1		13,22		12,86				BT932
91,8	1,41	0,8	0,60	4,98	1,7	19,0	19,11	7,78					BT940
101,7	1,73	1,0	0,60	5,91	1,5	17,3	16,48		18,63				BT942
109,1	0,17	0,7	1,46	6,80	1,8	18,7	18,47		0,16				BT943
77,4	1,62	0,5	1,10	4,60	1,3	22,3	15,57		23,68				BT944
100,1	1,62	0,8	0,80	5,76	1,5	16,8	16,06		17,48				BT945
108,1	1,54	1,2	0,58	6,06	1,6	18,0	17,00		17,71				BT946
76,2	1,85	0,8	1,60	6,15	1,3	13,4	27,66		13,40				BT947
104,2	1,88	6,2	0,17	8,39	1,2		32,52		20,24				BT948
70,9	1,12	0,5	0,50	4,24	1,1		12,04		12,93				BT949
4,5	1,08	1,6	0,23	3,89	1,1		13,49		10,90				BT950
108,0	1,01	0,7	0,49	6,31	1,3	16,5	11,23	6,74					BT956
74,4	1,32	0,8	0,57	5,08	1,5	15,4	17,60	7,23					BT957
101,9	1,51	0,6	0,98	5,16	1,6	16,4	17,72		16,93				BT601
112,4	1,70	0,7	0,97	5,71	1,9	18,3	18,96		18,62				BT602
75,6	1,31	0,9	0,45	5,38	1,3	15,6	14,45	9,90					BT603
77,4	1,43	1,0	0,43	5,34	1,3	16,8	15,71						BT604
126,0	2,82	1,5	1,68	8,15	2,0	25,6	21,52						BT605
96,4	1,59	1,0	0,46	5,36	1,5	18,4	22,46						BT606
61,8	1,33	0,8	0,42	4,00	1,5	13,7	15,09	2,59					BT614
120,8	1,86	1,1	0,59	5,11	1,5	19,8	23,42	3,22					BT639
83,3	1,46	1,1	0,48	5,33	1,3	15,6	16,33	1,93					BT640
103,3	1,76	1,2	0,62	5,72	1,7	19,9	23,88	4,32					BT708
116,3	1,66	0,5	1,49	6,14	1,8	20,5	17,51		0,18				BT801

Sample	Ware	Suggested Origin	Na	K	Sm	La	Cr	Fe	Co	Rb	Sb	Cs
BT803	PG	L	8261	17508	10,36	43,4	135	53321	16,4	64		2,55
BT804	PG	L	9350,7	23920	7,22	39,8	145	52252	16,3	143	0,6	8,55
BT810	PG	L	9170,6	25301	7,72	52,4	144	56618	17,0	119	1,0	5,50
BT811	PG	L	9760,9	22031	8,92	50,0	140	45295	16,4	75	0,8	1,38
BT819	PG	L	9862,7	25446	6,84	42,2	116	46348	13,4	147	0,8	7,73
BT820	PG	L	11124	32140	7,58	46,1	133	53552	15,0	187	0,9	10,70
BT821	PG	L	10765	31819	7,10	44,6	117	46082	15,3	187	0,7	10,06
BT825	PG	L	10388	25746	6,74	41,1	125	48794	14,4	141	0,7	7,85
BT826	PG	L	10714	21282	7,14	47,0	197	66124	21,2	108	0,5	4,88
BT833	PG	L	7643,5	17483	8,75	44,6	162	57177	16,6	58	0,6	2,70
BT835	PG	L	10444	23374	10,18	42,8	131	49693	13,6	142		7,38
BT836	PG	L	8718	34951	8,73	57,9	228	66853	27,5	203	1,1	13,89
BT843	PG	L	4099,7	22904	12,63	54,1	209	62152	26,6	144		5,93
BT851	PG	L	5018,3	20355	8,00	56,8	221	67444	27,5	150	0,9	8,15
BT852	PG	L	6011,9	26312	10,95	63,8	245	72447	31,1	161	0,7	10,28
BT854	PG	L	8519,7	20903	9,91	39,0	118	48362	14,7	146	0,5	6,11
BT855	PG	L	7528,8	17612	11,41	48,7	134	57895	17,5	84	0,7	3,77
BT856	PG	L	9639,8	27002	10,53	48,0	108	48050	15,7	190	0,7	9,64
BT858	PG	CG/A	4205,6	28923	7,09	41,0	509	81410	42,4	171	3,3	14,55
BT859	PG	CG/A	4434	30106	7,61	43,2	537	84407	42,9	184	3,4	14,97
BT404	I	L	7605,1	16778	6,08	38,7	116	50898	18,6	141	0,9	6,48
BT409	I	L	4560,7	22004	5,86	35,9	146	44129	15,7	168	0,7	8,13
BT420	I	L	7802,3	18697	3,31	27,4	87	48841	11,8	133	0,7	5,63
BT435	I	L	8781	18670	3,61	31,5	70	39486	9,9	107	0,6	4,10
BT436	I	L	6455,1	22159	6,42	36,8	114	45105	14,4	142	0,6	7,25
BT445	I	L	5192,8	22465	5,77	36,1	122	38655	13,2	168	0,5	8,40
BTP1	I	L	8424,7	26981	8,60	44,3	119	51946	13,4	185	0,5	8,61
BTP3	I	L	7378,1	22557	6,93	35,5	101	45514	12,1	165	0,6	7,69
BT206	I	L	8929,7	26990	7,57	49,1	101	9600	2,0	223	0,9	9,38
BT208	I	L	8854,6	22423	7,47	44,1	84	39139	11,8	155	1,0	8,07
BT209	I	L	9220,2	29764	8,56	47,5	106	53817	13,9	175	1,5	9,66
BT210	I	L	8010,5	28447	9,00	48,3	113	59894	13,7	218	1,7	12,28
BT247	I	L	18458	20152	5,34	33,9	63	30079	9,8	116	0,2	4,09
BT1	I	L	8857,5	23035	6,58	38,1	100	45248	13,6	196	0,8	7,89
BT7	I	L	4997	18711	5,26	31,4	96	35390	10,8	138	0,5	5,98
BT9	I	L	9002,9	22680	6,89	40,2	84	44146	13,9	153	0,8	7,75
BT10	I	L	10951	15643	8,39	57,4	130	51528	15,3	115	1,0	6,49
BT14	I	L	6609,5	17855	3,82	32,3	74	40044	10,3	133	0,5	6,18
BT1302	V	L	7949,3	19616	5,76	36,7	81	46871	12,8	166	0,7	9,19
BT1011	Daub	L	10955	20099	5,61	32,4	85	40647	12,9	159	0,7	6,65
BT1011C	Daub	L	11823	20675	6,07	32,4	63	33243	10,8	122	0,5	5,39
BT1012	Daub	L	9970,9	25161	6,48	40,5	132	57597	16,4	206	0,7	9,94
Broglio: Demokritos												
BTA001	IM	L/R	8600		6,83	38,9	93	40100	14,8	110	0,6	7,39
BTA003	M	P	8400		5,28	27,0	295	51000	30,8	130	0,6	8,59
BTA004	IM	L/R	8300		6,87	41,8	94	42400	15,3	190	0,6	9,96
BTA005	IM	L/R	7700		6,73	39,6	84	41100	13,6	170	0,6	7,64
BTA068	M	P	4800		5,34	31,4	199	54400	31,8	200	0,8	22,40
BTA069	IM	L/R	7000		5,85	33,2	85	38400	11,7	170	0,6	8,88
BTF021	F	L/R	9000		6,28	39,3	110	45800	15,4	120	0,7	8,03
BTF037	F	L/R	9000		6,21	38,2	105	47200	17,3	120	0,5	5,23
BTF039	F	L/R	6100		6,30	41,7	134	50100	19,1	100	0,5	5,45
BTF041	F	L/R	7800		6,45	35,5	69	36900	11,8	130	0,7	6,35
BTF042	F	L/R	7700		6,84	36,0	82	40400	13,2	110	0,6	6,84
BTF043	F	L/R	5800		6,81	43,2	135	56000	22,6	70	0,3	2,22
BTG022	G	L/R	8500		6,64	32,7	66	35400	12,7	120	0,5	6,02
BTG024	G	L/R	8200		6,92	39,4	95	41800	14,6	150	0,9	8,54

Ce	Eu	Tb	Lu	Hf	Ta	Pa	Sc	Yb	Th	U	As	Ca	Sample
83,0	1,62	1,2		5,87	2,0	20,9	17,32						BT803
74,4	1,62	1,0	0,51	5,34	1,4	17,7	18,19	3,06					BT804
85,7	1,61	1,2	0,66	6,76	2,0	22,5	19,14	5,67					BT810
81,3	1,62	0,9	0,55	6,15	2,1	19,9	16,45	2,91					BT811
77,9	1,47	1,2	0,57	6,22	1,6	18,5	16,47	4,26					BT819
86,4	1,56	1,1	0,63	6,78	1,7	20,8	19,41	4,58					BT820
83,9	1,41	1,3	0,54	6,69	1,6	20,3	17,98	4,01					BT821
74,5	1,38	1,2	0,50	5,74	1,6	16,6	16,58	4,02					BT825
89,5	1,82	1,1	0,48	6,66	1,5	18,6	22,73						BT826
82,8	1,61	1,2	0,54	6,08	1,7	18,9	18,16	5,05					BT833
85,5	1,69	1,1	0,56	6,70	1,5	17,1	17,17						BT835
115,8	1,99	1,3	0,61	6,47	1,9	23,0	27,33	5,06					BT836
111,3	1,93	1,3	0,68	6,45	1,9	23,1	20,75						BT843
119,7	1,96	1,1	0,63	6,06	2,3	22,0	24,28	5,00					BT851
117,7	2,02	1,2	0,66	6,89	2,2	24,3	27,65	4,91					BT852
79,0	1,53	1,2		6,02	1,7	17,5	15,54						BT854
97,7	1,67	1,2	0,62	7,49	1,7	22,6	18,00						BT855
96,8	1,54	1,1	0,64	6,84	1,7	21,1	17,62						BT856
66,1	1,74	1,2	0,52	5,13	1,6	18,5	28,60	3,60					BT858
68,8	1,71	1,3	0,51	5,56	1,4	19,6	29,67	4,57					BT859
109,3	1,41	0,9	0,49	7,42	1,6		15,72		19,88				BT404
5,7	1,21	2,2	0,21	4,07	1,2		17,56		14,45				BT409
72,4	1,09	0,9	0,54	7,08	1,5	21,4	14,04	6,86					BT420
69,1	1,00	0,8	0,47	5,85	1,3	18,1	11,52	7,31					BT435
71,0	1,32	0,9	0,51	5,23	1,5	16,6	15,96	7,77					BT436
56,1	1,16	1,1	0,30	4,05	1,3		15,16		13,96				BT445
81,3	1,61	0,9	0,50	6,41	1,9	19,9	17,09	3,50					BTP1
70,3	1,40	0,8	0,50	5,63	1,7	17,4	14,85	2,69					BTP3
109,5	0,25	2,8	0,23	7,31	1,5		13,84		21,91				BT206
112,7	1,44	0,7	0,80	6,53	1,7	21,4	13,52		21,74				BT208
120,4	1,64	1,4	0,54	6,33	1,9	23,5	16,78		24,00				BT209
108,6	1,79	0,3	2,23	6,60	2,0	23,3	16,39		0,21				BT210
78,2	1,11	2,8	0,10	5,76	0,9		10,78		13,56				BT247
101,4	1,32	1,2	0,42	6,43	1,7		14,87		20,53				BT1
5,6	1,14	0,9	0,38	4,94	1,3		12,66		15,40				BT7
90,4	1,46	1,1	0,69	7,13	1,7	20,5	13,57	10,19					BT9
146,0	2,07	0,9	0,89	8,41	1,8	25,1	18,28		23,11				BT10
74,5	1,30	0,9	0,53	5,59	1,3	17,3	12,49	7,48					BT14
93,8	1,18	1,0	0,52	6,16	1,4	20,0	15,12	2,66					BT1302
85,4	2,02	1,2	1,57	7,41	1,5	19,7	14,90						BT1011
65,8	1,21	1,0	0,60	6,41	1,2	15,3	11,71	3,21					BT1011C
94,7	2,30	1,2	1,39	6,17	1,7	20,7	19,16						BT1012
81,1	1,21	0,9	0,42	4,91	1,4		14,23	3,21	15,10	3,5	8,0	55600	BTA001
62,8	1,16	0,5	0,27	3,46	1,0		19,44	2,52	9,64	2,1	3,9	80700	BTA003
90,3	1,26	0,9	0,35	5,60	1,4		15,15	3,22	15,30	3,0	4,6	72500	BTA004
83,4	1,07	0,8	0,40	4,94	1,2		14,21	3,06	14,20	3,8	7,8	67800	BTA005
73,8	1,26	0,7	0,37	3,00	0,6		20,70	2,85	10,80	3,6	10,0	88400	BTA068
82,6	1,29	1,3	0,32	4,62	0,9		13,58	2,76	13,90	2,6	4,9	69100	BTA069
87,0	1,36	0,8	0,39	4,06	0,9		15,57	3,02	14,70	3,8	7,2	57400	BTF021
86,7	1,28	0,6	0,35	5,10	1,8		14,90	2,97	13,90	2,9	1,8	57000	BTF037
94,8	1,26	1,1	0,38	5,25	1,6		15,99	3,24	14,90	2,2	2,3	29000	BTF039
78,9	1,18	0,5	0,36	5,15	1,2		13,01	2,74	13,00	2,6	5,4	57200	BTF041
83,3	1,25	0,5	0,39	5,58	1,1		13,17	3,25	14,60	2,3	7,4	51300	BTF042
101,5	1,41	0,6	0,43	5,42	1,4		17,30	3,20	14,50	3,3		44500	BTF043
75,5	1,06	0,5	0,38	4,97	1,0		12,62	2,96	11,70	3,3	8,4	58400	BTG022
89,6	1,33	1,0	0,39	4,85	1,6		14,54	3,01	14,50	3,1	4,4	52700	BTG024

Sample	Ware	Suggested Origin	Na	K	Sm	La	Cr	Fe	Co	Rb	Sb	Cs
BTG025	G	L/R	10100		7,16	37,2	84	38500	13,2	150	0,6	7,11
BTG026	G	L/R	6600		7,17	41,6	102	44500	17,7	110		7,77
BTG067	G	L/R	7900		6,65	37,4	94	43900	14,5	130	0,7	9,39
BTG071	G	L/R	8400		7,10	38,8	86	40300	13,7	140	0,9	8,14
BTD030	D	L/R	11600		5,11	32,2	84	36600	13,4	120	0,9	5,22
BTD034	D	L/R	7800		6,06	36,2	85	39900	13,7	120	0,5	6,33
BTD035	D	L/R	4500		7,91	50,6	114	49700	20,0	140	0,9	8,72
BTD036	D	L/R	9000		6,47	36,6	86	40300	12,5	130	0,6	6,51
BTD062	D	L/R	4600		7,25	48,3	111	46400	20,3	160	0,7	10,40
BTD063	D	L/R	7300		7,28	43,4	123	53200	22,5	130	0,6	6,18
BTI050	I	L	6700		6,44	35,9	76	43600	14,0	140	0,9	6,73
BTI055	I	L	9300		7,13	41,1	62	39700	12,7	170	0,7	8,38
BTI059	I	L	13700		4,82	31,9	60	32100	7,8	130	0,4	4,94
BTI065	I	L	8900		7,29	47,2	62	39100	11,1	180	0,8	9,76
BTI066	I	L	7000		6,09	32,7	67	36600	12,4	140	0,6	7,54
BTI070	I	I	8900		6,70	38,6	66	36900	12,9	120	0,6	6,34
Francavilla Marittima												
FMA8	D	L	13476	17158	8,02	44,2	171	77036	22,6	105		4,03
FMA1	PG	L	13770	25827	7,53	50,4	173	72535	28,3	185	0,8	9,16
FMA2	PG	L	13263	22244	7,48	42,6	156	65501	25,3	136	0,6	6,05
FMA6	PG	L	11779	15103	5,47	26,0	487	59530	31,8	76	0,6	2,76
FMA7	PG	L	8949,4	28160	8,08	52,0	218	69068	26,9	209		11,94
FMA13	PG	L	9147,9	20536	6,44	38,9	144	52070	17,7	153	0,5	7,91
FMA17	PG	L	7975,6	27151	8,02	53,7	205	62862	22,6	203		12,03
FMA5	I	L	14043	26620	7,27	47,3	151	37733	13,9	196	0,7	9,04
FMA9	I	L	5786,6	18654	7,73	46,6	117	61131	18,6	138	0,6	7,59
FMA12	I	L	4771,4	12925	5,43	33,0	81	51307	17,2	103	0,5	6,12
TMF1	I	L	4889	13469	8,70	49,7	100	59246	20,7	135	0,5	6,36
TMF2	I	L	4307	15548	9,86	58,0	148	68862	21,3	176	0,7	9,60
FMA11	P	L	4427,5	17349	7,49	44,8	108	55667	18,2	161	1,6	8,38
Torre Mordillo												
TM96	D	L	8772,2	24650	5,71	33,0						
TDM20	G	L	6899,5	24666	7,49	46,9	220	71853	29,2	221	0,9	11,37
TDM21	G	L	7913	22674	6,49	39,1	164	57021	19,1	163	0,6	7,04
TDM22	G	L	9416,6	27640	7,20	45,9	195	67635	23,3	208	0,6	10,17
TDM23	G	L	7079,3	29545	11,68	54,7	218	61638	26,6	221	0,6	13,75
TDM17	PG	L	10918	21217	6,64	42,3	172	63255	20,7	164	0,8	7,83
TDM18	PG	L	8307,5	23661	6,45	40,9	168	58095	19,1	184	0,6	9,03
TDM2	I	L	7095,1	14069	5,29	34,1	131	51176	15,2	115		5,09
TDM3	I	L	7294,3	18860	9,20	60,4	25	19434	14,9	12	0,6	6,97
TDM6	I	L	5515	22353	6,18	36,0	100	46601	12,8	143	0,6	7,14
TDM7	I	L	11317	18336	7,25	52,0	80	43598	6,9	83		3,98
TDM8	I	L	8084,1	22058	6,60	43,3	99	44149	16,0	129	0,4	6,12
TDM15	I	L	10368	22046	7,36	48,9	96	47510	16,6	112	0,6	6,25
TDM14	I	L	7364	21762	5,93	39,1	111	49133	13,7	133	0,6	6,51
TDM24	Daub	L	3598	19609	4,23	24,1	119	40643	14,2	99	0,8	4,29
S. Cavalcatore												
SCAV2	I	L	11983	18737	3,69	35,2	108	44639	13,5	92	0,6	4,03
SCAV3	I	L	5551,9	21298	5,96	37,6	122	39169	13,2	108	0,4	5,25
Tarianne												
TA2	I	L	4578,3	19793	9,37	56,8	167	61578	26,2	108	0,7	5,03
TA4	I	L	7196,7	21213	7,06	39,4	105	45968	13,6	106	0,6	4,32
Villapiana												
VP2	I	L	7287,4	24298	7,44	49,9	85	40143	8,8	174	0,6	8,08
VP3	I	L	14139	17507	3,61	23,2	54	28621	4,4	98	0,5	4,49
Timpone Motta Cerchiara												
TMC1	G	L	6554,4	28159	8,43	52,8	223	69583	30,3	216	0,8	12,01

Ce	Eu	Tb	Lu	Hf	Ta	Pa	Sc	Yb	Th	U	As	Ca	Sample
82,4	1,22	1,0	0,39	5,53	1,3		13,60	3,06	14,30	3,2	5,2	54300	BTG025
89,0	1,23	1,1	0,35	4,33	1,6		15,34	2,79	13,50	3,1	1,7	68500	BTG026
84,5	1,15	1,1	0,40	4,81	1,5		14,00	3,06	14,20	3,3	4,2	59400	BTG067
86,1	1,32		0,38	4,45	1,6		13,87	2,64	14,90	3,0	4,7	43100	BTG071
67,6	1,32	0,4	0,24	4,10	0,8		12,95	2,37	9,43	1,9	7,8	35200	BTD030
73,9	1,29	0,5	0,32	4,62	1,1		12,89	2,31	11,70	2,0	4,6	41300	BTD034
109,6	1,54	0,6	0,43	4,87	1,2		18,24	3,11	16,50	4,4	5,4		BTD035
76,1	1,38	0,5	0,33	5,09	2,3		13,87	2,96	12,70	3,1	7,9	46500	BTD036
107,2	1,36	1,0	0,30	4,32	1,6		17,46	3,09	15,40	2,7	4,4	54600	BTD062
95,3	1,60	1,0	0,42	5,65	1,2		17,07	3,30	14,10	3,3	3,6	30300	BTD063
83,8	1,25	0,5	0,33	5,64	1,8		13,11	2,71	15,00	1,9	6,9		BTI050
81,5	1,57	1,1	0,38	6,91	1,3		12,76	3,19	17,90	2,8	8,6		BTI055
65,5	0,79	0,6	0,24	6,41	1,0		10,78	2,05	15,30	2,5	23,3		BTI059
98,0	1,55	1,0	0,38	7,04	1,8		12,82	3,30	17,70	2,7	7,8		BTI065
81,9	1,07	0,5	0,37	4,76	1,3		12,52	2,80	15,20	2,8	8,1	23000	BTI066
93,1	1,20	0,6	0,32	5,66	1,5		12,17	3,00	14,90	2,4	10,4		BTI070
88,9	2,15	1,5	0,85	9,10	1,1	12,0	32,50	3,88					FMA8
112,0	2,03	1,2	0,82	4,70	1,6	20,1	24,87	3,36					FMA1
95,9	1,72	1,0	0,70	5,01	1,4	18,5	21,84	2,82					FMA2
59,2	1,27	0,8	0,54	4,21	0,8	13,0	22,29	2,91					FMA6
134,5	1,87	1,1	0,76	5,83	1,7	20,5	26,15	3,51					FMA7
87,3	1,43	1,0	0,56	5,15	1,4	15,9	18,00	2,90					FMA13
119,2	1,86	1,1	0,65	5,42	1,7	20,2	24,71	3,34					FMA17
101,9	1,51	1,3	0,78	6,51	1,7	29,5	11,73	3,60					FMA5
110,0	1,78	1,0	0,61	6,80	1,8	22,7	17,05	3,08					FMA9
83,7	1,23	0,8	0,38	5,20	1,2	18,4	15,41	1,93					FMA12
106,7	2,09	1,3		6,63	1,8	22,5	16,73						TMF1
106,2	2,39	1,5		8,29	2,4	27,3	19,80						TMF2
106,3	1,69	1,1	0,58	6,72	1,7	20,0	16,16	2,57					FMA11
													TM96
119,6	2,89	1,3	1,36	6,54	1,9	21,9	26,30						TDM20
91,3	2,21	1,1	1,00	5,48	1,4	17,0	20,23						TDM21
110,2	2,56	1,2	1,20	6,13	1,9	20,5	23,14						TDM22
123,2	1,93	1,2	0,64	6,00	1,8	20,8	26,40	7,42					TDM23
99,8	2,47	1,2	1,41	6,30	1,5	19,1	21,81						TDM17
96,1	2,34	1,3	1,19	6,32	1,6	18,3	20,03						TDM18
62,1	1,17	0,9	0,51	5,94	1,3	14,8	18,56	7,62					TDM2
145,7	1,96	0,0	1,67	2,93	1,5	28,8	16,80		0,03				TDM3
86,5	1,43	0,9	0,49	6,30	1,6	18,6	14,63	7,04					TDM6
101,6	1,14	0,7	0,37	10,88	1,2	26,4	14,95						TDM7
120,2	1,41	1,0	0,54	8,17	1,7	21,6	13,40	8,66					TDM8
124,3	1,67	1,1	0,53	7,78	1,8	23,0	15,76	7,80					TDM15
86,7	1,30	0,1	0,48	7,53	1,5	19,1	15,81	7,46					TDM14
55,3	1,50	0,8	0,32	3,22	0,9	10,8	13,50						TDM24
58,0	1,51	1,0	0,43	3,60	0,7		17,77		11,74				SCAV2
72,8	1,22	4,1	0,08	3,60	1,3		13,91		11,47				SCAV3
107,8	1,82	1,0	0,54	6,47	2,3	19,0	20,60	3,58					TA2
76,9	1,36	0,7	0,45	5,86	2,0	15,6	14,32	1,78					TA4
92,7	1,37	1,2	0,34	5,76	1,8		13,00		20,37				VP2
3,9	0,68	0,6	0,21	7,25	1,3		8,40		19,62				VP3
124,0	2,84	1,4	0,76	6,01	2,0	22,5	26,80						TMC1

Sample	Ware	Suggested Origin	Na	K	Sm	La	Cr	Fe	Co	Rb	Sb	Cs
TMC2	I	L	9289,9	31980	7,48	41,7	99	54196	15,4	229	0,8	10,85
Timpa Castello Francavilla												
TCF1	I	L	10000	22479	6,92	43,3	83	40672	11,6	163	0,7	7,39
TCF3	I	L	6983,3	14553	4,87	35,9	91	38797	10,3	122	0,6	6,16
TCF7	I	L	4516,9	29556	10,82	50,7	155	59380	18,9	175		8,59
Monte S. Nicola												
MSNC2	I	L	4185	15653	9,23	46,8	122	58308	20,5	155	0,6	7,67
MSNC3	I	L	3405,8	14369	8,46	59,1	128	59254	15,4	142	0,5	8,20
Serra Castello												
SCS5	PG	L	7926,1	25924	7,35	45,9	217	68611	22,2	212	0,8	10,89
SCS6	I	L	15625	18271	7,31	26,9	129	42566	17,6	85		3,56
SCS9	I	L	11135	16956	6,41	40,8	111	45150	14,7	111	0,3	4,64
Serra Cagliano												
SCG1	I	L	17336	15276	3,02	18,0	60	36733	5,1	80	0,5	2,89
Fontana Finocchio												
FF1	I	L	20636	12083	7,23	38,9	73	36247	8,0	84		1,74
FF7	I	L	10502	15889	6,10	40,4	95	43858	20,9	78		4,18
Rosa Russa												
RR4	I	L	15475	19903	6,42	40,3	97	42683	7,9	123	0,7	5,53
RR7	I	L	14873	19496	6,00	38,4	93	43324	7,5	127		5,17
RR9	I	L	17938	17748	5,70	37,4	91	42323	12,5	128		4,01
RRP1	I	L	16473	25102	8,19	51,8	87	44861	18,6	134		6,60
RRP3	I	L	14835	20728	8,41	53,7	99	49103	14,4	134		6,98
Basili di Rossano												
BRS1	D	L	6276,7	19971	6,09	37,2	150	48388	12,8	88	0,6	4,35
BRS2	D	L	13249	26681	8,41	39,7	109	43775	14,3	181	0,5	6,92
BRS4	I	L	15563	19090	8,48	53,1	45	36396	8,8	120		3,61
Strange												
STR4	I	L	7810,4	13625	5,99	33,5	65	38016	1,0	81	0,7	5,27
STR5	I	L	9028	20566	6,50	41,1	99	51945	13,3	123	0,7	6,20
Clays from the Plain of Sybaris												
BT1136	Clay	L	11035	22960	9,96	43,9	150	52156	18,7	160	0,7	8,51
BT1117	Clay	L	9958	25965	6,75	45,0	140	55884	15,0	135	0,7	7,47
BT1106	Clay	L	7867,6	21932	6,93	41,1	160	55937	17,1	166	0,5	9,46
BT1104	Clay	L	11831	20680	6,33	36,4	96	41973	10,4	158	0,7	7,29
BT1111	Clay	L	5758,2	40399	7,01	55,0	139	47432	16,9	213	1,0	14,54
BT1119	Clay	L	8002,4	27858	11,14	48,3	200	70513	29,7	214	0,7	10,22
BT1122	Clay	L	9969,4	24007	6,63	42,8	146	51807	19,6	133	1,5	6,85
BT1124	Clay	L	10934	27950	6,76	48,3	160	54170	17,6	151	0,6	9,28
BT1126	Clay	L	9264,8	32103	7,80	50,9	109	45975	13,8	145	1,0	8,94
Capo Piccolo												
CP501	M	IMP	13535		8,11	32,2	346	73108	38,9	33		8,41
CP502	M	IMP	4118,4	19388	9,37	38,2	513	81515	45,1	96		8,41
CP6	D	L	17326	17470	11,83	55,7	47	43556	9,4	102		2,74
CP410	PG?	L	6668,2	19895	5,95	33,8	139	46239	14,0	110	0,4	4,73
CP2	I	L	10277	22712	8,17	31,4	74	37269	10,2	144	0,4	5,41
CP3	I	L	12244	21903	6,61	28,3	49	27680	8,9	128	0,3	3,65
CP14	I	L	12456	15359	6,83	35,6	73	45362	12,8	90	0,4	2,89
CP17	I	L	8507,1	18672	5,28	26,9	77	34874	8,6	97		3,42
CP30	I	L	8685,1	26048	10,20	43,1	90	39965	8,9	116	0,5	3,78
TTCR2	I	L	9027,8	24818	4,29	25,4	82	34401	9,9	137	0,4	5,07
CRNE1	I	L	177,7	440,5	0,13	0,8	89	47870	11,8	133	0,5	6,71
CP203	Daub?	L	7113,7	20583	5,83	34,3	121	42390	13,0	118	0,4	5,43
CP204	Daub	L	3467,2	8683,3	5,01	29,5	76	26409	5,9	32	0,7	1,02
TTCR4	Daub	L	7726,3	17359	7,16	42,3	155	46839	16,2	100	0,9	4,73
CP407	clay	L	6968,8	19898	6,19	38,0	146	48511	14,0	151	0,5	7,84

Ce	Eu	Tb	Lu	Hf	Ta	Pa	Sc	Yb	Th	U	As	Ca	Sample
91,8	1,52	1,1		6,21	1,9	23,4	18,99						TMC2
103,4	1,42	1,2	0,55	7,70	1,8		12,52		20,46				TCF1
99,0	1,11	0,5	0,49	5,64	1,4		11,57		19,44				TCF3
103,9	1,92	1,3		6,08	1,9	20,6	20,75						TCF7
108,9	2,02	1,3		7,65	2,3	25,2	16,00						MSNC2
84,4	1,81	1,2		6,16	1,9	23,1	17,08						MSNC3
115,9	2,59	1,3	1,32	6,17	1,9	22,0	24,11						SCS5
53,2	1,55	0,8		4,88	0,7	9,6	16,90						SCS6
79,4	1,47	1,0	0,49	6,19	1,1	17,0	16,55	6,68					SCS9
34,8	0,87	0,4	0,29	4,86	0,8	12,3	10,92	3,70					SCG1
64,4	1,58	0,8		5,22	0,8	12,6	12,87						FF1
111,6	1,35	0,8	0,56	7,79	1,4	18,3	14,83	7,32					FF7
97,8	1,29	0,5	0,68	5,24	1,4	20,2	15,04		20,57				RR4
66,1	1,25	0,6	0,35	5,53	1,6	19,5	14,29	2,22					RR7
79,1	1,47	0,7	0,48	6,65	1,5	17,6	14,37	2,89					RR9
97,6	1,66	0,9	0,51	7,09	1,9	20,9	14,48	3,33					RRP1
108,0	1,73	1,1	0,56	8,14	2,2	22,4	15,54	3,37					RRP3
71,8	1,36	0,9	0,47	4,70	1,4	16,0	16,82	8,89					BRS1
76,7	1,50	0,9		5,28	1,4	15,4	15,23						BRS2
132,8	1,65	1,1	0,42	7,21	1,4	28,4	13,18	6,29					BRS4
													Strange
78,8	0,30	0,2	1,40	6,37	1,6	17,6	10,75		0,11				STR4
93,7	1,48	1,0	0,46	7,18	1,6	20,8	14,74	7,35					STR5
82,5	1,69	1,3		4,99	1,9	16,4	18,53						BT1136
78,0	1,56	1,1	0,64	5,90	1,5	15,9	18,51	4,16					BT1117
99,2	2,41	1,3	1,40	6,30	1,7	19,5	20,08						BT1106
82,9	1,95	1,2	1,35	7,59	1,5	18,4	15,08						BT1104
87,5	1,36	1,0	0,57	4,23	1,7	19,5	20,29	3,10					BT1111
88,1	1,92	1,4		5,77	1,7	17,9	24,35						BT1119
77,6	1,52	1,3	0,68	6,39	1,2	15,6	18,74	4,08					BT1122
78,4	1,42	1,1	0,56	4,49	1,3	16,5	19,19	3,82					BT1124
76,8	1,49	1,1	0,57	5,32	1,2	16,3	16,55						BT1126
66,6	1,37	1,0	0,97	3,43	1,0	14,5	29,19	3,40					CP501
87,0	1,70	1,1	1,20	5,08	1,6	18,6	28,98	3,66					CP502
180,0	1,62	1,0	0,72	6,54	1,0	19,4	13,52	2,67					CP6
68,6	1,11	0,8	0,78	4,14	1,4	13,9	15,58	2,68					CP410
97,8	1,10	0,9	0,79	8,84	1,5	18,3	12,01	2,95					CP2
87,1	1,23	0,7	0,53	3,76	0,9	11,7	8,26	1,08					CP3
67,8	1,54	1,0	0,64	4,39	1,0	11,3	16,29	2,22					CP14
84,6	0,90	0,7	0,58	7,10	1,5	15,3	11,21	2,11					CP17
94,5	1,31	1,0	0,44	9,53	1,5	19,5	12,06	6,74					CP30
72,3	0,86	0,6	0,51	6,14	1,2	15,2	11,59	2,53					TTCR2
82,1	1,18	0,8	0,35	5,28	1,6	20,2	18,25						CRNE1
65,3	1,07	0,8	0,60	4,01	1,2	12,6	14,81	2,85					CP203
51,6	0,82	0,6	0,42	2,81	0,8	10,1	8,51	1,84					CP204
84,5	1,48	0,9	0,64	5,39	1,5	16,8	16,06	2,90					TTCR4
7,7	1,30	0,9	0,83	4,50	1,4	14,1	16,89	2,62					CP407

Sample	Ware	Suggested Origin	Na	K	Sm	La	Cr	Fe	Co	Rb	Sb	Cs
Capo Cimiti												
CC1	G	L	3804,3	8501,8	5,22	21,5	77	26735	10,0	54	0,5	2,99
Grotta del Pino												
GSA1	MP	?	2189,6	7387	8,22	49,1	147	48176	18,9	28	0,9	0,94
GSA2	MP?	P	5541,2	15023	17,27	100,5	326	115500	52,2	70	3,3	3,25
GSA3	MP?	L	2380,6	5100	7,76	46,5	137	60496	11,8	33	1,0	0,98
GSA4	MP?	L	2433	6412	11,84	45,0	139	63706	12,9	32	1,2	1,20
GSAI1	I	L	1215,7	14244,8	18,31	98,5	184	54937	14,6	191,0	2,9	19,3
GSAI2	I	L	1466,7	13759,2	23,26	107,9	121	54693	11,9	96,0	1,3	11,0
GSAI3	I	L	2824,0	10555,1	7,15	51,4	95	44869	9,7	1153,0	1,0	9,1
LATIUM												
Monte Rovello												
MRO1	IM	L	7212,6	24913	7,07	44,9	175	50849	19,1	152	3,4	7,57
MRO2	I	L	7415,1	47345	7,56	66,2	51	27796	11,6	323	16,7	44,78
MRO3	I	L	5676,8	35180	7,70	59,6	135	41144	13,9	204	7,5	24,01
Luni sul Mignone												
LUN5	M?	?	7373,3	24947	6,84	43,1	213	63217	28,4	196	1,2	11,80
LUN1	IM	L	5963	27865	6,96	40,2	223	57788	21,6	226	1,0	10,45
LUN2	IM	L	5045,2	29452	5,25	35,3	149	44220	16,8	232	0,7	18,93
LUN3	IM	L	5847,5	26969	5,96	38,2	149	47989	17,3	172	0,6	8,23
LUN4	IM	L	6465,6	23712	5,84	36,5	179	56228	22,0	184	1,0	9,12
S. Giovenale												
SGI1	M?	Uncertain	6539,2	32514	7,72	49,1	238	71116	28,5	218		11,03
VENETO												
Frattesina												
FRA1	IM	L/R	4810,3	18440	3,93	31,8	113	28155	9,0	106	1,3	4,70
FRA2	IM	L/R	8388,9	31606	6,13	36,4	138	45227	14,1	155		8,23
FR1	I	L	11618	26988	7,11	28,6	241	35856	20,1	181	2,3	7,71
FR2	I	L	8338,4	25004	5,84	34,5	274	50224	29,6	213	2,3	9,22
FR3	I	L	8017,4	28594	9,18	38,5	299	53905	26,3	225	2,6	11,46
FR4	I	L	9162,6	32017	7,35	43,0	337	59075	28,1	241	1,8	12,36
FR5	I	L	11740	25091	7,91	33,3	240	39320	21,4	174	1,4	7,30
FR6	I	L	11373	30405	9,96	41,2	282	46061	20,5	220	1,6	9,88
FR7	I	L	12257	47448	6,75	39,6	320	56896	28,5	242	2,6	11,77
FR8	I	L	8917,1	26874	4,86	27,1	213	26744	23,2	133	1,4	6,90
FR9	I	L	8375,5	20040	4,98	25,6	193	44019	20,0	112	1,8	5,73
FR10	I	L	7050,5	28363	4,77	31,7	246	46137	21,7	175	1,7	9,75
FR11	I	L	6205,8	27343	5,31	30,6	297	49249	24,6	189	1,9	10,94
FR12	I	L	7008,5	26323	6,38	39,1	257	49608	23,7	174		9,68
FR13	I	L	7560	29014	5,52	31,7	255	41044	19,6	183	1,1	10,42
FR14	I	L	7670,3	25441	6,13	39,2	259	37505	21,9	186	1,4	11,06
FR15	I	L	8420,5	25782	4,71	37,3	226	36416	22,9	177	1,5	9,61
FR16	I	L	8524,9	31032	6,17	41,3	300	43810	22,7	189	1,5	11,10
FR17	I	L	10063	26393	4,70	28,4	208	31253	16,8	157	2,2	8,21
FR18	I	L	7546,4	25347	4,60	36,7	272	46496	26,5	184	1,9	10,12
FR19	I	L	9210,4	23614	5,01	29,5	198	34358	28,1	142	1,4	6,92
FR20	I	L	7138	25994	5,71	36,5	254	45037	23,2	182	1,4	9,76
Fabbrica dei Soci												
FDS3	M	P/WG	8297,6	21765	5,95	33,8	300	50907	23,8	153	1,1	7,01
FDS4	M	P/WG	9339,1	25090	9,16	37,9	328	69410	31,5	162	1,1	7,36
FDS1	IM	L/R?	2829,9	8995,5	3,67	22,5	71	27565	23,2	64	0,9	3,59
FDS2	IM	L/R?	5179,8	13972	5,40	34,4	101	37007	19,2	104	0,8	5,81
FDS6	I	L	6682	20788	10,51	48,0	155	51291	30,3	165	1,0	9,28
FDS7	I	L	10422	19889	7,05	38,3	107	37511	34,1	159	0,9	7,15
FDS8	I	L	5266,5	19092	11,25	47,4	145	56493	24,8	157	1,0	9,33
FDS9	I	L	4257,6	20940	8,32	46,6	172	56539	20,1	173	2,0	9,98
FDS5	DMub	L	13812	26826	6,96	41,3	93	36212	14,1	160	0,6	9,62

Ce	Eu	Tb	Lu	Hf	Ta	Pa	Sc	Yb	Th	U	As	Ca	Sample
42,2	0,83	0,5	0,20	2,36	0,8	8,1	8,76		1,12				CC1
89,8	1,6	1,16	0,5	6,45	1,84	20,2	15,5						GSA1
217,5	1,7	2,19	0,8	13,72	4,16	49,1	36,5						GSA2
82,7	3,5	1,13	0,5	6,40	1,58	19,3	13,5						GSA3
86,8	1,2	1,11	0,5	6,65	1,61	20,1	12,9						GSA4
178,0	2,62	1,78	0,6	8,24	2,04	41,8	17,1	3,15					GSAI1
179,0	3,16	2,10	0,9	9,04	2,52	36,3	16,3	4,65					GSAI2
104,0	1,49	1,04	0,4	7,37	2,00	29,4	12,5	2,06					GSAI3
LATIUM													
68,6	1,75	1,0	0,63	3,73	1,3	13,5	17,96	3,58					MRO1
124,6	1,67	0,8	0,60	8,94	2,2	38,0	9,54	2,52					MRO2
102,4	1,89	1,1	0,53	7,84	1,8	31,3	15,03	3,08					MRO3
86,5	1,82	1,1	0,64	5,51	1,9	16,5	22,51	2,94					LUN5
85,2	1,62	0,8	0,71	4,44	1,9	16,5	21,71	3,47					LUN1
64,8	1,30	0,7	0,48	3,57	1,6	13,0	16,53	2,79					LUN2
65,3	1,48	0,8	0,49	3,60	1,5	13,0	16,60	3,04					LUN3
73,7	1,51	0,8	0,54	3,75	1,8	14,6	19,28	2,82					LUN4
89,5	1,79	1,1	0,65	5,08	2,1	18,5	24,30						SGI1
VENETO													
61,0	1,07	0,7	0,32	2,87	1,1	10,9	12,27						FRA1
70,6	1,44	0,9	0,42	4,97	1,6	15,4	15,83						FRA2
68,9	1,24	1,0	0,39	4,03	1,0	13,9	16,48	10,32					FR1
76,0	1,38	1,2	0,43	3,82	1,3	16,7	20,17	4,42					FR2
86,2	1,62	1,2	0,46	3,80	1,4	18,4	23,12	5,27					FR3
83,7	1,71	1,0	0,50	4,73	1,5	19,2	24,23	8,56					FR4
64,5	1,40	0,9	0,35	3,66	1,1	13,4	16,21						FR5
83,9	1,49	1,1	0,48	4,91	1,4	17,4	21,89	7,58					FR6
78,2	1,55	0,9	0,42	3,96	1,3	17,4	21,83	8,48					FR7
57,6	1,23	0,8	0,23	4,56	1,1	11,6	13,61						FR8
53,9	1,24	0,8	0,37	4,50	1,1	11,5	13,55	5,26					FR9
61,5	1,36	0,9	0,34	4,02	1,2	15,0	18,34						FR10
65,1	1,43	1,0	0,35	3,17	1,3	16,3	20,50						FR11
71,3	1,58	0,9	0,41	4,29	1,8	17,3	19,37	2,71					FR12
68,6	1,40	0,9	0,39	3,95	1,3	15,5	19,05						FR13
69,7	1,39	0,9	0,28	3,70	1,3	15,9	19,14						FR14
59,9	1,32	0,8	0,25	4,04	1,2	14,6	17,99	4,83					FR15
65,0	1,44	0,8	0,34	3,82	1,2	16,8	20,31						FR16
48,3	1,22	0,5	0,26	3,46	1,0	12,3	14,84						FR17
62,3	1,30	0,8	0,25	3,33	1,3	15,0	19,21						FR18
50,9	1,21	0,8	0,26	4,51	1,0	12,2	14,61						FR19
65,0	1,31	0,8	0,27	3,74	1,2	14,9	18,72						FR20
62,9	1,23	1,1	0,61	4,06	1,1	13,0	22,70	3,00					FDS3
75,9	1,47	1,2	0,67	4,34	1,4	16,5	27,92	2,57					FDS4
44,2	0,90	0,5	0,35	2,06	0,7	9,0	9,84	1,57					FDS1
69,6	1,29	1,0	0,51	3,33	1,0	12,0	13,31	2,74					FDS2
89,7	1,89	1,1	0,69	5,98	1,8	17,3	18,30	3,68					FDS6
73,7	1,63	1,2	0,60	5,58	1,3	16,3	15,15	2,94					FDS7
79,9	1,87	1,2	0,66	4,53	1,4	15,8	18,22	3,64					FDS8
95,7	1,97	1,4	0,49	4,88	1,5	17,8	21,08	13,88					FDS9
81,6	1,69	1,0	0,57	5,88	1,3	15,7	15,84	3,10					FDS5

Sample	Ware	Suggested Origin	Na	K	Sm	La	Cr	Fe	Co	Rb	Sb	Cs
LAG2	clMy	L	12416	22826	9,49	40,3	104	42549	13,8	137	1,3	8,44
LAG3	clMy	L	11867	28536	8,51	45,6	130	60056	25,8	194	1,6	16,02
Fondo Paviani												
FPA2	M	P/WG	4520,8	21157	9,01	38,2	357	73616	33,8	150	1,8	7,54
FPA1	IM	L/R	5445,4	18001	6,48	26,4	97	32985	12,8	117	1,0	6,83
FPA3	I	L	9379,4	21495	7,49	44,2	136	40210	15,8	168	1,1	8,92
FPA4	I	L	6901,2	24783	9,13	48,9	195	64916	22,0	245	1,6	15,70
FPA5	I	L	6974	22715	6,80	41,6	139	49456	36,8	181	1,2	9,51
FPA6	I	L	5580,7	17176	4,96	27,7	95	32307	30,3	104	1,1	6,86
FPA7	I	L	5446,2	20482	7,61	44,1	145	51315	19,4	171	1,2	8,60
Castello del Tartaro												
CTA1	M	L/R	4012,3	11636	5,65	28,5	95	32866	29,0	90	0,7	5,48
CTA3	I	L	11930	21923	8,03	45,5	106	44616	19,9	195	0,9	9,68
CTA4	I	L	2485,5	11213	5,52	27,9	128	32707	13,8	114	0,7	6,52
CTA5	I	L	8441,3	19750	8,11	45,1	146	49787	23,3	182	1,3	9,55
CTA6	I	L	8456,7	24880	8,59	49,5	136	49253	23,1	172	1,1	9,97
CTA2	V	L	6809,4	19162	6,00	33,1	90	35662	26,1	129	0,8	6,46
Canar												
CAN1	I	L	7193,8	22721	11,81	47,5	148	60298	17,3	165	1,8	8,74
CAN2	I	L	8015,5	29613	13,07	53,8	147	65605	17,0	151	0,9	7,62
CAN3	I	L	5390,2	12358	11,20	61,5	200	72350	22,3	74	0,8	3,76
CAN4	I	L	6859,4	23480	7,01	39,9	195	63285	20,0	173	1,1	9,24
CAN5	I	L	7349,2	22735	11,43	45,8	132	72659	19,4	174	1,3	9,22
Montagnana												
MON	IM	L/R?	4831,2	16564	4,13	27,2	100	24527	11,1	111	0,8	4,98
SICILY												
Madre Chiesa												
MC3	M	P	5107,6	23067	5,48	30,6	282	51585	33,3	131	0,6	7,28
Monte Grande												
MG1	MP	A	4149	25197	6,29	32,1	528	51073	35,9	158		15,54
MG2	MP	A	4090,7	23528	6,43	30,0	553	53522	38,6	172		16,07
MG3	MP	A	4078	22805	6,08	30,6	533	52042	35,8	173		15,18
MG7	BU?	A	4284,3	24556	6,46	32,0	591	57341	37,6	200	1,1	17,37
MG8	BU?	A	4135,1	24917	7,02	31,1	559	54800	35,6	179	1,0	16,51
MG9	BU?	A	4081,5	24226	6,65	32,0	532	51882	35,6	174	0,7	15,37
MG6	M?	A	4539,5	27560	6,66	32,7	576	54972	36,4	187		17,43
MG12	I	L	6841,7	16048	6,59	35,5	117	40089	11,2	117	0,4	5,17
MG13	I	L	4947,6	19495	6,18	36,4	129	43202	16,7	131	0,6	5,46
MG14	I	L	10608	11012	9,92	43,1	145	49675	15,4	85		6,56
MG15	I	L	4160,3	19425	5,84	36,0	114	40202	17,6	126	0,6	5,24
MG24	I	L	5419	27338	7,23	41,9	161	53044	18,8	120	0,7	6,50
MG25	I	L	4333,5	18031	6,20	38,3	137	47296	17,4	99	0,7	5,81
MG26	I	L	6909,9	21270	6,88	40,5	134	47770	14,2	101	0,6	6,25
MG27	I	L	4897,6	24353	7,79	44,2	160	54149	16,7	117	0,5	6,82
MG28	I	L	6259,9	23835	6,91	39,1	132	49557	12,4	101	0,3	5,89
MG29	I	L	3889,4	15488	5,42	30,0	101	37137	14,0	75	0,3	4,11
MG30	I	L	62268	23787	7,38	44,6	163	59062	18,2	123	0,7	7,01
MG31	I	L	4971,9	24261	7,24	44,3	152	54032	17,4	109	0,9	6,69
MG32	I	L	4762,2	23363	7,28	43,9	153	54865	16,0	112		6,73
MG33	I	L	5089,7	22186	6,30	39,0	127	46133	12,1	94	0,6	6,11
MG34	I	L	5830,4	24316	7,42	45,4	159	61348	22,8	122	0,7	6,97
MG41	I	L	7033,2	20011	6,64	43,9	155	54539	21,2	104	0,5	6,39
MG42	I	L	6470,8	19579	9,96	43,1	132	47561	24,4	131		6,00
MGL1	I	L	7220,5	24341	6,72	41,2	138	48755	14,9	120	1,1	7,20
MGL3	I	L	5235,5	18472	6,20	35,8	125	49081	14,1	103	0,5	5,19
MGL4	I	L	6147,6	17352	5,89	34,5	116	46968	18,8	96	1,1	5,15
MGL6	I	L	16009	15631	7,67	37,1	145	52832	17,9	1115	0,5	7,07

Ce	Eu	Tb	Lu	Hf	Ta	Pa	Sc	Yb	Th	U	As	Ca	Sample
91,4	1,57	1,1	0,43	7,25	1,4	15,9	16,42	11,95					LAG2
86,9	1,72	1,3	0,55	4,70	1,6	18,7	20,79	3,63					LAG3
71,5	1,78	1,2	0,64	4,94	1,5	17,8	27,52						FPA2
55,0	1,24	0,9	0,43	3,75	1,2	13,0	12,27	2,71					FPA1
79,5	1,63	1,1	0,62	6,26	1,4	16,0	16,63	3,29					FPA3
99,1	2,15	1,5	0,76	6,91	2,0	21,1	23,01	3,88					FPA4
81,7	1,42	1,0	0,61	6,21	1,4	16,2	17,01	3,31					FPA5
48,7	1,01	0,7	0,35	3,15	0,9	11,0	11,89	2,10					FPA6
95,3	1,79	1,3	0,51	6,48	1,3	17,1	18,57	12,82					FPA7
60,7	1,22	0,8	0,33	3,02	1,1	12,6	12,76	2,62					CTA1
96,2	1,73	1,3	0,61	7,48	1,5	19,1	17,91	3,74					CTA3
55,4	1,28	0,8	0,36	2,82	1,0	11,2	13,51	2,45					CTA4
90,7	1,76	1,3	0,61	7,28	1,5	19,4	18,89	4,11					CTA5
94,5	1,94	1,3	0,51	6,75	1,6	17,3	18,73	2,67					CTA6
69,5	1,37	1,1	0,42	4,22	1,3	14,1	13,76	2,49					CTA2
110,2	1,92	1,7	0,60	7,09	1,4	20,2	19,99	3,41					CAN1
94,2	1,97	1,4	0,60	7,18	1,6	18,7	19,74						CAN2
105,3	2,71	1,6	0,66	9,50	2,3	17,2	24,52						CAN3
71,7	1,52	1,0	0,45	5,23	1,4	16,2	18,49	7,28					CAN4
93,7	1,77	1,3	0,58	7,37	1,4	17,9	18,37	14,91					CAN5
55,1	1,12	0,7	0,30	2,76	1,0	10,7	10,93						MON
SICILY													
47,7	1,10	1,0	0,52	2,89	0,9	10,6	20,32	1,97					MC3
49,9	1,27	1,0	0,24	4,00	0,9	10,1	20,99	1,97	4,27				MG1
51,1	1,33	0,9	0,54	4,01	1,1	11,1	21,92	1,98	2,78				MG2
48,8	1,24	0,8	0,54	3,86	1,1	10,6	20,76	2,15	1,10				MG3
56,8	1,40	0,8	0,54	4,32	1,0	12,2	23,08	2,54	2,87				MG7
53,9	1,33	0,8	0,51	4,37	1,1	11,4	22,07	2,25	2,90				MG8
49,9	1,34	1,1	0,51	3,89	1,0	10,6	21,49	2,66	3,08				MG9
51,95	1,33	0,9	0,54	4,23	1,1	11,5	22,85	2,25					MG6
69,8	1,48	0,8	0,51	6,80	1,4	12,4	13,05	2,09	2,81				MG12
65,4	1,34	0,7	0,43	4,42	1,4	12,0	15,24	1,86					MG13
82,9	1,73	0,9	0,55	7,17	1,6	14,8	16,43	2,52	4,50				MG14
66,1	1,29	0,9	0,40	3,89	1,2	11,2	13,78	1,71	1,71				MG15
86,3	1,61	1,0	0,77	5,64	1,7	14,7	17,78	1,69					MG24
76,3	1,28	0,8	0,65	4,55	1,3	12,7	16,06	1,63					MG25
81,2	1,52	0,8	0,69	5,43	1,4	12,9	15,30	1,76					MG26
98,0	1,83	1,0	0,72	5,34	1,6	15,1	18,35	1,71					MG27
82,3	1,60	0,9	0,72	6,30	1,5	13,5	15,57	1,76					MG28
60,8	1,16	0,7	0,55	4,87	1,0	10,3	11,89	1,17					MG29
95,3	1,67	1,0	0,58	5,39	1,6	15,2	19,1	2,02					MG30
89,7	1,65	0,9	0,61	5,31	1,6	15,0	17,88	1,68					MG31
99,3	1,68	0,9	0,64	5,17	1,5	14,6	17,83	1,46					MG32
74,0	1,50	0,9	0,40	5,52	1,3	12,8	15,00						MG33
88,0	1,71	0,9	0,49	5,53	1,5	14,9	18,25						MG34
82,9	1,48	0,8	0,46	5,53	1,6	14,6	17,48						MG41
78,1	1,64	1,1	0,46	7,19	1,6	14,0	15,39	4,08					MG42
81,8	1,60	0,9	0,43	4,86	1,7	14,5	16,79	2,17	2,31				MGL1
78,0	1,48	1,1	0,38	5,61	1,6	13,7	15,57	2,69	2,69				MGL3
72,2	1,39	0,8	0,36	4,32	1,5	13,1	15,09	1,81	2,68				MGL4
75,6	1,48	1,0	0,39	5,71	1,7	15,0	18,14	2,87	3,96				MGL6

Sample	Ware	Suggested Origin	Na	K	Sm	La	Cr	Fe	Co	Rb	Sb	Cs
MGL8	I	L	4129,1	18456	6,67	40,8	128	45351	13,6	97	0,8	5,29
MGL10	I	L	7182,3	16872	6,70	41,5	134	50376	13,4	94	0,8	6,28
MGL13	I	L	6425	17605	6,38	38,2	127	49430	16,9	115	1,0	6,45
MGL14	I	L	7765	26752	9,20	46,1	155	57671	17,3	139	0,7	7,65
MGL16	I	L	6131,9	21753	6,78	41,5	146	52303	14,8	126	1,1	7,36
MGL19	I	L	4741,8	21445	6,56	38,7	127	48128	12,9	121	0,7	6,23
Milena (Troja *et al.* 1996)												
MIL21	I				4.895.4	34,4	116		14,6	99		5,60
MIL56	I				3,96	33,9	89		11,3	71		4,20
MIL57	M					22,2	321		26,0	74		4,70
Agrigento												
AGR1	M	P	13737	14731	7,724	34,4	327,55	63268	47,6	151,77		10,68

REFERENCE DATA		% Na	% K	Sm	La	Cr	% Fe	Co	Rb	Sb
Achaia (Mommsen *et al*. 2001a, Table 2) achaia-a group 146 samples	Mean	0,89	2,55	5,20	31,1	265	5	28,6	146	0,6
	% σ	20	6,3	5,9	4,3	10	5	7,8	6	19,0
Aegina (Mommsen 2003) Aegina group A 112 samples	Mean	1,04	1,98	3,8	22,2	402	4,15	20	74	0,8
	% σ	15	13	5,4	3,4	13	3,8	11	9,8	19,0
Akarnania (Mommsen *et al*. 2001a, Table 2) 25 samples	Mean	0,79	1,98	4,61	25,8	359	5	29,3	113	0,6
	% σ	16	7	5,1	3,7	15	5	6,2	10	22,0
Attica (Mommsen 2003) local Attica group 123 samples	Mean	0,63	2,38	4,68	26,7	531	5,16	34,2	129	1,4
	% σ	30	13	7,3	8,8	21	9	13	11	34,0
Central Crete (Mommsen *et al*. 2002a) PHAP group (mainly Phaistos) Perlman-Asaro group 35 samples	Mean	0,78	2,39	4,62	27,6	432	5,49	33,3	117	
	% σ	25	17	2,4	3	12	3,8	6	14	
Chania (Mommsen *et al*. 2002a, Table 2) Chania group 19 samples	Mean	0,62	2,26	6,78	42,7	120	3,73	14,5	107	
	% σ	17	15	6,2	5,7	17	24	29	10	
Ialysos, Rhodes (Marketou *et al.* 2006) RH a1 group 13 samples	Mean	0,24	2,1	2,5	17	2133	6	73	41	
	% σ	6,3	11	7,3	4,3	31	7	11	13	
Locris (Mommsen *et al.* 2001) Locris 1 group 42 samples	Mean	1,03	2,15	4,43	25,4	384	5,21	29	115	
	% σ	18	8	7,9	5,8	8,8	5,3	10	5,6	
Mycenae-Berbati (Mountjoy, Mommsen 2001, Table 1) 217 samples	Mean	0,53	2,6	4,9	32,0	226	5	29,0	150	0,6
	% σ	32	10	4,3	2,6	12	4	6,5	8	14,0
Mycenae-Berbati (Mommsen *et al*. 2002, App 1) MB Perlman-Asaro group 275 samples	Mean	0,59	2,57	5,12	31,9	243	5,33	28,8	156	
	% σ	27	15	2,7	3,3	8,2	3,7	5,2	12	
Thebes (Mommsen *et al*. 2002a, Table 2) Thebes a group 47 samples	Mean	0,54	2	4,12	23,5	509	5,47	41,2	98,6	
	% σ	14	5,3	7,2	5	7,3	2,9	5,2	4,3	
% σ = % root mean square deviation										

Ce	Eu	Tb	Lu	Hf	Ta	Pa	Sc	Yb	Th	U	As	Ca	Sample
78,5	1,43	0,9	0,35	5,38	1,6	13,7	15,51	3,06	2,41				MGL8
85,1	1,65	1,0	0,39	6,59	1,8	15,0	16,63	2,76	2,87				MGL10
75,4	1,50	0,9	0,36	5,46	1,6	13,9	16,13	3,13					MGL13
94,8	1,84	1,0	0,41	5,76	1,9	16,7	19,41	3,57	4,06				MGL14
86,4	1,60	1,2	0,36	5,56	1,8	15,5	17,66	3,07					MGL16
78,2	1,51	1,0	0,42	6,23	1,6	14,2	15,74	3,34	2,64				MGL19
70,0	1,15	0,7	0,35	4,70	1,4		13..5	2,35	9,90	2			MIL21
71,0	1,15	0,7	0,35	4,60	1,6		11,30	2,30	9,60	2,1			MIL56
48,0	0,93	0,6	0,31	2,90	0,8		14,30	1,99	6,90	2			MIL57
62,8	1,613		0,674	3,974	1,266	14,5	25,55	2.6831	12,02				AGR1

Cs	Ce	Eu	Tb	Lu	Hf	Ta	Pa	Sc	Yb	Th	U	As	% Ca
7,18	65,9	1,22	0,8	0,51	3,90	0,9		22,30	2,78	11,60	2,46	6,66	4,98
7,8	3,3	4,90	8,3	21,0	15,0	5,3		4,30	4,70	2,80	10	71	41
5,69	46,1	0,94	0,57	0,35	4,06	0,65		16,1	2,3	7,55			
12	4,1	3,4	7,7	5,7	5,6	5,9		3,6	5,4	5,1			
5,28	54,5	1,07	0,7	0,42	3,74	0,7		18,80	2,43	9.43 (5.6)	1,98	5,7	7,86
12,0	3,6	4,40	8,8	18,0	13,0	7,0		6,50	4,50	5,60	7,7	34	58
16,2	58,5	1,09	0,68	0,41	4,15	0,77		21,7	2,59	9,82	7,05		
40	9,6	6,2	7,1	7	12	7,8		5,6	5,5	7,4	50		
6,82	55	1,1	0,74	0,36	3,78	0,91		20,6	2,43	9,45			
19	2,7	7,3	8,8	6,1	8,9	5,7		5,4	4	2,9			
6,77	86,9	1,47	0,96	0,46	6,45	1,6		15	2,94	12,7	5,41		
15,0	6,7	8,2	6,6	4,6	16	8,4		4,1	4,8	7	32		
2,7	36	0,68	0,43	0,24	2,1	0,53		16	1,5	5,6	8,7		
15	7,4	5,3	11	6,3	11	11		4,3	6,3	4,1	22		
11,8	57,4	1,09	0,64	0,44	4,4	0,84		22,3	2,53	9,81			
24	4,8	5,7	10	8,5	7,8	4,6		4,1	3,9	3,6			
8,70	63,0	1,10	0,7	0,42	3,60	0,8		21,00	2,80	11,00	2,3	5,5	9,7
9,40	2,4	4,60	7,1	5,5	10,0	6,7		4,10	3,30	2,90	6,4	46	21
9,06	62,2	1,19	0,78	31,9	3,62	0,82		21,5	2,7	11	9,53		
7,6	2,7	7,5	8,1	3,3	13	4,6		4	5,1	3	14		
4,24	53,1	1,06	0,66	0,42	3,51	0,7		20,4	2,31	8,42	7,22		
6,6	2,4	5,1	8,3	24	6,5	4,4		2,9	6,5	2,3	27		

Database 3: ICP-ES (Al to Mn in % element oxide, the remainder in ppm)

P Peloponnese; WG West Greece; CG Central Greece; R Rodhes; CC Central Crete; CY Cyprus; IMP Import; L Local; L/R Local/Regional																
Sample	Ware	Suggested Origin	Al_2O_3	Fe_2O_3	MgO	CaO	Na2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Cr	Cu	Li
			Aluminium	Iron	Magnesium	Calcium	Sodium	Potassium	Titanium	Phosphorus	Manganese	Barium	Cobalt	Chromium	Copper	Lithium
APULIA																
Coppa Nevigata																
CN2013	BU?	L	12,29	4,60	1,59	18,40	1,24	3,78	0,52	0,41	0,08	598	8	72	30	36
CN2014	BU?	L	12,84	4,32	1,32	19,29	2,04	3,54	0,54	0,89	0,08	432	6	69	32	36
CN69	IM	L	13,57	4,68	2,16	20,73	1,28	2,96	0,58	0,16	0,15	432	12	44	29	52
CN69	IM	L	11,35	3,87	1,92	17,98	1,10	2,47	0,47	0,14	0,13	326	10	58	32	47
CN313	IM	L	11,10	4,10	1,75	14,47	1,76	2,58	0,45	0,48	0,07	497	8	62	23	39
CN314	IM	L	13,42	5,02	1,77	8,60	1,03	2,58	0,57	0,15	0,13	326	12	79	26	50
CN315	IM	L	12,61	4,45	1,61	14,51	1,13	2,31	0,51	0,15	0,07	319	9	86	96	41
CN316	IM	L	12,72	3,89	1,23	16,88	1,97	3,47	0,54	0,44	0,06	456	4	43	26	34
CN2001	IM	L	14,04	3,84	1,49	12,89	1,06	3,26	0,58	0,20	0,06	357	8	82	22	38
CN2002	IM	L	13,22	4,43	1,90	13,68	1,03	3,07	0,57	0,26	0,07	350	10	79	27	37
CN2003	IM	L	13,38	4,66	1,65	14,00	1,04	3,06	0,57	0,19	0,08	345	10	84	28	36
CN2004	IM	L	14,03	4,65	1,64	13,53	1,07	3,22	0,59	0,37	0,07	368	10	87	26	38
CN2007	IM	L	12,34	3,75	1,32	14,92	1,25	3,21	0,52	0,20	0,08	318	6	64	26	36
CN2008	IM	L	12,65	4,30	1,38	14,71	1,03	3,14	0,54	0,31	0,07	383	9	77	27	37
CN2010	IM	L	12,80	3,67	1,32	15,66	1,36	3,47	0,53	0,27	0,06	593	4	44	26	33
CN2011	IM	L	12,51	3,93	1,38	15,77	1,17	3,80	0,50	0,45	0,08	408	6	40	43	42
CN7337	IM	L	14,41	5,30	2,64	16,51	1,07	3,27	0,60	0,29	0,12	319	11	115	21	63
CN2005	G	L	13,10	3,58	1,36	13,60	1,38	3,10	0,54	0,27	0,06	351	6	63	20	34
CNS507	PG	L	10,97	4,09	1,71	12,75	1,18	2,41	0,45	0,24	0,07	235	12	70	30	49
CNS508	PG	L	12,79	4,54	1,82	11,60	1,15	2,59	0,53	0,22	0,10	265	11	91	22	47
CNS510	PG	L	12,77	4,64	1,92	10,50	1,53	2,97	0,50	0,45	0,10	417	10	81	33	57
CNS555	PG	L	13,96	5,11	1,81	10,11	1,05	2,79	0,59	0,20	0,08	351	10	103	25	42
CNS777	PG	L	13,19	4,70	2,85	14,06	1,54	2,95	0,53	0,20	0,10	309	10	89	25	57
CNS1172	PG	L	16,65	5,71	2,17	12,17	1,63	2,40	0,72	0,21	0,09	333	14	120	25	60
CNS1263	PG	L	11,41	4,04	1,40	13,95	1,39	2,59	0,47	0,23	0,07	393	8	75	20	37
CNS1264	PG	L	9,99	3,53	2,15	15,01	1,28	2,37	0,42	0,17	0,10	428	10	59	24	43
CNS1267	PG	L	14,02	4,96	2,02	9,83	1,27	2,65	0,58	0,16	0,09	721	12	97	26	61
CNS1270	PG	L	17,36	6,10	3,07	13,98	1,66	3,58	0,76	0,51	0,11	404	12	69	29	67
CNS1280	PG	L	14,38	4,85	1,64	17,89	1,60	3,13	0,61	0,30	0,11	405	11	85	25	40
CN2006	PG	L	12,74	4,19	2,31	12,77	1,33	3,15	0,52	0,20	0,09	454	7	71	23	56
CN2009	PG	L	14,59	5,50	2,04	12,54	1,27	3,00	0,61	0,38	0,12	466	11	94	29	62
CN2012	PG	L	18,45	6,92	2,90	12,47	1,48	3,55	0,78	0,24	0,12	390	13	79	42	76
CN11	I	L	18,90	6,77	1,05	1,67	1,01	3,88	0,75	0,38	0,12	593	14	81	26	44
CN21	I	L	17,67	6,28	2,45	10,73	1,91	4,79	0,69	0,42	0,15	597	13	86	32	62
CN36	I	L	15,37	5,11	0,93	8,91	0,86	3,05	0,58	0,12	0,07	340	11	81	20	48
CN2	Daub	L	8,83	3,04	1,15	22,84	1,55	3,42	0,32	0,50	0,12	361	8	30	19	26
CN2 heated	Daub	L	9,73	3,32	1,26	24,83	1,70	3,77	0,35	0,56	0,13	395	8	32	21	29
CN3	Daub	L	13,24	4,41	1,87	11,35	1,45	5,21	0,51	0,31	0,11	447	10	63	31	56
Chiancudda																
CH1	M	P	15,94	6,74	2,83	8,37	0,90	2,98	0,83	0,19	0,074	425	23	273	48	76
Torre S. Sabina																
TSS 2	M	P	14,53	6,67	4,01	14,85	1,20	2,83	0,66	0,25	0,12	392	18	230	23	66
TSS 3	M	P	14,84	6,82	3,93	10,43	1,73	2,50	0,73	0,21	0,11	523	20	257	29	71
TSS 5	M	P	15,34	7,19	3,60	8,58	1,25	3,09	0,77	0,20	0,11	336	23	235	34	67
TSS 6	M	P	15,11	7,64	4,28	11,10	1,23	2,49	0,75	0,25	0,16	513	27	307	44	64
TSS 7	M	P	13,51	6,84	4,49	6,86	1,41	2,35	0,68	0,19	0,09	285	23	228	63	59
TSS 8	M	P	16,90	7,95	4,15	8,69	1,38	2,90	0,85	0,14	0,12	434	24	259	45	70
TSS 11	M	P	16,35	7,78	3,70	10,66	1,25	2,66	0,80	0,14	0,14	486	28	199	51	68
TSS 13	M	P	15,92	7,92	4,45	8,53	1,62	2,98	0,78	0,22	0,10	370	25	311	45	84
TSS 1	IM	L	13,19	4,78	1,50	12,86	1,12	2,13	0,59	0,20	0,06	444	10	114	19	27
TSS 4	IM	L	12,13	5,62	3,97	20,45	1,26	1,69	0,61	0,21	0,11	659	18	178	32	58

Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Rb
Nickel	Scandium	Strontium	Vanadium	Yttrium	Zinc	Zirconium	Lanthanum	Cerium	Neodymium	Samarium	Europium	Dysprosium	Ytterbium	Lead	Rubidium
APULIA															
25	11	375	129	22	84	46	26	53	28	4,0	1,1	3,5	1,8	17	101
26	11	318	124	23	95	52	28	55	30	4,8	1,3	3,6	1,7	20	98
42	10	468	113	28	82	111	40	82	42	5,8	1,4	4,7	2,2	63	128
34	9	366	100	25	71	103	38	73	42	5,0	1,8	4,1	1,9	54	89
27	9	525	87	20	81	69	29	56	33	4,2	1,4	3,3	1,6	16	126
39	11	318	100	21	79	80	36	71	41	4,7	1,4	4,1	1,7	173	106
35	11	304	123	20	76	59	28	55	33	4,4	1,5	3,8	1,7	2995	108
24	10	315	105	21	78	44	22	51	24	3,9	1,0	3,3	1,6	22	102
28	10	291	101	19	87	46	29	58	30	4,8	1,1	3,4	1,6	13	123
33	10	297	94	20	93	48	27	56	29	4,6	1,1	3,5	1,6	14	115
35	11	295	106	19	85	45	27	56	29	4,0	1,0	3,4	1,6	18	112
35	11	299	116	20	88	59	28	58	30	4,6	1,1	3,5	1,7	19	120
30	9	261	78	20	82	44	25	53	27	4,4	1,1	3,3	1,5	15	111
31	11	322	122	20	84	42	26	55	28	4,2	1,1	3,3	1,6	17	118
22	10	356	100	22	77	45	25	53	27	3,5	1,0	3,4	1,6	15	110
26	11	267	104	23	100	66	29	60	31	4,8	1,2	3,7	1,8	18	112
52	13	489	125	21	94	51	31	50	32	5,0	1,4	3,4	1,7	19	128
27	10	294	91	25	71	71	28	58	30	4,9	1,1	3,9	1,8	9	116
38	10	310	115	20	71	68	30	56	33	4,8	1,9	3,4	1,7	34	100
35	11	324	109	19	76	45	28	51	33	4,5	1,7	3,2	1,5	16	115
32	11	340	90	19	87	39	29	55	30	4,1	1,5	3,3	1,5	17	113
35	13	264	126	19	84	46	31	59	32	4,5	1,6	3,5	1,6	6	124
40	12	417	98	21	86	47	33	53	31	4,6	1,7	3,6	1,7	17	108
45	14	393	135	23	98	79	33	64	35	5,6	2,0	4,1	2,1	5	112
29	11	337	90	20	70	45	27	50	30	5,3	1,4	3,4	1,5	15	103
34	9	419	77	20	69	59	29	53	30	4,3	1,2	3,5	1,6	20	92
39	12	411	92	19	88	49	29	54	29	4,9	1,6	3,5	1,6	6	120
50	15	492	122	26	123	61	36	74	38	5,6	1,5	4,5	2,2	22	126
41	12	385	117	24	93	49	31	63	33	5,2	1,3	4,1	1,9	20	116
33	10	374	88	19	91	36	24	50	25	4,5	1,0	3,0	1,4	16	110
42	13	368	111	21	94	43	29	60	31	4,3	1,2	3,9	1,7	19	120
50	15	381	112	25	117	64	35	69	37	5,2	1,3	4,2	1,9	21	134
40	13	281	172	38	84	246	72	154	70	8,6	2,8	7,2	3,8	33	161
46	15	443	130	27	119	177	43	90	44	5,2	1,4	4,3	2,3	31	171
37	10	124	133	26	64	194	53	129	50	5,9	2,4	4,6	2,4	38	148
24	6	588	52	19	75	83	30	52	31	4,1	1,0	3,0	1,6	10	80
26	7	640	58	20	83	90	32	61	41	4,5	1,0	3,3	1,8	11	91
34	9	355	89	26	91	149	44	90	43	5,8	1,7	4,4	2,2	21	142
229	18	246	121	24	94	37	34	57	35	6,5	1,3	3,5	2,5	14	128
176	16	373	98	26	103	65	33	64	35	5,5	1,4	4,3	2,3	19	113
190	17	511	107	28	77	68	27	54	30	5,0	1,4	4,5	2,5	12	100
180	18	203	111	23	96	52	27	57	29	4,7	1,2	3,9	2,0	18	141
271	20	257	106	27	98	58	26	53	29	5,0	1,4	4,5	2,4	18	114
235	17	167	108	19	110	45	20	43	22	3,7	1,1	3,2	2,0	22	97
221	20	215	122	22	104	42	27	56	29	5,4	1,4	4,0	2,0	17	138
201	20	270	134	25	119	54	28	58	30	5,3	1,4	4,3	2,4	19	152
247	20	218	110	24	107	47	28	56	30	5,3	1,3	4,2	2,3	18	136
61	12	267	80	27	63	72	36	74	38	5,5	1,4	4,4	2,1	20	80
169	14	749	88	31	112	68	26	48	29	4,8	1,3	4,4	2,3	13	59

Sample	Ware	Suggested Origin	Al_2O_3	Fe_2O_3	MgO	CaO	Na2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Cr	Cu	Li
TSS 9	IM	L	14,05	5,03	2,23	15,24	1,19	2,52	0,64	0,28	0,09	368	10	110	21	44
TSS 10	IM	L	15,03	5,26	2,32	14,48	1,32	2,61	0,66	0,25	0,08	365	10	118	20	49
TSS 12	IM	L	12,88	5,45	2,12	16,22	1,09	2,30	0,57	0,15	0,08	414	12	147	17	44
TSS 21	IM	L	15,50	6,14	2,92	16,94	2,08	1,00	0,68	0,28	0,10	410	14	137	28	54
TSS 14	I	L	21,15	8,19	0,93	2,77	0,67	2,16	0,80	0,29	0,08	968	15	95	26	36
TSS15	I	L	19,61	7,35	0,78	3,04	0,71	1,92	0,66	0,28	0,07	868	11	126	24	25
TSS15 heated	I	L	21,99	8,26	0,86	3,33	0,79	2,14	0,74	0,30	0,07	971	13	136	25	28
TSS 16	I	L	21,00	7,34	0,82	3,49	0,78	1,89	0,81	0,71	0,06	1063	12	120	31	27
TSS 17	I	L	22,62	8,42	1,08	3,47	0,72	2,01	0,77	0,49	0,09	1042	13	131	35	20
TSS 18	I	L	19,48	7,83	1,07	4,19	1,15	1,72	0,69	0,11	0,09	463	13	117	37	32
TSS 19	I	L	21,75	7,85	0,98	3,80	0,68	1,97	0,74	0,87	0,06	988	12	134	31	29
TSS 20	I	L	20,79	7,66	1,24	3,01	0,80	2,21	0,81	0,34	0,09	754	14	117	26	37
Rocavecchia																
RO34	MP	P	14,51	6,85	4,66	15,96	1,16	2,85	0,72	0,26	0,09	431	22	255	34	88
RO36	BU	IMP	15,7	8,03	4,11	4,03	1,23	2,67	0,8	0,26	0,17	539	32	372	57	81
RO356	MIN	IMP	15,56	7,99	3,67	0,85	1,23	2,46	0,75	0,17	0,091	355	24	381	36	54
RO360	MIN	IMP	13,62	7,25	3,73	1,09	1,66	2,01	0,67	0,07	0,133	378	31	598	32	42
RO23	M	P	15,47	7	3,82	9,24	1,39	2,89	0,8	0,23	0,09	280	23	235	62	63
RO25	M	P	15,44	7,31	4	7,85	1,12	2,72	0,75	0,2	0,13	333	24	226	41	59
RO26	M	P	13,56	7,2	4,19	4,57	1,36	2,11	0,74	0,16	0,26	388	30	395	50	60
RO35	M	P	18,31	8,12	4,2	12,27	0,8	3,53	0,84	0,17	0,13	380	25	213	65	85
RO37	M	P?	14,69	7,18	4,71	8,93	1,46	2,71	0,73	0,18	0,1	369	23	254	36	83
RO38	M	P?	18,82	8,31	4,22	4,49	1,36	3,54	0,93	0,18	0,13	388	28	231	52	84
RO39	M	P	17,77	7,69	3,93	16,92	2,28	1,07	0,8	0,28	0,11	415	22	219	50	104
RO49	M	P	16,23	7,14	3,64	11,79	1,62	1,63	0,75	0,19	0,115	340	22	216	55	60
RO6P	M	P	16,32	7,47	3,73	2,48	1,15	2,77	0,81	0,15	0,087	337	26	297	36	67
RO10P	M	P?	12,36	6,08	3,55	5,58	1,78	2,30	0,64	0,39	0,075	479	18	307	25	61
RO42	M	CG?	13,60	6,90	4,98	10,77	1,31	2,56	0,68	0,36	0,104	323	25	336	36	60
RO8P	M	CG?	11,39	6,23	5,21	8,52	1,08	2,09	0,56	0,35	0,094	334	22	405	31	46
RO11P	M	CG?	14,09	7,66	5,99	6,26	0,98	2,66	0,65	0,10	0,098	325	27	347	47	65
RO364	M	WC	18,56	7,18	1,15	9,16	1,02	1,37	0,90	0,22	0,028	305	11	182	30	37
RO430	M	WC	15,43	6,19	1,93	6,80	1,11	2,70	0,88	0,22	0,060	328	17	122	27	43
RO531	M	WC	15,32	6,63	0,99	1,53	0,94	1,95	0,58	0,46	0,02	438	10	108	23	28
RO461	M	Not Cretan	14,92	7,05	3,95	10,08	1,30	2,82	0,73	0,20	0,136	356	22	212	42	66
RO5P	M	IMP?	14,34	6,40	3,32	7,75	1,10	2,97	0,67	0,30	0,111	338	22	183	53	64
RO22	M	L?	12,86	5,53	2,16	14,84	1,07	2,26	0,59	0,47	0,08	407	12	162	16	38
RO32	M	L	12	4,48	2,37	18,91	1,32	2,15	0,53	0,39	0,07	393	9	118	19	41
RO33	M	L	13,92	5,35	2,01	13,39	1,17	2,34	0,59	0,38	0,11	460	18	137	19	44
RO47	M	L	10,36	4,07	2,79	19,77	1,37	2,04	0,46	0,30	0,067	376	10	108	24	42
RO48	M	L	17,80	7,01	1,94	3,16	1,14	2,79	0,80	0,14	0,062	515	24	183	31	61
RO55	M	L	10,90	4,28	2,56	15,06	1,24	1,82	0,48	0,25	0,068	346	11	112	20	35
RO74	M	L	11,86	4,51	1,98	12,26	1,27	2,11	0,54	0,32	0,097	410	12	134	17	28
RO101	M	L	10,41	3,96	2,40	15,87	1,01	1,79	0,45	0,49	0,066	334	10	106	18	38
RO151	M	L	11,50	4,38	2,32	14,93	1,15	1,87	0,51	0,31	0,075	345	11	106	19	35
RO282	M	L?	16,61	6,14	3,21	7,33	1,02	3,07	0,73	0,21	0,123	466	17	119	41	58
RO353	M	L	9,61	3,45	2,20	15,60	0,96	1,86	0,41	0,17	0,064	275	8	88	26	32
RO1P	M	L	12,25	4,54	1,96	11,10	1,00	2,09	0,48	0,30	0,064	318	10	111	20	41
RO2P	M	L	13,61	5,39	2,90	11,51	1,61	2,07	0,63	0,26	0,081	328	13	237	24	46
RO3P	M	L	10,72	4,13	2,67	17,53	1,18	1,75	0,48	0,64	0,084	430	10	119	26	38
RO4P	M	L	11,07	4,27	2,29	14,69	1,16	1,98	0,51	0,44	0,070	403	10	130	22	38
RO7P	M	L	10,39	4,13	2,30	12,91	0,99	1,78	0,48	0,42	0,053	370	10	112	17	31
RO9P	M	L	12,71	4,98	2,22	5,71	1,10	2,26	0,56	0,35	0,075	405	12	101	26	48
RO1d	D	L	14,42	5,86	1,15	11,73	0,86	1,56	0,47	0,52	0,11	418	12	118	26	43
RO1d	D	L	10,7	4,34	0,85	8,99	0,66	1,16	0,35	0,39	0,09	312	9	73	21	28
RO10d	D	L	16,19	6,28	2,68	6,54	1,26	2,8	0,73	0,25	0,09	362	14	125	31	66
RO10d	D	L	15,51	5,99	2,55	6,4	1,27	2,78	0,69	0,24	0,09	351	14	106	29	59

Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Rb
63	13	361	103	26	99	62	30	60	32	4,2	1,2	4,1	2,0	20	117
66	13	385	96	25	102	62	31	62	33	5,4	1,3	4,3	2,0	19	120
109	13	310	95	21	74	47	25	51	27	4,0	1,2	3,6	1,8	16	108
65	15	494	129	32	85	103	33	65	35	4,7	1,4	4,7	2,6	18	48
62	16	176	136	36	82	250	63	160	66	8,7	2,1	6,7	3,7	37	152
65	16	184	110	35	78	204	56	127	59	10,8	2,1	6,5	3,2	34	134
71	17	206	122	39	85	230	61	142	71	11,5	2,3	7,0	3,6	35	146
60	15	296	145	36	84	239	65	132	67	8,9	2,1	6,7	3,7	44	137
73	18	242	142	47	92	250	71	151	75	11,5	2,7	8,5	4,4	40	158
61	16	256	126	34	67	211	56	126	59	8,3	2,1	6,4	3,3	31	133
62	18	276	150	46	92	232	67	130	71	10,3	2,7	8,2	4,3	38	155
61	15	207	142	38	100	226	71	141	73	9,5	2,1	6,7	3,6	38	180
213	18	468	136	26	128	62	26	54	28	4,6	1,3	4	2,4		
310	20	165	139	32	127	65	35	62	38	6,8	1,7	5,3	2,7		
253	21	79	133	17	105	37	26	47	28	5,7	0,9	4,0	1,8	15	115
393	18	104	115	21	89	32	27	51	31	6,7	1,2	5,7	2,0	18	91
179	18	263	124	20	92	57	30	46	34	4,6	1,2	3,9	1,6		
180	19	214	125	23	95	50	30	51	34	5,5	1,2	4,4	1,9		
306	16	162	103	27	97	53	31	50	30	5,9	1,4	4,8	2,2		
184	21	372	146	25	118	65	32	62	34	5,3	1,4	4,3	2,3		
203	18	300	93	23	112	44	25	51	27	5	1,3	4	2,1		
175	23	196	161	28	129	58	37	69	39	6,5	1,6	4,9	2,6		
188	22	650	162	28	100	72	31	58	33	4,5	1,4	4,6	2,7		
161	20	312	144	21	93	54	29	50	32	6,3	1,2	5,2	2,1	17	132
216	21	124	155	21	114	40	30	53	32	6,6	1,2	4,5	2,0	23	126
201	14	238	91	14	97	37	21	37	23	4,4	0,9	3,3	1,4	15	101
288	18	263	121	22	86	45	23	43	26	5,3	1,1	4,9	1,9	11	107
312	16	230	82	17	83	35	21	41	24	5,1	1,0	4,3	1,7	13	103
307	18	208	102	16	102	36	22	41	25	5,3	1,0	4,5	1,7	22	113
74	15	310	164	18	58	113	29	56	30	6,0	1,0	2,8	1,9	14	57
110	13	299	111	20	70	42	38	65	39	5,3	1,4	3,9	1,4	101	
66	14	155	113	32	77	55	42	63	44	6,8	1,7	5	2,5	20	124
173	18	246	95	20	109	38	28	48	30	5,7	1,0	3,6	1,5	123	
144	17	226	94	20	94	42	28	51	31	5,8	1,3	4,8	1,7	19	129
96	13	359	99	21	85	49	29	54	33	4,4	1,2	3,7	1,3		
72	12	451	83	22	81	51	23	48	25	4,1	1	3,7	1,8		
89	13	343	97	29	88	71	36	70	38	5	1,5	4,7	2,2		
70	10	428	94	17	75	38	22	37	24	3,9	0,7	3,4	1,4	17	82
112	19	166	138	22	106	50	36	71	38	7,9	1,3	4,5	1,9	19	128
71	10	369	78	17	84	45	24	42	26	4,4	0,8	3,7	1,2	11	102
77	11	311	66	19	67	46	26	49	29	5,1	1,0	4,7	1,5	14	95
68	10	348	100	17	72	40	22	40	24	4,0	0,8	3,4	1,5	15	93
69	11	388	92	22	78	46	25	46	27	5,2	0,9	4,0	1,8	15	95
59	16	211	107	17	122	46	36	64	38	7,0	1,2	4,9	1,6	20	140
50	9	336	71	17	102	40	23	40	25	4,0	0,9	3,3	1,3	14	110
58	11	325	89	20	72	71	30	51	32	6,1	1,1	3,9	1,8	20	109
112	13	349	103	21	83	78	30	58	32	6,3	1,1	4,4	1,9	15	100
68	10	415	58	17	97	50	23	42	25	4,6	0,8	4,1	1,6	17	75
71	10	387	85	16	85	45	23	44	25	4,2	0,9	3,6	1,4	16	101
72	10	345	61	17	88	50	23	44	25	4,8	0,8	3,6	1,5	16	95
45	11	237	88	14	94	34	28	51	30	5,3	1,1	3,6	1,4	17	99
55	10	292	94	44	69	119	47	85	51	7,7	1,9	6,5	3		
43	8	213	71	33	58	87	34	73	47	6,3	1,4	5	2,4		
58	15	261	114	22	94	63	37	66	42	5,7	1,5	4,2	1,7		
57	13	249	108	18	94	32	35	68	37	6,2	1,5	3,9	1,4		

Sample	Ware	Suggested Origin	Al_2O_3	Fe_2O_3	MgO	CaO	Na2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Cr	Cu	Li
RO12d	D	L	16,43	6,61	2,76	4,82	1,16	2,61	0,73	0,65	0,11	557	14	131	30	65
RO13d	D	L	15,2	6,11	2,79	7,36	1,03	2,23	0,7	0,33	0,09	351	13	119	25	58
RO11b	B	L	15,89	6,42	2,76	4,52	1,15	2,57	0,73	0,6	0,1	453	14	128	27	61
RO14b	B	L	15,98	6,36	2,7	7,57	1,19	2,78	0,74	0,4	0,1	411	15	129	32	68
RO27	G	L	7,74	3,82	1,5	34,27	0,31	0,91	0,36	0,55	0,07	403	9	179	26	46
RO28g	G	L	10,33	3,61	2,08	17,94	1,26	1,94	0,45	0,41	0,08	430	8	114	20	41
RO31g	G	L	12,67	4,81	3,05	16,89	1,51	2,31	0,56	0,11	0,07	315	11	129	16	47
RO5f	PG	L	11,8	4,51	2,3	14,12	1,17	2,21	0,51	0,4	0,08	396	10	100	25	42
RO5f	PG	L	11,14	4,24	2,22	13,67	1,15	2,15	0,49	0,39	0,08	375	9	88	24	38
RO15f	PG	L	11,95	4,92	1,97	11,98	1,42	2,58	0,53	0,25	0,08	311	12	130	26	48
RO16f	PG	L	11,81	4,51	1,77	18,48	1,09	2,14	0,52	0,41	0,07	290	10	124	19	39
RO2i	I	L	13,93	5,01	1,49	8,14	1,31	2,15	0,46	0,66	0,16	427	14	127	16	44
RO3i	I	L	11,75	3,87	0,99	6,21	0,93	2,13	0,44	0,26	0,04	323	5	84	16	45
RO3i	I	L	11,08	3,65	1	5,86	0,87	1,95	0,41	0,25	0,04	297	6	73	16	38
RO4i	I	L	13,67	5,66	0,86	1,81	0,95	1,66	0,39	0,48	0,14	400	16	94	27	26
RO6i	I	L	15,43	5,43	1,05	2,05	0,94	1,6	0,59	0,42	0,1	358	15	127	23	39
RO6i	I	L	15,75	5,55	1,04	2,13	1	1,66	0,61	0,44	0,1	373	16	118	24	36
RO7i	I	L	19,27	7,77	1,22	2,15	0,64	2	0,76	0,34	0,06	447	13	174	29	48
RO8i	I	L	16,66	6,72	1,25	1,7	0,84	2,11	0,67	0,19	0,11	494	15	152	25	42
RO9i	I	L	19,11	7,91	1,91	7,12	0,62	2,27	0,73	0,46	0,06	481	12	190	31	38
RO9i	I	L	15,6	6,32	1,61	6,44	0,5	1,76	0,57	0,4	0,05	415	11	175	29	29
RO18i	I	L	11,55	4,76	0,73	10,62	1,02	1,38	0,48	0,53	0,11	433	12	89	15	23
RO18i	I	L	12,27	4,92	0,72	11,07	1,07	1,49	0,5	0,56	0,11	462	12	88	14	26
RO19i	I	L	16	7,04	1,04	1,39	0,84	1,73	0,61	0,25	0,08	363	12	162	25	33
RO20i	I	L	13,18	5,27	0,79	1,21	1,38	1,75	0,49	0,25	0,1	384	11	87	11	28
365	I	L	7,83	2,61	0,83	22,12	0,71	1,11	0,29	0,34	0,101	607	5	46	24	20
RO21v	V	L	10,04	3,83	1,03	10,61	0,48	1,47	0,44	0,27	0,05	386	8	108	31	32
RO17c	C	L	16,05	8,32	4,13	11,4	0,96	2,61	0,82	0,22	0,1	340	24	246	50	72
Torre Castelluccia																
TCA2	D	L	16,58	6,35	2,38	6,12	1,50	2,89	0,69	0,63	0,12	786	11	118	34	65
TCA3	D	L	15,56	5,99	2,78	8,53	1,26	2,77	0,65	0,16	0,10	380	12	107	32	66
TCA5	D	L	14,78	5,79	2,15	5,77	1,45	2,89	0,59	1,32	0,09	529	11	99	24	60
TCA6	B	L	15,10	5,91	2,45	6,37	1,23	2,78	0,65	0,37	0,10	466	12	100	29	61
TCA7	B	L	14,96	5,89	2,24	5,42	1,46	5,06	0,62	1,46	0,09	630	12	104	31	66
TCA16	I	L	19,54	7,27	1,82	2,49	0,93	3,30	0,73	0,12	0,12	590	12	105	27	34
TCA17	I	L	18,81	6,90	1,99	2,40	0,86	3,02	0,69	0,09	0,11	885	12	93	22	38
TCA18	I	L	16,11	7,30	0,79	2,00	0,84	2,21	0,51	0,14	0,21	688	22	86	22	29
Porto Perone - Satyrion																
PP16	MP	P	13,06	9,83	3,12	12,09	1,19	2,88	0,60	0,23	0,09	363	21	234	39	93
PP17	P	L?	13,63	6,22	2,67	11,79	0,68	3,19	0,56	0,20	0,25	455	26	158	66	65
PP23	P	L?	14,98	6,96	1,78	6,72	0,66	2,68	0,65	0,31	0,05	379	14	197	69	44
PP12	D	L	11,95	4,64	2,26	18,99	1,24	2,29	0,51	0,15	0,07	373	11	137	18	44
Taranto S. Domenico																
SDO1	I	L	10,05	4,02	2,76	19,29	0,70	2,04	0,41	0,34	0,07	216	9	98	34	51
Scoglio del Tonno																
ST87 (215)	BU	L	12,2	5,24	2,74	16,57	0,96	2,73	0,53	0,42	0,165	511	15	150	21	34
ST59	M	P	15,99	6,99	3,70	11,81	0,78	2,57	0,68	0,08	0,10	413	23	202	60	72
ST60	M	CG	16,29	7,19	6,17	6,18	1,28	2,95	0,60	0,10	0,09	501	28	379	37	60
ST40	M	R	9,08	6,36	7,29	12,52	1,19	1,29	0,48	0,09	0,09	294	29	553	38	49
ST61	M	R	7,42	7,21	10,61	11,60	0,59	1,08	0,41	0,06	0,14	178	51	621	35	32
ST63	M	R	7,46	8,17	13,28	13,37	0,55	0,82	0,40	0,10	0,15	252	69	569	39	37
ST64	M	R	6,49	6,97	13,56	13,17	0,72	0,69	0,36	0,10	0,13	245	59	489	42	34
ST65	M	R	7,97	8,75	12,90	12,12	0,92	1,15	0,46	0,08	0,11	126	73	588	59	30
ST83 (211)	CW	L	17,88	6,19	1,98	6,76	2,35	1,55	0,65	0,05	0,102	641	12	44	23	12
ST84 (212)	CW	R	13,37	10,93	5,34	4,71	0,82	1,54	0,69	0,06	0,164	232	62	1622	38	36
ST85 (214)	CW	L	17,51	6,64	2,13	2,15	1,01	3,41	0,66	0,12	0,097	510	11	82	27	27

Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Rb
58	15	312	122	22	117	56	38	66	38	5,7	1,5	4,1	1,8		
54	13	307	105	20	98	55	35	60	40	5,3	1,3	3,9	1,5		
58	15	278	120	22	105	62	37	65	29	5,8	1,5	4,1	1,8		
58	15	337	129	24	92	62	37	69	47	5,5	1,6	4,2	1,8		
133	11	813	81	34	90	46	23	29	-5	3,6	1,3	3,8	1,4		
54	9	465	71	21	72	46	29	48	32	4,6	1	3,5	1,1		
79	12	445	110	23	74	52	26	51	28	3,9	1,1	3,6	1,8		
55	10	481	84	23	93	59	31	57	32	4,7	1,2	3,7	1,3		
54	9	451	80	22	96	54	31	62	35	5,7	1,3	3,9	1,5		
88	12	339	89	20	108	46	27	48	34	4,1	1,2	3,6	1,3		
64	11	437	90	21	96	52	28	46	31	4,2	1,2	3,6	1,2		
81	11	300	93	40	79	87	45	84	58	8,3	2,1	6,6	2,8		
46	8	203	61	29	69	95	38	62	40	6,1	1,4	4,2	2,2		
42	8	189	58	28	64	75	36	64	34	6,1	1,4	4,5	2		
57	10	186	100	33	60	117	41	93	50	7,3	1,7	5,3	2,9		
58	13	216	103	52	60	138	65	155	73	11,8	3	8,2	4,1		
61	13	220	108	50	65	132	67	156	70	12,9	2,6	9	4,4		
82	18	217	131	73	81	222	71	105	77	12	3,2	9,8	5		
83	16	182	114	67	70	175	67	124	74	12	3,2	9,1	4,5		
113	23	360	144	55	84	193	53	113	57	8,7	2,4	8,1	4,1		
100	19	321	126	46	76	150	49	104	57	9,9	2,3	7,4	3,6		
43	9	350	82	42	63	112	43	91	50	7,5	1,8	6,3	2,8		
43	10	358	83	43	60	121	44	87	47	7,1	1,7	6,3	3		
92	14	214	129	66	70	183	64	104	72	10,6	2,8	8,6	4,5		
46	10	171	63	35	45	119	47	69	47	7,4	1,8	5,3	2,7		
28	6	465	36	25	52	65	28	46	31	5,2	1,1	5,2	1,7	19	71
45	9	390	79	30	55	107	36	78	46	5,8	1,5	5	2,1		
180	21	325	138	22	92	59	32	64	32	5,6	1,4	4	1,8		
56	15	519	114	22	111	55	41	69	42	6,7	1,5	4,2	1,9	22	143
54	13	313	110	20	111	42	37	60	38	5,7	1,6	3,5	1,6	21	129
50	13	352	101	21	130	55	35	60	36	6,0	1,3	3,7	1,8	20	128
54	13	289	90	22	113	61	37	63	38	6,3	1,5	3,9	1,9	20	138
51	13	392	100	21	155	61	34	59	35	6,0	1,2	3,6	1,9	18	156
55	14	390	108	38	187	237	66	134	68	10,3	2,1	6,4	3,5	37	194
52	13	386	87	31	151	229	55	117	56	9,0	1,8	5,1	2,9	35	174
54	13	436	122	29	60	169	48	386	51	8,7	1,6	5,8	3,2	52	122
186	16	415	136	35	139	55	33	53	36	7,8	2,1	5,7	3,1	25	125
189	15	758	98	25	111	46	35	59	37	5,9	1,6	4,5	2,2	29	116
115	17	704	147	21	103	46	27	51	29	4,8	1,3	3,6	2,2	25	97
89	11	901	134	23	79	42	28	44	30	4,1	1,4	3,6	1,9	21	102
64	9	352	97	19	96	44	23	37	24	3,8	1,1	3,0	1,6	16	96
108	11	946	117	21	84	61	28	54	27	5,2	1,1	3,2	1,5	15	90
243	18	466	139	19	121	39	29	51	31	5,1	1,4	3,7	2,0	25	152
372	16	223	106	24	92	27	34	60	36	6,6	1,4	4,4	2,3	27	164
455	15	214	97	17	88	39	19	24	20	3,8	1,2	2,8	1,5	20	53
983	13	376	77	17	66	46	19	24	21	4,1	1,4	2,9	1,5	12	49
1092	13	617	68	15	91	54	18	25	19	3,8	1,2	2,5	1,4	25	40
1015	12	544	78	15	73	41	18	20	19	3,5	1,2	2,6	1,4	12	31
1351	14	339	73	16	90	47	20	25	22	4,1	1,4	2,9	1,6	18	47
65	14	448	108	23	65	93	26	53	24	4,8	1,1	3,6	2,1	19	56
1008	19	222	145	31	82	94	35	65	32	6,5	1,3	4,7	2,4	17	61
60	13	763	103	25	113	199	49	97	41	7,5	1,5	4,2	2,0	32	155

Sample	Ware	Suggested Origin	Al_2O_3	Fe_2O_3	MgO	CaO	Na2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Cr	Cu	Li
ST86 (213)	CW	L	18,05	6,93	2,44	2,32	1,03	3,68	0,68	0,09	0,121	609	13	91	48	34
ST62	IM	L	15,55	6,04	3,21	12,08	0,80	2,92	0,66	0,50	0,06	421	14	199	32	58
ST90 (218)	IM	L	13,85	5,7	3,65	13,57	1,13	2,73	0,6	0,47	0,082	490	16	182	30	53
ST76 (204)	DF	L	12,04	5,17	3,23	17,05	0,98	2,25	0,53	0,15	0,076	318	13	148	20	42
ST75 (203)	DI	L	16,76	6,28	1,86	2,41	1,05	3,34	0,65	0,13	0,113	532	11	100	39	22
ST80 (208)	DI	L	14,37	5,01	1,4	1,53	0,82	2,68	0,48	0,11	0,049	495	6	69	26	16
ST81 (209)	DI	L	18,09	6,86	1,39	2,14	1,03	2,74	0,6	0,11	0,132	577	12	89	23	23
ST66	G	L	12,93	4,88	3,22	11,06	1,24	3,08	0,56	0,47	0,08	558	15	187	39	64
ST67	G	L	14,10	5,08	2,65	14,11	1,17	2,80	0,62	0,29	0,09	545	13	141	34	66
ST68	G	L	13,85	5,46	2,79	13,02	1,26	2,80	0,60	0,34	0,10	426	13	134	28	61
ST69	G	L	13,45	5,35	2,77	12,52	1,01	2,49	0,59	0,24	0,10	572	15	129	30	58
ST88 (216)	G	L	14,66	5,77	3,4	12,71	2,07	1,44	0,64	0,24	0,092	359	13	141	25	52
ST89 (217)	G	L	13,19	5,18	2,82	12,6	1,13	2,97	0,57	0,61	0,078	603	13	158	28	40
ST91 (219)	G	L	14,07	5,58	3,24	13,87	1,18	2,47	0,62	0,56	0,091	445	14	150	29	44
ST70	I	L	14,43	5,03	1,72	1,55	1,16	2,83	0,52	0,08	0,08	551	9	73	38	35
ST71	I	L	15,83	5,97	2,06	1,80	0,97	3,53	0,63	0,12	0,10	635	12	83	34	40
ST72	I	L	18,11	6,73	2,23	1,37	1,39	3,70	0,68	0,12	0,12	609	12	120	28	47
ST73 (201)	I	L	10,61	4,76	2,96	22,15	0,73	2,34	0,56	0,22	0,045	356	9	82	100	35
ST74 (202)	I	L	8,5	3,85	5,23	22,64	0,57	2,32	0,47	0,11	0,028	218	5	72	52	27
ST78 (206)	I	L	17,39	6,06	1,38	1,55	0,82	3,2	0,63	0,2	0,116	625	11	76	16	21
ST79 (207)	I	L	19,17	7,27	2,24	1,43	0,79	3,66	0,71	0,1	0,118	387	12	110	22	34
ST82 (210)	I	L	16,01	5,65	1,47	1,84	1,02	3,45	0,58	0,1	0,075	745	9	55	26	18
ST77 (205)	Fornello	L	16,93	6,07	2,35	2,37	1,49	4,26	0,59	0,13	0,122	822	10	80	24	42
CALABRIA																
Broglio di Trebisacce																
BT707	CW	L	16,13	5,95	2,59	6,85	1,03	3,20	0,66	0,14	0,08	459	12	107	41	72
BT712	CW	L	15,69	5,94	2,30	7,42	0,99	2,81	0,56	0,15	0,063	468	9	65	26	73
BT701	IM	L	17,22	6,11	2,83	10,58	1,11	3,02	0,74	0,20	0,096	708	12	101	33	65
BT705	IM	L	15,71	5,75	2,68	9,87	0,99	2,96	0,67	0,13	0,073	497	9	79	32	73
BT706	IM	L	16,11	5,79	2,58	7,00	1,00	3,10	0,67	0,18	0,071	827	10	99	35	73
BT710	IM	L	17,01	6,18	2,59	6,33	0,98	3,36	0,70	0,13	0,087	467	12	109	41	71
BT711	IM	L	15,87	6,30	3,19	8,35	0,91	2,65	0,69	0,16	0,120	1003	13	99	37	60
BT713	IM	L	16,11	5,86	2,51	6,81	0,94	3,12	0,69	0,15	0,073	1540	11	72	31	73
BT714	IM	L	16,66	6,51	2,87	9,5	0,87	2,97	0,71	0,17	0,102	1419	13	112	31	46
Torre Mordillo																
TM51	IM	L	17,67	6,62	2,87	6,77	0,79	3,19	0,80	0,18	0,091	450	17	108	36	65
TM78	IM	L	14,23	6,04	3,75	8,66	0,79	2,94	0,69	0,24	0,138	623	14	98	37	56
TM84	IM	L	13,07	5,45	3,08	11,41	0,85	2,49	0,58	0,30	0,134	680	15	87	32	46
Taureana																
TAU19	M	P	16,36	7,62	4,03	12,71	1,00	2,59	0,75	0,20	0,154	515	25	254	67	76
TAU2	I	L	18,45	8,36	0,87	2,54	1,41	1,96	0,90	1,44	0,066	1493	16	69	78	18
TAU6	I	L	19,41	7,88	2,01	2,55	1,13	3,07	0,90	0,68	0,190	1129	21	127	52	50
TAU9	I	L	19,92	10,89	0,81	2,55	1,15	1,99	1,02	1,45	0,168	2144	21	91	67	17
TAU11	I	L	19,00	8,24	2,06	3,49	2,02	3,90	0,89	1,01	0,135	1858	16	81	39	24
TAU14	I	L	18,41	8,09	1,47	3,62	1,20	2,18	0,85	1,44	0,123	1876	21	100	68	20
TAU15	I	L	20,32	8,93	1,72	2,25	1,35	2,62	0,95	0,28	0,117	763	18	103	71	28
Pontecagnano																
PON1	IM	L	15,57	5,82	1,90	7,35	0,79	2,11	0,75	0,30	0,118	433	17	100	34	44
PONI1	I	L	21,71	7,71	1,11	2,69	1,24	3,37	0,86	0,26	0,106	1014	14	57	27	22
PONI2	I	L	20,78	6,33	1,14	2,82	1,52	4,22	0,78	0,69	0,187	974	12	36	53	16
PONI3	I	L	21,76	7,58	1,12	2,81	1,37	3,48	0,88	0,25	0,278	1040	16	57	48	19
PONI4	I	L	21,63	6,73	1,21	2,42	1,39	4,04	0,78	0,31	0,133	931	14	39	27	33
Monteroduni																
ROD1	IM	L	17,31	7,35	3,13	8,16	0,24	2,07	1,01	0,80	0,069	387	17	194	31	34

Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Rb
70	13	593	108	30	95	211	54	105	46	8,6	1,6	4,9	2,4	27	151
132	16	1014	209	22	103	54	35	58	36	5,2	1,5	3,6	2,1	23	149
138	14	1273	184	22	105	61	32	58	30	5,7	1,1	3,5	1,7	13	116
114	12	619	98	22	79	55	29	54	29	5,4	1,1	3,5	1,6	12	96
64	12	516	106	31	92	189	58	106	48	9,0	1,7	5,5	2,6	28	145
34	9	389	67	24	68	181	45	74	36	6,7	1,3	4,0	2,0	23	122
55	12	681	111	28	82	206	54	113	49	8,8	1,7	5,0	2,4	33	153
146	14	815	128	21	133	50	31	49	33	5,3	1,3	3,6	1,9	19	127
88	13	837	129	24	111	59	34	55	36	5,7	1,3	3,8	2,1	22	128
74	13	766	131	23	109	56	32	54	34	5,4	1,5	4,0	2,1	18	125
104	13	618	109	23	122	55	33	52	35	5,7	1,2	4,0	2,0	19	121
90	13	672	144	24	74	72	35	63	34	6,4	1,2	4,1	1,9	6	69
107	13	1008	169	21	95	54	30	56	27	5,5	1,2	3,4	1,6	15	102
91	13	909	186	23	88	61	33	61	31	6,1	1,2	3,6	1,6	14	105
42	9	587	74	25	107	183	51	93	52	7,6	1,4	4,4	2,3	32	175
65	12	513	106	25	122	172	51	98	52	8,1	1,6	4,8	2,7	34	173
88	14	326	114	30	114	188	57	105	59	8,3	2,0	5,3	2,9	35	205
34	9	866	87	20	80	94	31	58	29	5,5	1,1	3,4	1,5	50	88
26	7	609	70	17	57	83	26	48	23	4,5	0,9	2,8	1,4	23	78
44	11	573	102	29	86	212	56	128	53	9,4	1,8	5,3	2,5	31	144
64	14	256	111	36	98	226	65	130	55	10,1	1,8	6,2	3,0	32	191
43	10	479	82	26	83	188	51	88	42	7,9	1,6	4,4	2,1	28	133
49	11	700	87	25	76	198	48	95	41	7,5	1,5	4,4	2,1	27	149
CALABRIA															
44	14	270	113	22	110	57	38	68	37	5,0	1,6	3,9	1,9	3	167
39	13	249	96	22	97	73	39	64	41	7,0	1,2	4,6	2,1	25	130
51	15	348	110	22	139	48	44	74	46	7,2	1,2	4,7	2,1	29	143
45	14	316	111	25	106	73	41	68	43	6,9	1,3	4,8	2,5	23	149
44	14	322	108	18	108	41	42	70	43	6,6	1,3	4,2	1,8	21	150
47	14	259	119	22	117	58	44	77	46	7,4	1,3	4,6	2,2	24	158
60	13	285	111	19	114	55	38	60	40	6,2	1,2	4,3	1,9	23	126
46	14	292	98	20	117	45	43	67	44	7,2	1,2	4,1	1,8	24	147
61	14	398	122	21	125	66	38	76	34	6,6	1,5	3,5	1,5	19	115
284	17	258	131	20	136	68	37	63	39	7,1	1,2	4,4	1,7	29	127
68	14	326	95	21	122	66	32	59	35	6,2	1,1	5,2	1,8	19	109
56	12	449	98	16	121	35	30	45	33	5,7	1,0	5,3	1,6	25	105
206	21	399	143	24	110	38	32	49	34	6,5	1,3	4,2	2,6	20	129
20	17	984	174	27	103	125	45	75	46	7,9	1,6	4,3	3,0	31	89
54	17	384	161	25	122	93	48	81	50	9,2	1,5	5,0	2,6	21	111
26	17	950	229	36	123	186	57	114	60	11,4	2,1	6,3	3,8	40	103
30	18	1033	150	36	122	54	54	85	56	9,2	1,9	5,1	3,2	20	119
32	18	989	184	41	113	83	58	107	60	11,2	2,0	5,9	3,8	21	100
34	21	348	192	31	114	89	54	77	56	10,0	1,8	5,1	3,2	23	119
51	13	230	95	22	107	58	37	69	38	7,2	1,2	3,9	2,1	20	96
25	10	434	145	33	81	266	70	123	71	11,3	1,9	5,3	3,3	47	198
17	8	439	99	24	95	290	59	101	60	8,0	1,3	4,9	2,7	56	199
27	10	427	124	33	97	264	72	142	74	11,4	1,9	7,1	3,3	53	190
18	9	352	108	36	100	292	75	147	76	11,1	1,7	5,4	3,4	62	211
86	17	127	126	27	89	77	40	79	41	8,4	1,4	4,0	2,6	12	53

Sample	Ware	Suggested Origin	Al_2O_3	Fe_2O_3	MgO	CaO	Na2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Cr	Cu	Li
MARCHE																
Treazzano																
TRE1	M	P	18,134	8,904	5,093	5,271	1,082	3,024	0,851	0,378	0,151	630	29,4	293	52,5	63
Tolentino																
TOL1	IM	L	17,43	7,802	4,032	15,278	0,672	2,825	0,767	0,221	0,101	574,4	24,15	191,1	68,25	75,6
TOL2	IM	L	14,249	6,468	2,499	7,014	0,756	2,793	0,714	0,189	0,089	380,1	19,95	173,3	53,55	66,2
TOL3	IM	L	12,926	5,135	2,31	19,688	0,924	2,394	0,567	0,609	0,088	802,2	10,5	106,1	29,4	41
TOL4	IM	L	16,695	6,248	3,035	13,304	1,082	2,993	0,714	0,483	0,079	618,5	12,6	151,2	28,35	53,6
TOL5	IM	L	15,015	5,912	2,793	13,02	1,082	2,699	0,641	0,546	0,062	524	11,55	137,6	31,5	47,3
TOL6	IM	L	16,223	6,363	3,161	12,348	1,113	2,93	0,714	0,347	0,065	616,4	11,55	148,1	27,3	47,3
TOL7	IM	L	15,33	6,143	3,140	13,797	1,092	2,762	0,662	0,389	0,072	696,2	11,55	139,7	32,55	54,6
TOL8	IM	L	14,112	5,586	2,930	15,551	1,239	2,006	0,609	0,893	0,109	752,9	11,55	129,2	32,55	48,3
TOL9	IM	L	11,771	4,074	1,659	19,74	1,26	1,89	0,483	1,029	0,076	678,3	10,5	54,6	36,75	31,5
TOL10	IM	L	14,406	5,712	2,657	15,603	0,987	2,52	0,609	0,546	0,108	767,6	12,6	70,4	26,25	44,1
TOL11	IM	L	16,695	7,476	3,759	14,007	0,966	2,489	0,735	0,273	0,127	492,5	23,1	153,3	56,7	59,9
TOL12	IM	L	14,637	6,395	3,182	13,797	0,704	2,625	0,683	0,336	0,122	1065,8	19,95	120,8	50,4	51,5
TOL13A	IM	L	14,123	5,67	2,930	23,300	1,827	0,987	0,599	0,473	0,105	562,8	12,6	71,4	38,85	48,3
TOL13B	IM	L	13,892	5,513	2,793	22,733	1,848	0,893	0,599	1,145	0,087	601,7	11,55	72,5	38,85	45,2
TOL14	IM	L	10,259	3,381	1,239	21,063	0,662	1,565	0,42	0,189	0,067	579,6	7,35	42	34,65	26,3
TOL15	I	L	18,575	7,623	2,478	3,371	0,567	2,657	0,798	0,756	0,114	1119,3	17,85	140,7	52,5	59,9
TOL16	I	L	17,651	6,878	2,174	2,625	1,155	2,657	0,735	0,767	0,13	1233,8	18,9	104	57,75	46,2
TOL17	I	L	16,632	6,72	1,953	3,392	0,924	2,562	0,693	0,672	0,135	1260	16,8	104	42	45,2
TOL18	I	L	15,761	5,985	2,111	9,923	0,861	2,426	0,662	0,462	0,104	793,8	13,65	81,9	37,8	43,1
TOL19	I	L	18,386	7,445	2,321	3,507	0,662	2,625	0,788	0,714	0,147	1501,5	18,9	111,3	49,35	46,2
Jesi																
JES1	IM	L	15,33	6,195	3,213	15,981	0,956	3,465	0,651	0,462	0,152	476,7	13,65	106,1	32,55	47,3
JES2	IM	L	14,711	5,67	3,035	19,782	0,861	3,591	0,609	2,31	0,141	809,6	11,55	97,7	35,7	47,3
JES3	IM	L	15,561	6,321	3,539	16,097	0,977	3,686	0,662	0,378	0,139	475,7	13,65	134,4	36,75	56,7
JES4	I	L	17,693	6,584	2,079	1,995	1,019	3,612	0,777	0,536	0,109	541,8	17,85	99,8	52,5	46,2
JES5	I	L	16,790	6,731	1,943	1,848	1,187	3,581	0,809	0,578	0,165	678,3	21	93,5	74,55	46,2
JES6	I	L	18,669	7,487	2,457	2,111	0,788	4,001	0,819	0,851	0,134	705,6	16,8	119,7	45,15	58,8
JES7	I	L	18,312	7,319	1,985	2,321	1,008	3,833	0,788	0,494	0,219	659,4	23,1	100,8	74,55	34,7
JES8	I	L	18,638	7,067	2,079	1,985	1,029	3,686	0,830	0,620	0,12	620,6	19,95	111,3	43,05	49,4
Ancona																
ANC1	IM	L	16,097	6,710	3,297	13,556	1,292	2,993	0,693	0,42	0,122	667,8	15,75	120,8	34,65	58,8
ANC2	IM	L	15,813	5,838	2,247	10,269	1,113	3,014	0,683	0,357	0,099	517,7	12,6	73,5	32,55	50,4
ANC3	I	L	17,661	7,256	2,184	1,89	1,134	2,93	0,777	0,315	0,074	909,3	15,75	108,2	37,8	37,8
ANC4	I	L	18,554	7,161	1,491	2,982	1,113	2,541	0,882	0,599	0,069	1262,1	18,9	104	30,45	44,1
ANC5	I	L	17,892	7,308	2,384	2,226	1,302	2,804	0,819	0,347	0,112	942,9	18,9	118,7	32,55	50,4
ANC6	I	L	16,884	7,067	2,195	3,339	0,956	2,751	0,756	0,956	0,131	878,9	17,85	179,6	48,3	47,3
VENETO																
Lovara																
LOV1	IM	L	14,49	5,74	2,72	11,84	1,05	2,87	0,62	0,44	0,194	988	22	138	35	53
LOV2	IM	L	11,65	5,51	2,47	21,16	0,69	2,44	0,57	1,04	0,29	819	47	75	49	55
LOV3	IM	L	14,20	5,83	3,13	10,94	0,99	2,75	0,61	0,58	0,307	655	35	123	39	47
LOV4	I	L	15,51	5,45	1,60	2,56	1,25	3,32	0,60	1,03	0,132	931	18	91	52	49
LOV5	I	L	15,41	6,02	1,84	2,87	1,06	3,12	0,62	0,50	0,087	534	15	96	31	63
LOV6	I	L	16,59	5,20	1,87	5,64	0,75	3,22	0,73	0,22	0,101	549	19	114	33	61
LOV7	I	L	17,48	6,83	2,11	2,20	0,92	3,46	0,73	0,52	0,153	753	24	120	34	64
LOV8	I	L	15,16	5,91	2,49	5,36	0,89	3,32	0,64	0,92	0,155	814	22	106	46	58
LOV9	I	L	16,73	7,44	2,09	2,97	0,90	3,29	0,64	1,74	0,111	1065	23	99	65	67
Fondo Paviani																
FPA 8	IM	L/R	15,06	5,68	2,55	10,00	1,13	2,63	0,67	0,36	0,100	443	14	108	34	61
FPA 9	IM	L/R	15,41	5,86	2,49	10,01	1,15	2,71	0,70	0,40	0,106	607	14	112	37	60
FPA B1	I	L	19,10	6,27	1,71	2,67	0,93	2,41	0,91	0,99	0,074	885	20	123	71	42
FPA B2	I	L	16,59	5,78	1,74	2,41	0,97	2,67	0,74	0,81	0,151	1285	24	133	63	60
FPA A3	I	L	16,58	5,58	1,66	1,93	1,04	2,84	0,76	0,80	0,111	890	17	132	37	46

Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Rb
MARCHE															
340,2	23,1	195,3	153,3	27,3	105	52,5	37	63	39,381	7,4	2	5,1	3,3	30,587	
200,6	21	456,75	149,1	24,15	99,75	57,75	35	50,4	36,618	5,9	1,6	4,3	2,7	26,565	
197,4	15,75	170,1	118,7	28,35	91,35	63	38	58,8	39,48	8	1,8	4,2	2,6	20,612	
55,7	11,55	493,5	87,2	25,2	111,3	59,85	32	48,3	33,755	6,3	1,4	4,4	2,2	18,155	
80,9	15,75	481,95	116,6	23,1	106,05	51,45	36	61,95	37,605	7	1,6	4,3	2,3	20,37	
69,3	13,65	430,5	114,5	22,05	109,2	54,6	33	57,75	33,953	6,1	1,5	3,6	2,4	19,53	
73,5	14,7	439,95	114,5	23,1	122,85	54,6	36	58,8	37,210	7,1	1,6	3,9	2,3	16,643	
72,5	13,65	438,9	114,5	23,1	133,35	57,75	34	54,6	34,644	7	1,6	3,3	2,3	19,11	
66,2	12,6	452,55	102,9	24,15	148,05	69,3	33	53,55	34,545	6,1	1,5	4,2	2,4	8,778	
52,5	10,5	417,9	53,6	23,1	103,95	57,75	30	43,05	32,472	5,9	1,4	4,1	2,2	5,765	
65,1	12,6	475,65	101,9	24,15	94,5	66,15	34	54,6	34,841	6,4	1,5	3,5	2,3	11,004	
204,8	18,9	327,6	136,5	24,15	107,1	55,65	34	53,55	35,532	6,6	1,6	4,2	2,5	22,365	
154,4	15,75	331,8	115,5	21	98,7	37,8	30	45,15	32,374	6,1	1,5	4	2,1	19,698	
67,2	13,65	586,95	91,4	28,35	114,45	90,3	34	47,25	35,729	7,1	1,6	4,4	2,7	8,033	
66,2	12,6	582,75	93,5	28,35	108,15	94,5	33	47,25	35,335	6,5	1,7	5	2,6	10,259	
46,2	9,45	343,35	65,1	21	112,35	39,9	25	45,15	26,945	5,8	1,1	3,5	1,9	12,842	
117,6	17,85	142,8	154,4	27,3	229,95	66,15	42	77,7	44,218	8,5	2	5	2,9	27,206	
130,2	16,8	166,95	122,9	43,05	228,9	58,8	55	93,45	58,332	10,2	2,7	7,5	3,8	31,805	
87,2	15,75	164,85	134,4	27,3	126	55,65	43	74,55	45,402	8,2	1,9	5,3	2,8	33,138	
71,4	14,7	264,6	123,9	23,1	122,85	50,4	35	55,65	36,618	6,8	1,6	4,3	2,3	21,305	
95,6	17,85	195,3	154,4	26,25	151,2	61,95	42	72,45	44,415	7,4	2	5,3	2,7	29,390	
73,5	13,65	415,8	115,5	24,15	115,5	57,75	34	47,25	35,532	7,2	1,5	4,2	2,6	16,59	
70,4	13,65	525	93,5	25,2	109,2	59,85	30	48,3	32,670	6,1	1,3	4,3	2,5	12,800	
78,8	13,65	486,15	107,1	25,2	99,75	58,8	34	51,45	35,927	7	1,5	4,6	2,4	18,039	
93,5	17,85	141,75	133,4	38,85	118,65	80,85	54	89,25	56,654	10,6	2,6	6,7	3,8	32,918	
88,2	15,75	153,3	122,9	33,6	106,05	76,65	50	92,4	52,311	8,6	2	5,3	3,4	35,501	
89,3	18,9	158,55	159,6	30,45	130,2	81,9	44	73,5	46,784	8,2	1,9	5,7	3,2	31,206	
97,7	16,8	148,05	130,2	33,6	116,55	94,5	51	224,7	54,285	9,5	2,1	6,3	3,5	41,643	
86,1	17,85	148,05	140,7	36,75	121,8	76,65	51	93,45	53,989	9,3	2,3	6	3,6	35,228	
83	14,7	575,4	107,1	24,15	108,15	61,95	35	59,85	37,013	6,5	1,6	4,7	2,3	18,344	
47,3	12,6	337,05	95,6	22,05	115,5	51,45	37	59,85	38,098	6,7	1,6	3,8	2	23,457	
85,1	16,8	168	125	25,2	136,5	70,35	42	74,55	44,218	7,4	1,7	5	2,9	31,899	
63	16,8	225,75	141,8	30,45	89,25	102,9	56	114,45	57,838	9,9	2,3	5,9	3,5	41,192	
89,3	16,8	195,3	136,5	26,25	124,95	69,3	46	87,15	47,968	8,1	1,9	4,8	2,9	32,928	
88,2	16,8	228,9	144,9	31,5	150,15	71,4	47	80,85	49,35	8,4	2,1	5,3	3,3	33,201	
VENETO															
88	14	464	97	25	115	68	34	49	37	7,3	1,0	5,0	2,3	24	119
57	10	390	75	26	231	49	29	39	33	4,2	0,7	6,0	2,3	26	101
96	14	435	94	24	170	62	34	53	37	6,5	1,0	5,4	2,2	22	105
46	14	239	96	29	181	45	43	65	46	8,3	1,3	5,5	2,7	33	149
55	15	161	108	31	122	51	43	65	46	8,1	1,3	5,5	2,9	32	152
72	15	153	116	31	111	57	46	62	48	7,9	1,3	5,5	2,7	34	159
71	17	171	132	35	149	63	49	83	52	9,7	1,4	6,1	3,0	38	162
73	15	220	115	34	191	60	44	65	47	8,8	1,3	6,3	3,0	31	132
91	16	286	120	28	241	55	44	62	46	8,9	1,2	5,2	2,8	36	168
55	14	335	102	23	92	64	37	66	39	5,2	1,1	4,4	2,6	16	132
56	14	352	103	23	86	71	40	67	42	5,7	0,9	4,2	2,7	21	128
72	15	167	129	36	124	46	57	94	59	8,2	1,4	5,4	3,4	47	108
80	15	200	128	33	111	50	50	105	53	7,9	1,3	6,1	3,3	36	168
64	16	153	122	35	101	43	54	96	56	8,1	1,4	5,6	3,0	34	156

Sample	Ware	Suggested Origin	Al_2O_3	Fe_2O_3	MgO	CaO	Na2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Cr	Cu	Li
Terranegra																
TNE1	M?	L/R	17,02	6,16	1,56	2,87	1,27	2,29	0,73	1,12	0,108	1491	15	97	44	47
TNE2	M?	L/R	16,99	6,27	1,57	2,95	1,26	2,14	0,67	1,44	0,103	1348	19	113	36	56
TNE4	I	L	16,90	8,16	1,56	11,35	0,39	1,39	0,74	1,88	0,096	1063	20	172	37	49
TNE5	I	L	16,03	5,68	1,60	1,65	1,03	2,95	0,64	0,38	0,093	697	16	104	28	41
TNE6	I	L	16,45	6,79	1,71	13,64	0,45	1,66	0,58	1,78	0,073	1224	20	131	43	80
TNE7	I	L	17,30	4,81	1,16	3,54	2,95	3,65	0,66	0,37	0,066	644	11	58	23	37
TNE8	I	L	15,91	5,81	1,63	2,38	1,03	2,95	0,69	0,88	0,087	1001	17	105	52	54
TNE9	I	L	15,39	5,30	1,69	3,06	1,10	2,99	0,63	0,57	0,093	1261	16	100	36	53
Bovolone																
BOV1	IM	L/R?	13,19	6,54	2,23	10,59	0,81	3,18	0,65	0,59	0,360	961	25	143	43	53
BOV2	IM	L/R?	13,14	6,95	1,85	11,17	0,75	2,07	0,64	1,90	0,963	1399	28	139	64	56
BOV3	IM	L/R?	12,68	8,58	1,85	12,06	0,69	1,94	0,60	2,07	0,235	1181	22	142	65	56
BOV4	IM	L/R	8,38	5,92	3,23	31,42	0,46	1,22	0,42	1,28	0,34	778	22	64	38	51
BOV5	I	L	12,65	3,99	2,48	7,19	1,26	2,29	0,52	0,62	0,110	900	10	60	38	46
BOV6	I	L	16,00	6,50	1,78	2,32	1,01	2,55	0,69	0,50	0,084	773	18	98	27	48
BOV7	I	L	14,25	5,55	1,87	2,16	1,27	2,27	0,63	0,45	0,074	622	14	69	27	49
BOV8	I	L	14,82	6,27	1,78	2,88	1,00	2,46	0,61	0,58	0,113	855	16	90	28	50
BOV9	I	L	14,34	5,06	1,80	7,20	1,00	2,46	0,58	0,37	0,122	641	12	72	21	56
SICILY																
Mulinello di Augusta																
MOL1	M	P	17,98	7,81	4,17	12,15	0,96	3,17	0,80	0,14	0,113	337	25	217	66	78
Thapsos																
THA26	M	P	15,41	7,85	2,87	7,51	2,44	2,68	0,82	0,26	0,139	426	22	201	73	75
THA27	M	P	14,09	7,53	2,65	11,35	0,92	2,01	0,81	0,16	0,089	406	22	259	54	45
THA28	M	P	17,56	9,13	4,20	14,94	1,32	0,45	0,90	0,18	0,130	279	25	252	48	38
THA29	M	P	16,53	9,28	3,99	11,48	0,56	1,19	0,92	0,17	0,125	352	24	251	53	49
THA30	M	P	17,89	10,22	3,14	11,55	0,43	1,19	0,97	3,12	0,227	409	30	258	107	40
THA31	M	P	17,79	9,38	5,05	17,46	0,56	0,88	0,90	0,18	0,161	461	33	278	78	67
THA32	M	P	18,69	9,87	3,27	13,84	0,17	0,55	1,00	0,40	0,138	300	25	338	76	35
THA33	M	P	15,41	9,46	3,35	9,08	0,44	1,31	0,98	0,56	0,148	293	24	235	60	39
THA1	I	L	16,27	7,39	2,41	10,29	1,27	1,38	0,98	0,47	0,094	408	14	131	36	54
THA2	I	L	17,20	7,30	2,27	10,86	1,33	1,45	0,90	0,30	0,125	457	16	100	40	48
THA3	I	L	18,24	7,66	2,34	8,15	0,92	2,03	0,97	0,40	0,104	631	15	132	45	62
THA4	I	L	20,77	9,24	1,47	2,39	0,53	1,73	1,19	0,54	0,084	1019	11	166	79	55
THA5	I	L	20,53	8,90	1,50	5,37	0,66	1,55	1,19	1,66	0,083	955	12	153	78	48
THA6	I	L	19,30	8,82	2,40	4,35	2,35	1,66	1,11	0,29	0,078	373	14	113	49	41
THA7	I	L	20,19	9,35	1,92	2,35	1,13	2,27	1,12	0,29	0,095	425	16	113	55	51
THA8	I	L	16,59	6,66	2,44	9,76	0,98	2,10	0,84	0,42	0,079	396	11	119	33	45
THA9	I	L	18,78	7,76	2,26	9,67	1,08	1,56	1,05	0,28	0,074	326	12	138	30	43
THA10	I	L	19,42	8,95	1,42	3,35	0,86	1,87	1,19	0,32	0,076	574	12	106	63	44
THA11	I	L	18,41	7,20	1,93	6,88	0,98	1,76	1,03	0,30	0,066	523	11	101	48	41
THA12	I	L	18,15	7,40	2,58	8,93	1,03	1,55	0,99	0,24	0,076	389	12	103	37	47
THA13	I	L	18,55	7,36	2,28	1,64	1,28	2,28	0,96	0,17	0,081	445	18	133	42	69
THA14	I	L	19,85	8,93	2,46	1,74	1,22	2,59	1,06	0,22	0,080	407	16	145	56	61
THA16	I	L	16,23	6,30	2,31	11,68	1,19	2,23	0,82	0,38	0,072	425	11	82	98	52
THA17	I	L	17,85	7,49	1,49	4,27	0,56	1,57	0,93	0,26	0,077	833	12	92	77	50
THA18	I	L	17,63	7,24	1,78	6,38	0,69	1,91	0,92	0,78	0,082	859	14	122	76	49
THA19	I	L	17,48	6,57	1,79	6,02	0,51	1,60	0,94	0,38	0,071	700	10	123	93	55
THA20	I	L	15,29	6,36	1,46	18,54	0,88	1,30	0,84	0,22	0,054	673	9	102	38	41
THA21	I	L	19,54	7,56	1,40	9,76	0,81	1,38	1,03	0,27	0,072	775	11	116	56	60
THA22	I	L	17,68	7,17	1,38	12,78	0,85	1,40	0,96	0,30	0,073	844	10	118	63	53
THA23	I	L	19,88	7,82	1,97	6,91	0,77	1,08	1,05	0,40	0,086	457	15	135	47	40
THA24	I	L	21,27	9,06	1,96	5,06	0,64	1,23	1,19	0,95	0,100	486	16	142	64	48
THA25	I	L	18,89	7,91	2,20	8,03	0,75	1,32	1,04	0,45	0,082	430	14	134	35	41
THA15	Daub	L	17,01	6,97	2,22	8,47	0,76	1,92	0,85	0,25	0,086	516	12	90	263	64

Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Rb
53	15	317	103	28	184	115	53	74	55	9,5	1,5	5,6	2,6	29	160
54	16	330	109	35	183	102	57	81	59	10,7	1,7	6,2	3,0	36	141
88	17	408	180	45	121	69	55	76	59	11,5	2,1	7,8	3,7	30	119
34	15	151	108	35	115	49	47	65	50	9,4	1,4	5,9	3,0	35	166
93	15	370	124	34	189	63	42	69	45	8,8	1,4	6,0	3,1	31	175
34	9	189	57	27	115	373	63	94	64	8,7	1,7	5,0	2,4	27	134
65	15	230	110	31	165	51	44	64	46	8,1	1,2	5,4	2,8	35	179
50	14	237	100	31	149	47	46	71	49	9,0	1,4	5,6	2,8	38	176
168	14	230	122	30	113	57	36	47	40	8,2	1,4	6,5	3,0	20	125
179	16	255	101	34	123	68	41	51	47	9,3	1,6	9,3	3,2	34	136
151	14	257	113	29	111	62	35	45	39	7,6	1,3	6,2	3,0	22	127
54	6	413	80	19	115	38	22	19	26	3,2	0,7	5,4	1,9	18	117
28	11	175	62	26	83	37	41	59	43	6,8	1,0	4,8	2,4	23	125
60	15	149	113	36	112	58	50	73	53	9,5	1,5	6,2	3,2	35	159
38	13	139	83	28	102	44	40	57	42	7,5	1,0	4,9	2,7	28	157
54	14	154	95	33	112	55	46	63	49	8,7	1,3	5,8	3,0	32	159
35	13	157	86	28	109	41	40	58	42	6,7	1,0	5,1	2,5	29	143
SICILY															
200	22	335	154	24	210	55	34	58	37	7,0	1,6	4,6	2,7	31	
159	17	239	110	24	120	63	31	56	34	7,4	1,7	4,9	2,8	25	
207	17	252	106	24	76	73	33	54	35	7,1	1,6	4,5	2,7	39	
241	24	304	163	26	83	135	27	51	30	7,4	1,6	4,6	3,2	96	
213	22	232	131	26	122	84	35	53	38	7,6	1,6	4,8	2,9	35	
205	25	189	114	35	219	93	47	71	50	9,9	2,1	6,4	3,6	32	
249	25	440	155	30	123	74	41	63	43	8,3	1,8	5,5	3,3	23	
305	22	216	99	28	82	101	37	64	40	8,8	1,8	5,5	3,2	25	
208	21	163	95	32	89	87	47	68	49	9,7	2,1	5,7	3,5	51	
43	16	354	164	27	87	103	50	85	52	10,2	2,0	5,4	2,9	18	
50	16	352	133	27	92	99	50	89	52	9,8	1,9	5,1	2,7	19	
49	16	381	152	26	106	103	53	94	55	10,0	2,0	5,1	2,7	26	
70	17	113	164	41	110	141	59	94	62	13,8	2,8	7,1	3,8	40	
55	18	253	149	33	115	141	63	101	66	12,6	2,4	6,3	3,5	36	
46	14	212	188	40	73	134	68	96	70	13,4	2,7	6,8	3,6	34	
54	16	148	161	36	102	135	66	102	68	13,2	2,7	6,7	3,5	40	
44	15	279	123	27	103	105	50	77	52	9,4	1,9	4,9	2,7	26	
44	16	374	172	28	87	106	57	93	59	11,2	2,2	5,3	2,9	25	
47	15	152	159	41	86	139	69	103	71	13,8	2,9	7,3	4,0	39	
40	16	305	137	32	97	119	62	92	64	11,5	2,3	6,0	3,2	31	
44	16	373	172	31	94	98	58	88	60	11,3	2,3	5,8	3,0	26	
53	17	119	131	28	104	123	50	97	52	10,3	2,1	5,7	3,2	37	
58	16	126	162	36	111	140	56	94	59	12,1	2,5	6,7	3,6	39	
42	14	415	147	25	106	97	48	75	49	9,0	1,9	4,7	2,7	23	
47	15	164	105	22	127	109	38	83	40	9,0	1,8	4,6	2,6	33	
47	15	257	108	27	124	112	49	86	51	9,8	1,9	5,3	2,8	28	
43	15	189	116	25	137	109	42	78	44	9,2	1,9	4,9	2,8	29	
37	12	322	123	25	80	99	46	73	47	9,0	1,8	4,7	2,6	18	
50	16	250	139	27	102	123	52	89	54	10,3	2,1	5,5	3,0	31	
46	14	249	137	26	90	107	50	82	52	9,9	2,0	5,0	2,8	26	
47	17	295	146	30	106	137	57	94	59	11,3	2,2	5,9	3,3	31	
55	18	179	155	37	106	166	64	105	67	13,6	2,6	7,2	3,8	38	
41	17	328	172	33	94	138	58	95	61	11,4	2,3	6,2	3,6	30	
51	16	242	137	26	133	106	48	93	50	10,6	1,9	5,2	2,9	30	

Sample	Ware	Suggested Origin	Al_2O_3	Fe_2O_3	MgO	CaO	Na2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Cr	Cu	Li
Buscemi																
MAI1	M	P	16,42	7,68	3,65	15,33	1,59	1,37	0,78	0,14	0,123	410	22	217	49	48
Cannatello																
CAN4570	M	P?	11,46	5,92	3,63	21,26	1,40	1,74	0,62	0,34	0,18	1102	19	176	62	42
CAN4592	M	P?	13,68	6,34	2,89	11,81	0,70	2,39	0,65	0,16	0,11	563	44	185	52	65
CAN4766	M	P	15,19	6,92	4,39	9,32	1,83	2,40	0,74	0,16	0,10	755	24	251	50	64
CAN4771	M	P	16,99	7,94	3,76	7,31	1,35	3,08	0,84	0,13	0,13	428	25	237	53	78
CAN4774	M	P?	12,23	6,58	5,82	15,84	1,13	1,61	0,59	0,18	0,12	710	25	308	40	62
CAN4885	M	P	13,79	7,20	4,41	11,16	0,92	2,29	0,64	0,19	0,10	734	24	302	47	64
CAN4896	M	P	14,16	6,80	3,50	15,61	0,86	2,29	0,63	0,24	0,10	946	18	239	54	64
CAN4913	M	P	13,87	6,31	3,14	12,94	0,68	2,49	0,63	0,19	0,11	667	37	186	53	68
CAN4916	M	P?	11,53	5,88	4,48	14,32	0,38	1,66	0,69	0,35	0,12	1458	22	113	62	41
CAN4601	M	CG/CC	14,84	8,69	7,47	11,38	1,02	2,50	0,73	0,13	0,14	869	36	514	57	76
CAN4571	M	? Cycl	14,40	5,08	1,60	12,42	1,39	2,41	0,60	0,31	0,14	1719	10	68	32	46
CAN401	P	S Cy	7,44	5,23	5,69	19,76	0,67	0,81	0,39	0,18	0,27	1803	21	523	51	23
CAN401 Heated	P	S Cy	8,10	5,69	6,22	20,94	0,73	0,88	0,43	0,19	0,29	2002	24	497	55	25
CAN402	P	S Cy	9,90	9,36	7,07	16,16	1,47	0,63	0,79	0,08	0,18	1270	32	603	80	29
CAN501	D	L	14,88	5,99	2,04	12,44	0,45	2,43	0,72	0,28	0,06	1277	8	100	26	53
CAN502	D	L	15,19	6,12	1,99	12,66	0,46	2,17	0,72	0,24	0,06	1873	10	103	27	50
CAN503	D	L	23,05	7,91	1,31	4,85	2,57	1,15	1,20	0,22	0,17	1220	11	6	17	36
CAN504	D	L	21,74	6,02	1,34	4,63	2,25	1,06	0,94	0,17	0,06	1315	6	6	24	33
CAN504 Heated	D	L	22,54	6,61	1,40	4,99	2,46	1,16	1,05	0,19	0,07	1853	8	7	24	33
CAN601	I	Malta	16,60	6,28	1,96	16,98	0,40	2,60	0,77	0,40	0,04	970	10	122	21	48
CAN602	I	Malta	16,61	6,23	1,91	17,72	0,36	2,53	0,75	0,30	0,03	1206	9	115	22	50
CAN603	I	Malta	17,35	6,60	1,94	15,49	0,43	2,78	0,79	0,34	0,03	759	10	116	25	41
CAN604	I	L	15,29	6,09	1,63	22,94	0,43	2,02	0,74	0,34	0,042	1423	10	112	23	44
CAN701	I	L	16,18	6,62	1,81	9,94	0,55	2,17	0,76	0,22	0,06	2171	10	103	36	49
CAN702	I	L	18,25	5,27	1,31	4,19	2,37	2,47	0,79	0,07	0,08	1875	8	10	38	30
CAN801	I	L	15,48	6,36	1,86	8,84	0,63	2,21	0,74	0,18	0,06	2826	9	95	28	51
CAN802	I	L	12,80	4,36	1,65	9,15	1,13	2,59	0,46	0,25	0,08	1690	7	49	42	45
CAN803	I	L	16,46	7,42	1,85	10,91	0,68	2,24	0,79	0,35	0,06	1133	10	110	25	56
CAN804	I	L	14,21	6,05	1,66	12,02	0,56	1,91	0,70	0,29	0,07	940	9	97	29	47
CAN805	I	L	15,58	6,32	1,53	10,46	0,58	1,83	0,77	0,26	0,06	2262	10	104	36	67
CAN901	I	L	17,57	7,14	1,85	9,27	0,56	2,29	0,84	0,33	0,07	4346	11	108	64	63
CAN902	I	L	17,95	7,28	2,05	6,26	0,43	2,24	0,85	0,20	0,04	1627	14	123	29	60
CAN903	I	L	16,95	6,53	1,73	10,75	0,53	2,18	0,79	0,31	0,04	2919	12	112	38	48
CAN904	I	L	17,50	7,16	1,99	5,80	0,43	2,18	0,83	0,18	0,04	1176	12	118	34	64
CAN1001	I	L	14,26	5,44	1,65	12,68	0,60	2,03	0,70	0,27	0,06	2485	8	71	39	50
CAN1002	I	L	16,95	6,89	2,01	10,38	0,46	1,85	0,81	0,21	0,07	1780	11	94	43	63
CANQ3D	I	L	14,35	5,33	1,77	11,40	0,44	1,86	0,69	0,20	0,06	1637	10	87	49	51
CANSIV189	I	L	17,59	7,20	1,99	10,25	0,58	2,50	0,82	0,29	0,07	977	13	114	35	59
CAN1301	Daub	L	4,74	2,57	0,49	15,93	0,39	1,02	0,27	0,11	0,04	1150	3	23	16	19
Ustica																
UST1	IM?	?	18,13	6,98	2,69	6,82	1,02	2,85	0,81	0,28	0,107	510	17	111	34	71
Salina																
POR1	P	S Cy	13,31	9,47	6,47	11,97	1,80	1,16	0,79	0,06	0,18	365	31	568	85	27
POR3	P	S Cy	14,45	9,85	6,13	11,52	1,82	1,17	0,79	0,06	0,20	351	33	549	82	29
POR2	I	L	18,11	7,66	2,40	2,81	1,96	2,88	0,72	0,12	0,11	616	17	63	118	27
POR5	I	L	17,61	8,63	2,92	3,76	2,01	2,93	0,71	0,21	0,11	759	24	47	138	20
POR6	I	L	17,74	9,19	2,66	4,42	2,02	1,86	0,74	0,07	0,13	604	20	41	131	21
POR7	I	L	16,83	7,74	2,87	2,93	1,57	2,54	0,74	0,12	0,12	627	24	76	199	33
POR8	I	L	17,13	8,51	3,56	4,40	2,19	2,59	0,70	0,18	0,14	737	24	50	168	25
POR9	I	L	17,05	9,93	2,87	4,61	2,24	1,98	0,85	0,09	0,10	477	21	81	104	15
POR10	I	L	16,77	9,19	4,17	5,82	2,34	2,55	0,73	0,13	0,14	610	27	47	140	19
POR11	I	L	17,65	8,35	2,92	3,65	2,04	2,72	0,71	0,15	0,10	601	21	47	182	20

Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Rb
189	20	349	110	22	125	77	26	42	28	5,5	1,3	4,0	2,6	19	
150	16	629	92	24	115	55	20	26	23	4,8	1,4	4,1	2,0	13	40
145	16	311	103	21	91	37	26	36	28	1,3	1,1	3,6	1,7	14	93
218	17	291	119	21	104	35	28	36	30	5,9	1,5	3,9	1,9	19	87
197	20	190	133	25	106	34	32	48	35	4,5	1,6	5,0	2,3	18	125
285	16	397	118	19	85	53	22	33	24	4,3	1,4	3,4	1,9	12	61
261	17	273	130	19	102	32	27	40	29	4,9	1,4	3,6	1,7	15	85
187	16	346	115	22	111	46	32	43	34	5,6	1,4	3,7	1,8	18	86
162	17	331	115	21	93	38	29	39	31	2,9	1,4	3,6	1,8	15	111
166	13	566	90	26	87	79	31	47	33	5,7	1,5	4,2	2,0	9	52
431	22	307	149	20	104	32	26	34	28	4,1	1,3	3,8	2,0	19	96
38	11	637	84	19	73	47	31	50	33	5,1	1,3	3,7	1,6	18	98
100	24	462	112	20	70	35	12	10	19	2,9	1,0	3,3	2,0	13	32
112	25	501	118	22	78	39	14	9	23	2,9	1,0	3,8	2,2	13	33
122	35	414	285	20	84	31	5	7	8	3,3	1,3	3,2	2,5	7	12
36	13	553	115	21	92	72	36	59	38	6,1	1,4	3,9	1,9	18	72
35	13	611	124	24	100	81	42	64	43	5,5	1,5	3,9	1,9	17	78
6	18	397	104	40	107	258	48	94	52	9,4	2,7	7,3	3,8	20	41
7	15	406	59	35	94	252	38	77	44	7,0	2,1	5,6	2,9	14	62
8	15	430	71	34	100	257	39	76	46	7,6	2,1	5,8	2,8	13	63
41	14	493	126	25	94	83	45	68	46	4,9	1,5	4,3	2,0	18	99
41	14	518	125	25	96	81	45	72	47	7,8	1,4	4,5	2,1	18	90
42	14	449	123	26	104	85	45	74	46	7,2	1,7	4,4	2,2	19	99
42	12	682	111	27	86	101	43	69	44	8,0	1,7	4,5	2,6	16	
36	13	437	127	20	113	72	40	65	41	6,3	1,4	4,0	1,9	20	84
10	13	321	71	23	109	100	32	48	34	5,3	1,5	4,3	2,1	24	91
36	13	487	124	21	112	74	38	64	39	5,9	1,5	4,0	1,9	22	81
31	11	355	79	21	126	48	32	39	34	5,2	1,1	3,7	1,8	24	105
36	14	471	139	22	107	72	40	68	41	5,1	1,4	3,9	1,9	20	87
35	12	475	113	20	105	58	40	62	41	6,0	1,4	3,9	1,7	43	73
40	13	461	106	22	126	70	39	63	41	6,2	1,5	4,2	1,8	21	68
42	15	523	135	23	129	86	43	73	45	5,7	1,6	4,5	2,2	21	88
46	15	401	126	25	115	87	47	82	49	8,2	1,5	4,8	2,4	22	90
45	14	624	112	23	116	85	38	63	40	6,4	1,4	4,3	2,1	20	78
45	15	340	118	23	114	87	40	73	42	7,0	1,5	4,5	2,2	21	89
35	12	427	108	22	116	75	38	59	39	5,7	1,5	4,0	2,0	16	67
42	15	375	123	24	120	90	42	71	44	7,0	1,7	4,3	2,3	18	77
36	12	447	115	20	105	71	37	60	38	5,8	1,4	3,9	1,9	19	82
47	15	496	126	22	122	74	45	72	46	6,5	1,6	4,3	2,0	20	95
14	4	319	31	13	40	31	13	22	14	1,9	0,9	2,3	0,8	11	22
64	15	298	125	26	108	86	52	90	53	9,0	1,4	4,4	2,5	27	154
144	36	461	202	21	54	82	17	18	19	4,6	1,3	3,7	2,5	8	46
139	36	451	190	23	69	89	16	21	19	4,5	1,3	4,1	2,7	8	46
26	18	446	181	20	70	119	35	49	36	5,2	1,3	3,8	2,5	21	133
19	19	661	194	27	81	146	42	63	44	6,2	1,7	4,5	2,8	21	134
18	24	470	209	21	151	119	28	43	30	4,7	1,3	4,0	2,7	73	91
36	20	426	169	27	91	119	46	59	48	7,0	1,4	4,6	2,7	23	162
22	25	579	207	33	84	137	53	64	55	6,2	1,9	5,8	3,3	17	128
26	25	456	262	19	59	122	26	31	28	5,2	1,3	3,8	2,7	12	73
23	28	698	209	22	91	131	32	54	34	5,2	1,6	4,0	2,5	18	99
19	18	566	186	26	70	149	37	49	39	5,7	1,5	4,2	2,7	21	118

Sample	Ware	Suggested Origin	Al_2O_3	Fe_2O_3	MgO	CaO	Na2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Cr	Cu	Li
POR12	I	L	17,38	7,98	2,99	3,62	2,07	2,63	0,69	0,12	0,09	682	20	45	198	22
POR12 Heated	I	L	17,99	8,14	3,10	3,57	2,16	2,76	0,69	0,13	0,10	698	20	43	207	24
POR13	I	L	17,57	7,67	2,14	2,79	1,95	2,59	0,77	0,12	0,14	674	23	73	97	39
POR15	I	L	18,26	8,70	2,72	5,09	2,26	2,44	0,76	0,12	0,13	971	18	40	52	21
POR17	I	L	16,63	8,50	2,70	4,33	1,95	1,94	0,69	0,09	0,13	594	17	41	162	17
POR17 Heated	I	L	17,81	9,18	2,95	4,72	2,13	2,05	0,75	0,09	0,14	608	19	42	166	19
POR18	I	L	19,53	9,34	2,62	4,61	2,30	1,97	0,78	0,15	0,11	578	19	59	103	20
POR19	I	L	18,49	9,55	3,10	5,16	2,37	2,24	0,81	0,14	0,14	644	25	71	71	18
POR20	I	L	18,37	8,80	3,17	5,30	2,15	1,86	0,75	0,08	0,14	674	20	47	83	21
POR22	I	L	18,14	8,13	2,51	3,22	1,90	3,11	0,85	0,20	0,13	637	18	83	94	40
POR23	I	L	17,25	8,13	2,64	3,59	1,82	2,57	0,78	0,17	0,11	1285	17	78	97	39
POR24	I	L	18,98	8,95	2,60	4,83	1,96	1,93	0,79	0,12	0,13	575	22	75	122	20
POR25	I	L	16,89	8,47	2,54	3,64	2,63	4,22	1,06	0,12	0,19	376	18	90	83	29
RIN2	I	L	17,76	9,29	2,37	3,21	1,42	1,48	0,61	0,13	0,07	815	21	52	178	17
Lipari																
MIC2	M	P	17,92	8,67	3,33	7,37	1,13	4,67	0,80	1,61	0,28	611	24	302	54	115
MIC3	M	P	16,83	8,24	3,27	9,15	0,61	3,98	0,78	1,05	0,19	642	33	234	84	68
MIC4	M	P	12,55	7,37	1,56	6,24	0,74	3,89	0,63	10,55	0,11	1356	18	355	43	27
MIC5	M	P	13,05	7,12	2,71	7,10	1,33	3,79	0,57	3,10	0,17	1379	30	323	53	46
MIC7	M	P	15,56	8,69	3,63	6,98	0,68	3,74	0,78	4,17	0,08	539	21	376	41	41
MIC8	M	P	15,61	7,51	2,56	7,64	0,56	4,06	0,78	5,91	0,15	576	28	287	56	54
MIC9	M	A?	15,85	7,86	3,34	12,33	1,46	2,23	0,78	0,75	0,16	296	20	161	55	48
MIC10	M	A	13,94	7,32	2,04	10,37	0,47	3,08	0,59	2,34	0,24	411	44	251	66	52
MIC1	M?	?	16,29	7,25	2,42	9,98	1,24	3,34	0,77	4,37	0,09	591	12	111	57	49
MIC6	P	?	14,62	6,47	2,01	11,06	0,42	1,94	0,75	0,48	0,09	343	15	93	54	54
NUR1	I	Not Aeolian	18,61	7,31	2,13	11,87	0,44	3,24	0,88	1,45	0,07	611	13	151	31	56
NUR2	I	?	16,72	7,35	2,18	10,81	0,74	3,52	0,78	1,04	0,07	381	11	127	28	57
NUR3	I	Sardinia	15,93	4,33	0,67	0,90	2,13	3,55	0,35	0,29	0,02	1033	1	26	16	24
NUR4	I	Sardinia	16,55	4,95	1,05	3,24	2,37	3,41	0,67	0,31	0,07	1056	6	14	28	25
NUR5	I	Sardinia	18,41	8,49	1,16	1,88	1,94	3,22	0,90	0,86	0,12	803	19	84	77	31
CVE8	I	L	17,12	7,33	2,24	4,01	1,90	2,61	0,65	0,15	0,08	635	15	68	72	31
CVE8 Heated	I	L	18,71	7,93	2,36	4,20	2,07	2,86	0,71	0,16	0,08	659	16	70	77	33
CVE9	I	L	17,82	9,99	2,53	2,81	1,41	1,36	0,64	0,25	0,05	594	18	56	90	22
LIP1	Clay	L	15,76	12,78	3,05	0,45	0,06	1,51	0,77	0,06	0,02	207	7	143	58	9

Reference data																
Bay of Naples: Mirti *et al*. (1998) Table 3 Group A (n=20)																
	Al_2O_3	Fe_2O_3	MgO	CaO	Na2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Cr	Cu	Li	Ni	Sc
mean	18,8	5,01	1,53	3,49	3,12	4,99	0,764		0,104			47				8
s.d.	0,5	0,28	0,13	0,59	0,35	0,33	0,018		0,005			10				0,8

Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Rb
19	18	633	180	27	72	146	43	77	38	6,5	1,6	4,2	2,5	17	135
19	19	626	179	29	72	155	41	73	33	6,0	1,7	4,5	2,6	22	125
31	19	382	158	27	86	97	48	76	50	7,7	1,8	5,0	2,6	24	121
17	25	532	191	23	162	117	32	49	34	5,6	1,6	4,5	2,9	62	88
21	23	465	176	22	150	111	31	44	27	5,0	1,4	3,8	2,5	74	110
21	25	492	190	24	156	119	33	47	33	5,1	1,6	4,0	2,7	77	116
25	26	510	199	23	69	132	34	48	36	5,5	1,6	4,2	2,8	11	75
28	27	527	238	21	74	125	29	47	31	4,6	1,4	3,7	2,7	10	73
21	27	532	195	24	209	112	32	44	34	6,3	1,6	4,3	2,7	70	96
30	20	433	179	34	87	109	60	66	62	8,3	2,1	5,7	3,1	21	134
27	23	464	183	25	95	101	45	57	46	6,3	1,4	4,3	2,5	20	113
26	24	478	204	21	71	133	30	46	32	5,1	1,6	3,8	2,6	15	75
26	18	295	187	37	112	233	66	133	68	11,6	1,9	6,8	3,2	34	179
30	31	439	227	15	66	75	19	21	20	3,2	1,1	2,6	2,2	15	74
222	21	806	154	34	288	101	41	68	45	7,8	1,5	7,4	3,2	21	175
247	21	869	135	28	160	70	37	72	39	6,7	1,3	5,0	2,6	23	156
197	18	2032	70	21	278	66	24	47	26	4,5	0,9	3,5	1,9	27	121
225	19	1322	127	26	150	53	30	56	33	6,3	1,1	4,7	2,5	26	142
289	20	586	116	24	161	94	34	57	36	6,3	1,3	4,1	2,6	16	134
236	24	641	133	30	153	117	35	68	38	6,8	1,3	4,9	2,9	29	195
162	19	635	132	25	99	82	31	55	33	5,8	1,1	4,6	2,6	17	199
239	16	870	108	33	165	64	34	50	38	7,1	1,5	6,6	2,8	30	128
48	20	1534	148	28	101	122	38	75	40	6,5	1,3	4,6	2,6	21	135
43	13	1043	91	27	123	91	43	82	45	7,9	1,5	4,6	2,2	26	93
45	17	955	148	32	151	131	50	93	52	7,9	1,6	5,2	2,8	23	133
41	16	809	144	27	123	130	42	88	43	6,0	1,2	4,2	2,3	31	137
10	7	469	41	55	119	569	63	143	68	10,5	0,7	9,2	6,1	39	164
7	12	538	81	24	87	119	32	62	34	5,2	1,3	4,3	2,3	2538	139
29	17	851	154	28	126	116	47	79	49	7,4	1,4	5,0	2,7	28	156
20	20	621	151	25	78	145	37	59	43	6,1	1,5	4,1	2,5	15	137
21	21	644	162	27	81	160	39	65	43	6,8	1,7	4,4	2,6	16	150
27	34	381	243	11	97	77	12	17	13	4,6	1,2	2,1	1,9	13	95
8	52	63	347	3	97	86	2	7	3	2,0	0,7	0,7	1,6	8	73

Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Rb
192					79								
17					6								

Database 4: PE and XRD data

APULIA

Egnatia			
Means of modal petrographic analyses (vol. %) of pottery			
Inclusion type	Egnatia	Protoapennine	Apennine
Clay	51,17	53,67	47,89
Quartz	21,5	21,47	21,52
Grog	11,21	8,29	15,05
Voids	8,26	8,26	8,25
Feldspars	1,91	1,77	2,08
Muscovite+ Biotite	1,75	1,79	1,69
Fe-ox/hydrox	1,25	1,27	1,23
Calcite	1,16	1,06	1,3
Lithics	0,78	1,14	0,3
Pyroxenes	0,53	0,66	0,36
Pisoliths	0,5	0,62	0,33

CALABRIA

Amendolara XRD: summary by wares (from Jones *et al.* 1994)															
Ware	Quartz		Other minerals												
	ang	sub	cal	pol	che	Fel	Pla	Mus	Cal	Pir	Anf	Opa	Fra	Bio	Ill
AM Grey	xxx	x/xx		x	x/xx	0/tr	x			0/tr		xx	0/x	x	xxx
AM *dolium*	xxx	xx		x	x	x	x	x	xx			x	x	x	xx

Amendolara XRD: summary by wares (from Jones *et al.* 1994)													
Sample N.	qz	kf	p	c	dol	px	gr	gh	oFe	CH	M-I	ML	SM
AM Grey	xxx	tr	x			tr/(tr)			xx/ xxx		x/xx		

Broglio di Trebisacce PE of Aegean samples (from Jones *et al.* 1994)																	
Sample number	Texture	Quartz							Other			Minerals					Notes
		ang	sub	cal	pol	che	Fel	Pla	Mus	Cal	Pir	Anf	Opa	Fra	Bio	Ill	
A1	abund., v. fine	xx	x		x	x	xx im	x	tr	xx			x		tr	xx	Microforaminifera and microcline
A11	abund., fine	xx	x		x	x	x	x				xx	x	xx		xx	vescicular vulcanite, serpentinised
A13	abund., v. fine	xxx	x			tr	x	x		x			xx			xxx	
A18	abund., v. fine	xxx	xx		tr	tr	x	xx			(tr)		xx	x		xxx	sericite schist, sandstone
A30	medium, fine	xxx	x			xx	x	x	xx	x			x	tr		xxx	microforaminifera, gastropod
A38	abund., v. fine	xxx	xx		x		x	x	x	x			xx	x		xxx	microforaminifera, gastropod
A43	medium, very fine	xxx	xx		x		x	x	xx	xx			xx	x		xxx	titanite, sericite schist, microforaminifera
A51	abund., v. fine	xxx	x			xx	x						x			xx	
A59	abund., v. fine	xx	xx			x	x	x		xx	tr		xx			xx	Microforaminifera and microcline
A60	abund., v. fine	xxx	x	tr	x	xx	x	x			(tr)		x		tr	xxx	sandstone, chlorite, microcline
A63	little, v. fine	xx	xx			x	x	x					x	tr		xx	radiolaria and coral, argillaceous rock fragments

A64	abund., v. fine	xxx	x		tr	x	x	xx	xx	xxx			x			xxx	microcline, microforamanifera
A65	medium, very fine	xxx	xx				x	x			(tr)		x	tr	tr	x	overfired
A69	abund., v. fine	xx	xx		tr	x	x	tr		xx						xxx	radiolaria, nodul, overfired
A71	abund., v. fine	x	xxx		x	x	x	x	xx	xxx			x		xx	xx	
A72	abund., v. fine	xxx	x		tr	tr	xx	tr	xx	xxx			xx			xxx	argillaceous rock fragment invece di noduletto
A73	little, v. fine	xx	x				x	x					x	x		xx	microforaminifera, brown siltstone

Broglio di Trebisacce PE summary for the different wares (from Jones *et al.* 1994)														
Ware	**Quartz**		**Other Minerals**											
	ang	**sub**	**cal**	**pol**	**che**	**Fel**	**Pla**	**Mus**	**Cal**	**Pir**	**Opa**	**Fra**	**Bio**	**Ill**
G	xx/xxx	0/xx	0/tr	0/xx	0/xx	0/x	tr/xx	0/xx	0/xxx	0/tr	xx/xxx	0/x	0/x	x/xxx
D	xx/xxx	x/xxx	0/tr	tr/xx	0/xx	x/xx	tr/xx	tr/xx	0/xxx	0/x	0/xxx	0/xx	0/xx	x/xxx
F	xx/xxx	xx/xxx			x	x/xx	x/xx	0/tr		(tr)/tr	x/xx	0/x	0/x	xxx
I	xx/xxx	xx/xxx	0/tr	tr/xxx	tr/xx	x/xx	x/xx	0/xx	0/xxx	0/tr	tr/xx	xx/xxx	0/xx	0/xxx

Broglio di Trebisacce XRD data: single compositions for Aegean and summary for other wares and geological samples (from Jones *et al.* 1994)													
Sample N.	**qz**	**kf**	**p**	**c**	**dol**	**px**	**gr**	**gh**	**oFe**	**CH**	**M-I**	**ML**	**SM**
A1	xx	tr	x			tr			xx		xx		
A11	xx	xx	xx			x			xx		x	tr	
A13	xx	tr	x					tr	xx		x		
A18	xx	x	x	x		tr		tr	x		x		
A37	xxx	tr	x	xx					xx	tr	xx		
A38	xxx	x	x	tr				tr	x		xx		
A43	xx	x	x	x					xx		x		
A58	x	x	x					tr	x		tr		
A59	xxx	x	x	x					xx		xxx		
A60	xx	tr	x			tr		tr	xx		X		
A61	xx	tr	x	tr		tr		x	tr		Tr		
A62	xx	tr	x			tr		tr	x		Xx		tr
A63	x	tr	xx	tr		x		tr	xxx		Tr		
A64	xxx	x	xx	xx					tr		Xxx		
A65	x	x	xx			x		tr	xx		Tr		
A66	xx	tr	x	x					tr		Xx		
A67	xx	tr	x					tr	tr		Tr		
A68	x	tr	x	tr		tr		tr	x		Tr		
A69	xxx	tr	x	xx					tr		xx	tr	tr
A70	xxx	tr	x					x	x		tr		tr
A71	xx	tr	x	x					x	tr	xxx		
A72	xxx	x	x	xx					xx		xx		
G	x/xxx	tr/x	tr/xx	0/xx		0/x		0/x	x/xx	0/tr	tr/xxx	0/tr	0/(tr)
D	xx/xxx	tr/xx	tr/xx	tr/xx		0/xx	0/xxx	0/x	tr/xxx	0/tr	tr/xxx	0/tr	0/(tr)
F	xx/xxx	x/xx	x/xx	0/x		tr/x		0/tr	tr/xx	0/tr	tr/x		
I	xxx	tr/xx	x/xx	0/xxx		0/x	0/xx	o/(tr)	tr/xx	0/tr	tr/xxx	0/tr	0/tr
rocks	tr/xxx	0/xx	0/xx	0/xxx	0/tr	0/(tr)	0/(tr)		tr/xx	0/xx	tr/xxx	0/tr	0/tr
clays	xx	tr/x	x	(tr)/x		tr/x		x	x/xx		tr/x		

Broglio di Trebisacce PE point counting for *dolia* (Levi 1999)												
	BT905	**BT921**	**BT927**	**BT932**	**BT942**	**BT944**	**BT947**	**BT948**	**BT949**	**BT950**	**BT956**	**BT980**
QUARTZ												
Single quartz	16	42	52	22	31	44	35	43	38	69	49	15
Quartz in metamorphic	2		2	6		4	5		2	1	6	17
Quartz in plutonic			4	11		10		2	14	1	6	2
Quartz in arenite					24							
FELDSPAR												
Single K-Feldspar	1	1	10	10	1	2	1		1		9	
K-Feldspar in metamorphic												
K-Feldspar in plutonic			1	2					3		1	1
K-Feldspar in arenite												
Single plagioclase		10	25	23	2	29	20	14	26		16	19
Plagioclase in metamorphic				1		1	7	1				16
Plagioclase in plutonic			6	11		7	4	1	9	1	9	2
Plagioclase in arenite												
LITHIC												
Phyllite	3									2		
Schist	13									3		
Serpentinite												
Flint					6					12		
Siltstone	2	10			19		1		1	4	4	
Argillite	35	10			10							
Micritic calcite		3			6							
Biomicritic calcite		14										
Spathitic calcite												
Single spathite	3									2		
Fossil (single skeleton)				8								
MICA												
Mica light single				1		2						
Mica dark single							16	26	4	5		
Chlorite single												
DENSE MINERALS												
Granite							10	7	1			25
Green hornblende												
Opaque oxide	25	10		5	1	1	1	6	1			2
Zircon												1
Alterite												

Broglio di Trebisacce PE point counting for *impasto* (Levi 1999)											
	BT1	**BT7**	**BT9**	**BT10**	**BT14**	**BT208**	**BT209**	**BT249**	**BT404**	**BT435**	**BT445**
QUARTZ											
Single quartz	53	44	65	52	46	69	54	49	62	57	14
Quartz in metamorphic	7	1	7	8	3	2	1	1	5	12	
Quartz in plutonic				3		2		3	2		
Quartz in arenite						1	1	2		5	
FELDSPAR											
Single K-Feldspar	1	1	3	7	5	2	3	7	6	4	2
K-Feldspar in metamorphic											

	BT1	BT7	BT9	BT10	BT14	BT208	BT209	BT249	BT404	BT435	BT445
K-Feldspar in plutonic				2							
K-Feldspar in arenite											
Single plagioclase		10	18	11	8	9	18	29	6	8	10
Plagioclase in metamoprhic				2					1		
Plagioclase in metamorphic			3	4		1		7	1	1	
Plagioclase in arenite											
LITHIC											
Phyllite					1	1	1	1	2	1	
Schist			3	4		4		1	6	2	
Serpentinite											
Flint											3
Siltstone	6	3			2	5	5		6	6	5
Argillite	18	2	1	1	1	2	5		1	2	40
Micritic calcite	2	2				1					10
Biomicritic calcite	1	33			2		3				8
Spathitic calcite	2										
Single spathite					32	1					6
Fossil (single skeleton)											
MICA											
Mica light single		1								1	
Mica dark single	1			5							2
Chlorite single									1		
DENSE MINERALS											
Granite											
Green hornblende				1							
Opaque oxide	1	1					9		1	1	
Zircon											
Alterite											

Broglio di Trebisacce XRD data for *dolia* and *impasto* (Levi 1999)								
Sample n.	Ware	Quartz	Calcite	Plagioclase	Gehlenite	Diopside	K-Mica	K-Feldspar
905	D	+++	++	+			+	
927	D	+++		+		±	+	
932	D	+++	+	++			+	
950	D	+++		+		±		±
957	D	+++		±		±		±
1	I	+++	±	+			±	
7	I	+++	++	+			±	
9	I	+++		+				+
210	I	+++	±	+		±	±	

Plain of Sybaris XRD data for clays (Levi 1999)								
Sample N.	Findspot	Quartz	Calcite	Plagioclase	Gehlenite	Diopside	K-Mica	K-Feldspar
1104	Marzuca	+++	±	+	+			
1106	Trebisacce	+++	±	+	+			
1117	Amendolara	+++	±	+	+		±	
1122	Torre Mordillo	+++	+	+	±		+	+
1124	Corigliano	+++	±	+			±	

Torre Mordillo PE for Aegean type (from Jones *et al.* 1994)						
Sample N.	**quartz**		**other minerals**		**texture**	**notes**
	ang	sub	Pla	Ill		
TDM1-E	xxx	x	tr	xx	medium, v. fine	microforaminifera

Torre Mordillo XRD for Aegean type (from Jones *et al.* 1994)													
Sample N.	**qz**	**kf**	**p**	**c**	**dol**	**px**	**gr**	**gh**	**oFe**	**CH**	**M-I**	**ML**	**SM**
TDM1-E	xx	(tr)	tr	tr		tr	(tr)		xxx		xx	tr	
TDM2-E	xx	x	x			(tr)			xxx	(tr)	xx		
TDM3-G	xx	xx	xx			tr	(tr)	(tr)	xx		xxx		
TDM4-D	xx	x	x	x		x		xx	xx		x		

Plain of Sybaris Regional project (phase 2)
PE of clays from various sites (Levi 1999)
Tursi Castello (**TUC12**): clay with silstones and sandstones.
Tursi S. Martino (**TUM9**): fossiliferous calcareous fine clay with quartz and mica.
Straface (**BT1136**): calcareous clay with quartz and muscovite.
Avena, Fig. 24 (**BT1117**): fossiliferous silty clay with quartz and muscovite.
Trebisacce (**BT1102**, **BT1106**): big quarry between Broglio and Trebisacce. On the northern side the clay is fine and grey-blue, on the southern side it is silty and yellowish. The clay contains fossils, quartz, calcite, muscovite.
Canale Marzuca (**BT1104**): small deposits on Torrente Marzuca, immediately north of Broglio near the "Sellata di Broglio". It is a silt and sand rich clay (with quartz and muscovite) and contains large clasts of siltstone (with microfossils and calcite) (*cfr*. **BT1109**).
Villapiana: alternating silt and clay layers, the clay contains many fossils (**BT1111**).
Civita (**BT1119**): clay with siltstone (quartz, calcite, muscovite).
Cassano allo Ionio (**BT1120**): clay with quartz, calcite and muscovite.
Near Torre Mordillo - Valle Saetta (**BT1121**): clay and siltstone with calcite, fossils, quartz, rarely feldspars.
Near Torre Mordillo - Spezzano Albanese, fig. 25 (**BT1122**): siltstone with fossils, calcite, quartz, feldspars.
Corigliano Le Varie (**BT1123**): clay and carbonatic siltstone with fossils, quartz, pyroxene.
Corigliano, quarry for brick (**BT1124**): clay/siltstone with macro- and microfossils, quartz, muscovite.
Strange (Trionto) (**BT1126**): calcareous clay with fossils, quartz, feldspars, muscovite, glauconite, chlorite.

Plain of Sybaris Regional project (phase 2)															
PE point counting of pottery from sites in the Plain															
	VP2	**VP3**	**TMC2**	**TCF3**	**FMA8**	**FMA12**	**TDM2**	**TDM15**	**SCS6**	**SCG1**	**FF7**	**RR4**	**RR9**	**BRS1**	**BRS4**
QUARTZ															
Single quartz	31	53	54	40	21	47	45	46	37	47	53	38	48	23	35
Quartz in metamorphic		5	9	15	7	6	7	14	7	15	17	7	6	10	1
Quartz in plutonic		2		1				3	4		1	2	4	10	4
Quartz in arenite	1		2			6		1							
FELDSPAR															
Single K-Feldspar	11	10	6	5			10	3	12	6	7	11	7	12	15
K-Feldspar in metamorphic								1				1			
K-Feldspar in plutonic									1				2	4	1

K-Feldspar in arenite							1								
Single plagioclase	17	12	11	15	27	7	7	11	23	27	7	32	19	16	25
Plagioclase in metamorphic		2		1	7				1				1	2	
Plagioclase in plutonic		2		1			1	2	1	5	2	2	2	14	6
Plagioclase in arenite						1									
LITHIC															
Phyllite						2	3								
Schist	5			7		7	8	3	6					2	
Serpentinite							1								
Flint			2			9			3						
Siltstone	5	5				7	2	8			2				
Argillite	10	5	1	8							1	2		2	
Micritic calcite	3						4	1							
Biomicritic calcite															
Spathitic calcite							1								
Single spathite							2								
Fossil (single skeleton)						1									
MICA															
Mica light single	6	1					2						1	1	
Mica dark single	6	1	10	1	20	1	1	3					10		11
Chlorite single															
DENSE MINERALS															
Granite					18		3								
Green hornblende								1							
Opaque oxide	5	1				1	2		5		5	5		4	2
Zircon															
Alterite			5	6		5		3			5				

CAMPANIA

Vivara											
PE Williams in Cazzella *et al.* 1997											
X=abundant	#=common	*=sparse	!=rare	T=trace							
Fabric	1	1	1	1	1	1	1	2	2	2	2
Sherd n.	5	6	7	10	12	13	14	1	2	3	4
MATRIX	76,0	78,0	68,0	70,4	72,0	71,0	58,0	56,0	57,2	52,0	59,6
clay rich											
silty clay							X				
loamy clay											
sandy clay	X	X	X	X	X	X		X	X	X	X
VOIDS	6,0	3,2	5,6	2,0	1,6	6,0	9,2	7,2	5,2	8,4	3,6
GRAINS	12,8	9,2	8,4	19,6	9,6	13,5	5,6	24,4	24,8	26,8	25,6
quartz angular	#	#	#	#	#	#	#				

quartz aggregate	!	!	!	!	T	!	!				
plagioclase	!	!	!	!	!	!	!	#	#	#	#
alkali-feldspar	#	#	#	#	#	#	#				
clinopyroxene	!	T	T	!	T	!	!	*	#	*	#
orthopyroxene	T	T	T	T	T	T	T	!	!	!	!
amphibole								T			
muscovite	#	#	#	#	#	#	#				
biotite	#	#	#	#	#	#	#				
calcite											
vitric fragments	!	T	T	T	T	!	*	X	X	X	X
GROG	1,2					1,5					
CLASTS (Tot.)	4,0	9,2	17,2	8,0	16,8	8,0	27,2	12,4	12,8	12,8	11,2
pumice/obsidian	1,6	0,4	5,6	2,4	0,8	0,4	8,0	4,0	5,2	3,2	6,0
intersertal lavas	1,2	*	0,4	0,8	3,2	1,0		4,0	4,0	7,2	0,8
trachytoid lavas		0,4	3,2	1,2	4,4	0,8	1,6	1,6			1,2
phenocrysts	1,2	7,2	5,6	3,2	8,4	4,4	16,0	2,8	3,6	2,4	3,2
sandstone											
siltstone											
quartz clasts		1,2	0,4	0,4			1,2				
ferric nodules					1,4	1,4					
calcite concretion											
TOTAL COUNT	250	250	250	250	250	250	250	250	250	250	250

Fabric	3	4	5	5	5
Sherd n.	9	11	101	102	103
MATRIX	70,4	76,0	78,0	74,8	73,6
clay rich		X			
silty clay	X		X		
loamy clay					
sandy clay				X	X
VOIDS	6,4	5,2	11,6	14,2	17,2
GRAINS	6,8	2,0	8,0	9,4	7,2
quartz angular	*	*			
quartz aggregate	T	T			
plagioclase	*	T	*	*	*
alkali-feldspar	*	T?	*	*	*
clinopyroxene	!	T	!	!	*
orthopyroxene	!	!			
amphibole					
muscovite		*	?	?	?
biotite		*	#	#	#
calcite			X		
vitreous fragments	T	T	X	X	X
GROG	12,4	13,6			
CLASTS (Tot.)	4,0	3,2	2,4	1,6	2,0
pumice/obsidian	0,8	1,2	0,4	1,6	0,8

intersertal lavas	0,8				
trachytoid lavas		T			T
phenocrysts	1,6	2,0	0,4		1,2
sandstone	0,8				
siltstone	T				
quartz clasts	!				
ferric nodules					
calcite concretion			1,6		
TOTAL COUNT	250	250	250	250	250

CENTRE-NORTH

Scarceta (Martini *et al.* 1996)											
PE of the two groups of *impasto*: XXX: abundant, XX: presence, X: traces, 0: absent											
Group	**Date**	**Quartz**	**Sanidine**	**Plagiocl.**	**Augite**	**Biotite**	**volc. rock**	**Sedim. Rock**	**Metam. Rock**	**Flint**	**Shape**
SA	4 MBA 7 FBA	X	XXX	X/XX	XX/XXX	X/XX	X/XX	X/XX	0/X	0/X	subrounded
SQ	1 MBA 4 FBA	XX/XXX	XX/XXX	X	X/XX	0/X	0/XX	X/XX	0/XX	0/X	angular/ rounded

Frattesina						
XRD of sample FrX38: percentage proportions of minerals (Saracino *et al*. 2006a)						
Quartz	**Plagioclase**	**Feldspar**	**Calcite**	**Pyroxene**	**Gehlenite**	**Wairakite**
13,89	22,82	11,95	3,27	34,11	9,13	4,83

SICILY

Lipari		
PE of Mycenaean MYC 2 and MYC 6 (Williams 1980)		
Relative % age content		
Inclusion	MYC2	MYC6
MATRIX	76,5	81,9
Matrix Texture		
VOIDS	6,2	3,7
Construc ??	4	1,5
Bio-clastic	2,2	2,2
GRAINS	5,5	8
Plagioclase		present?
Orthoclase	?	present?
Quartz	5	7
Calcite		1
Muscovite/biotite	absent	present?
GROG	11,2	0,2
CLASTS		6,1
Detached quartz		0,2
Calcite mud		2,2
Calcite		3,5
Concretion	present	
Black nodule		0,2
Unidentified	0,5	

Database 5: Other data sets

APULIA

Coppa Nevigata XRF (Na-Fe %element oxides, remainder ppm element) (Boccuccia *et al.* 1995)																
See also Appendix section f on ICP-XRF comparison																
Ware	Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe (tot.)	Zr	Y	Rb	Nb	Sr	Ba	LoI
Impasto (mean)	1,14	2,20	16,80	49,08	0,33	3,78	10,96	0,77	0,13	6,48	259,1	37,5	150,5	34,0	358,8	581,9	9,45
C.V.	35,3	21,8	21,9	10,0	42,9	14,7	61,8	27,3	21,7	21,1	29,9	43,3	19,9	33,6	39,9	29,5	7,69
Italo-Mycenaean	0,90	2,63	13,15	51,04	0,27	2,90	14,87	0,66	0,11	5,79	129,0	19,7	98,1	16,9	276,9	379,2	7,69
C.V.	24,1	26,3	9,8	6,9	84,1	7,1	21,8	10,1	23,4	16,9	23,2	24,2	15,2	19,2	16,4	21,5	
PG (mean)	1,56	3,19	13,08	51,86	0,26	2,74	15,81	0,60	0,12	6,33	86,5	16.4*	57,7	12,7	285,0	309,9	5,44
C.V.	19,7	13,2	4,7	7,5	20,7	12,5	15,8	14,0	16,5	15,2	39,2	48.2*	41,9	29,2	30,8	40,1	
LoI=loss on ignition																	

Madonna del Petto XRF (Na-Fe %element oxides, remainder ppm element) (Eramo *et al.* 2002)																				
Ware	Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe (tot.)	Zr	Y	Rb	Nb	Sr	Ba	LoI	V	Cr	La	Ce
Impasto (mean)	0,87	2,21	16,29	52,5	0,56	3,05	7,33	0,74	0,14	6,46	216	26	138	23	439	582	9,88	163	117	58	110
Figulina (mean)	0,76	2,37	14,28	51,34	0,36	2,65	11,95	0,67	0,1	5,68	137	19	113	13	404	542	9,84	144	101	34	63
MP7 Mycenaean	0,73	2,3	13,59	49,93	0,59	2,29	12,72	0,64	0,11	5,64	121	16	105	12	400	526	11,45	179	91	32	56

Egnatia XRF (Cinquepalmi *et al.* 2003)																				
Ware	Na	Mg	Al	Si	P	K	Ca	Ti	Mn	Fe (tot.)	Zr	Y	Rb	Nb	Sr	Ba	LoI	V	Cr	La	Ce
Impasto (mean)	1,1	1,67	19,97	56,45	0,51	3,45	1,86	0,83	0,13	7,22	263	37	155	28	133	438	6,82	114	107	66	127

VENETO

Po Valley				
Area (no. of samples)	Cr ppm (st. dev.)	Ni ppm (st. dev.)	CaO % (st. dev.)	Publication
Area a (7 clays)	86-208	41-180	Not determined	Picon (2000)
Area b (42 clays)	All but 7 clays in the range 60-200. Values 200-270 found near and to the west of Piacenza	Similar to Cr	23 clays < 5%; 16 clays 5-15%; 3 clays > 15%; 38% CaO found south of Picenza along the Trebibia river	Picon (2000)
Rovigo	101, 127, 243, 302	n.d.	4.6, 5.3, 5.8, 6.8	Calogero (1986)
Este (25)	187 (73)	96 (51)	6.9 (3)	Maritan (2004)
Altino (34)	183 (52)	92 (42)	2.2 (1.8)	Maritan (2004)
Padova (27)	148 (35)	75 (39)	3.6 (2.4)	Maritan (2004)
Adria (35)	204 (109)	109 (50)	4.7 (2.6)	Maritan (2004)

SICILY

Monte Grande SEM-EDAX (% element oxides)											
Sample	Class	Na	Mg	Al	Si	K	Ca	Ti	Mn	Fe	Cr
MGL5	Local	0,81	1,6	15,4	60	3,63	10,4	1,03	0,05	6,7	
MGL6	Local	1,62	2,2	15,9	57	1,99	12,8	0,84	0,154	6,7	
MGL7	Local	0,81	1,9	14,7	56	3,28	14,5	0,98	0,072	7,7	
MGL8	Local	0,73	1,7	16,4	56	3,13	13,4	1,03	0,037	6,7	

MGL8 grog	Local	0,44	1,5	19,1	57	3,4	8,7	1,02	0,159	8,3	
MGL9	Local	0,48	2,1	19,6	57	3,65	8,5	1,05	0,085	7,2	
MGL9 grog	Local	0,95	1,9	17,4	52	2,59	16,4	0,86	0,108	6,9	
MGL19	Local	0,53	1,8	16,3	59	3,15	11,2	0,97	0,044	7,0	
MGL19 grog	Local	0,52	1,8	16,3	59	3,22	10,3	1,04	0,155	7,0	
MG12	Coarse pithos	0,87	1,9	15	57	2,58	15,4	0,78	0,078	5,7	0,054
MG14	MH	0,88	2,6	17,5	54	3,21	11,9	1,01	0,115	7,5	0,048
MG16	'Levantine'	0,91	2,4	15,4	48	2,32	23,8	0,54	0,114	5,4	
MG17	'Levantine'	1,02	2,5	15,4	53	1,63	18,5	0,85	0,118	6,4	
MG21	Plain unpainted burnished	0,76	2,8	14,1	56	2,83	16,1	0,81	0,027	6,1	0,082
MG23	Plain unpainted burnished	1,13	2,4	15,5	56	1,92	15,4	0,82	0,16	6,1	0,096
MG27	M-P Burnished coarse	0,66	2,4	20,2	54	3,28	10,5	0,94	0,109	7,2	0,033
MG41	Coarse pithos	1,07	2,3	21	57	3,14	6,5	1,09	0,064	7,1	0,035

Milena (M-LBA pottery; XRF % element oxides) (Troja *et al.* 1996 Table 2)									
Sample	**Na**	**Mg**	**Al**	**Si**	**K**	**Ca**	**Ti**	**Mn**	**Fe**
MIL 21	0,8	2,22	15,6	48,2	2,5	12,0	0,77	0,05	6,4
MIL 24	0,85	2,2	15,8	47,1	3,12	11,1	0,76	0,04	5,1
MIL 26	0,83	2,12	16,1	48,6	2,67	11,0	0,81	0,04	4,6
MIL 27	0,72	1,94	13,5	41,6	2,84	13,0	0,63	0,04	5,1
MIL 55	0,55	1,97	16,4	50	2	9,1	0,79	0,07	4,5
MIL 56	0,39	1,87	15,1	49,7	1,6	9,9	0,76	0,05	4,8
MIL 57	0,71	4,13	13,2	50,5	0,71	11,3	0,68	0,09	6,2

Milazzzo XRF (Na-P % element oxides, the remainder ppm element) (Levi *et al.* 1999)																			
Sample	**Na**	**Mg**	**Al**	**Si**	**K**	**Ca**	**Ti**	**Mn**	**Fe**	**P**	**L.O.I.**	**Zr**	**Y**	**Rb**	**Nb**	**Sr**	**Ce**	**La**	**Ba**	**Cr**
M31-5	0,45	1,81	18,41	55,92	1,67	3,14	1	0,08	7,55	0,29	9,7	136	16	40	0	378	91	40	1334	115
M31-2	1,19	1,85	20,33	50,42	1,16	4,82	0,91	0,12	10,32	0,27	8,6	145	26	39	9	599	76	42	843	106
M31-3	1,24	1,82	20,37	50,73	1,28	4,91	0,85	0,13	9,94	0,45	8,28	147	23	36	9	622	77	42	991	99
M31-18	1,23	1,54	19,95	50,53	1,37	3,41	0,81	0,05	9,35	0,43	11,32	151	2	47	0	476	46	29	1361	93
M31-13	1,68	1,7	17,36	58,16	1,9	3,66	0,8	0,09	7,96	0,4	6,3	139	15	84	0	715	68	38	1221	72
M31-16	1,56	1,76	17,45	57,31	1,76	3,53	0,79	0,1	7,76	0,27	7,72	150	19	96	0	664	59	33	1124	70
M9-1	0,94	2,29	20,44	53,18	3,2	1,52	0,97	0,04	9,24	0,19	7,98	165	20	121	9	283	80	45	795	129
M9-2	1,11	3,63	16,69	57,7	2,63	1,99	0,84	0,08	7,68	0,19	7,48	132	17	90	0	273	57	26	722	120
M20-1	0,53	2,19	17,36	56,03	1,73	6,31	0,84	0,09	6,89	0,25	7,79	130	2	36	0	430	57	27	1521	97
M26-1	1,07	1,85	17,07	62,03	2,53	4,33	0,74	0,09	6,56	0,36	3,36	136	2	77	0	272	76	35	785	95
M26-2	0,76	2,28	15,5	61	1,85	5,1	0,69	0,07	5,86	0,24	6,65	147	16	59	0	428	59	25	1438	79
M27-1	1,45	1,38	17,05	63,18	3,01	1,38	0,66	0,07	5,7	0,55	5,58	141	15	96	0	312	66	29	1037	53
M31-10	1,4	1,22	17,82	61,65	2,64	2,05	0,74	0,13	6,71	0,27	5,37	160	20	105	13	449	80	44	1377	59
M31-24	1,16	2,03	17,29	59,54	2,61	2,59	0,83	0,06	7,48	0,37	6,03	170	22	102	0	417	73	34	808	88
M31-29	1,6	2,37	17,6	55,46	2,61	3,36	0,8	0,1	8,36	0,39	7,36	147	17	92	0	554	81	40	1248	84
M31-43	1,22	2,72	18,08	57,22	2,48	2,6	0,9	0,09	8,53	0,22	5,94									
MXXV1	0,81	3,42	17,64	56,31	2,17	7,94	0,82	0,12	6,78	0,15	3,84									

Lipari XRF (Na-P % element oxides, the remainder ppm element)																			
Clays	**Na**	**Mg**	**Al**	**Si**	**K**	**Ca**	**Ti**	**Mn**	**Fe**	**P**	**LoI**	**Zr**	**Y**	**Rb**	**Nb**	**Sr**	**Ce**	**La**	**Ba**	**Cr**
Fuardo	0,17	3,09	11,89	45,41	1,46	0,14	0,58	0,03	15,6	0,06	21,6	74	18	75	0	47	0	5	146	168
Portinente	1	2,96	15,34	50,13	1,63	3,02	0,64	0,02	19,99	0,33	11,95	85	23	51	0	615	57	31	261	59

APPENDIX

Richard Jones

1. Analytical Methods

a. AAS (*Fitch Laboratory, British School at Athens)*

Sample dissolution was achieved using the lithium metaborate fusion method (Hughes *et al.* 1976). For each sample, an excess of lithium metaborate, 125 mg, was added to 25 mg of the powdered pottery. The mixture was then fused at *c.* 900ºC to form a borosilicate glass which dissolved readily in 5% Analar nitric acid spiked with 2000 ppm Specpure lanthanum chloride (added as an ionisation buffer). The avoidance of contamination was of utmost importance during all stages of the procedure. The lithium metaborate used was a Specpure reagent, and fusion was performed in a platinum crucible. Analar nitric acid and deionised water were used throughout. A Pye-Unicam SP2900 flame spectrophotometer was calibrated for each element using two concurrent methods: with a series of multi-element standard (so-called 'potmix') solutions made from Specpure nitrates and chlorides, and with solutions, made exactly as above, of four ceramic standards (Lefkandi Brick, Mycenae 22, Knossos 38, New Knossos standard: Jones 1986a, Tables 2.2 and 2.3). The 'potmix' recipes which were based upon those used by the RLAHA (Hatcher *et al.* 1980) but since modified (Liddy 1989) were designed to incorporate the full range of element concentrations found in the pottery under analysis. The ceramic standards, though for some elements not providing such a good calibration line, ensured a consistent, reproducible calibration. Usually, the two calibration lines were in satisfactory agreement, but the standard clay line, guided if necessary by the Potmix line, was always used in the final calculations of element concentration from the absorption readings obtained.

Each batch of analyses, normally comprising 20-30 samples, included two blank solutions made in the above manner but excluding a pottery sample. This ensured that sample contamination from the reagents and preparation procedure, was constantly reviewed. All but two elements were measured using atomic *absorption*; concentrations of Na and K were more reliable (in the sense of producing straighter and more closely matching calibration curves) using atomic *emission*. All but two elements were measured using an air-acetylene flame; Al and Ti required an acetylene-nitrous oxide flame. Table

	Al	Ca	Mg	Fe	Ti	Na	K	Mn	Cr	Ni	Si
Dilution factor	x5	x50	x50	x5	x1	x5	x5	x1	x1	x1	x1
CV (%)	10	7	10	10	12	12	10	5	15	14	10

Table 1. Elements determined by AAS, dilution factors and coefficient of variation values.

1 summarises the elements measured, the dilution factors and the values of coefficient of variation expressed as a percentage calculated from replicate analyses by AAS of the Lefkandi standard over a six year period (*revised* from those in Jones, Vagnetti 1992, Table 1).

As a routine, at least one sample was analysed twice in each batch, mainly to ensure that any calibration drift of the spectrometer was satisfactorily small during each batch, and to check upon the reproducibility of the analyses and sample preparation. Other samples were re-analysed in different batches to ensure inter-batch comparability.

b. INAA

Scottish Universities Research & Reactor Centre (SURRC), East Kilbride

Using the method described by Topping and MacKenzie (1988), neutron irradiation of batches of up to thirty samples of 0.15g subsamples of pottery were carried out for 6 hours at a flux of 3×10^{12} neutrons $cm^{-2}\ s^{-1}$ in the UTR-300 Reactor at SURRC. Iron wires (Specpure) were attached to each sample vial for irradiation; corrections for variations in neutron flux experienced between samples were applied on the basis of the induced activity of Fe^{59}. Standards were the Lefkandi Brick, Podmore and Edinburgh Clay (Table 2) and the IAEA reference sediment SL-1. Samples were stored for two days after irradiation to allow excess activity of short-lived nuclides to decay and were then counted for 10 minutes each on a Ge-Li detector (25 ml vol; 1.8 KeV resolution at 661 KeV) for analysis of Na, K, La and Sm. After a further decay period of two weeks, the samples were recounted on the same detector for 60 minute periods for the analysis of longer-lived nuclides (MacKenzie *et al.* 1983). Gamma spectra were recorded on an EG& G Ortec 7032 analyser and were analysed using the Ortec peak search and analysis programme Gamma 2. INAA calculations were performed using the SURRC program NAA (Harris 1982). The following elements were determined: Na, K, La, Sm, Cr, Fe, Co, Rb, Sb, Cs, Ce, Eu, Tb, Lu, Hf, Ta, U, Sc and Yb.

Ascot

When the SURRC reactor closed, irradiations were carried out at the Consort reactor at Imperial College's Research Centre at Silwood Park, Ascot. Irradiation conditions were 22 hours in a neutron flux of 1×10^{16} $m^{-2}\ s^{-1}$. Samples were then transported back to SURRC for gamma-ray spectrometry, as described above.

c. ICP-ES

Department of Earth Sciences, Royal Holloway, University of London

Samples, free of surface weathering, slip and/or paint, were thoroughly dried before grinding to fine powder in an agate mortar. The powder was then transferred to a small crucible and placed in batches of ten in a furnace heated to 550°C for 3 hours. The heated sample was stored in a plastic vial. Batches of samples which included at least two standards (Edinburgh Standard clay and British Museum Pottery standard) were sent for analysis to the NERC ICP-AES facility in the Department of Geology, Royal Holloway College, London University. The instrument was a Perkin Elmer 3300RL ICP optical spectrometer; the analytical procedure (Thompson, Walsh 2003, 93f) entailed dissolution in $HF/HClO_4$ (except for Zr which required the lithium metaborate fusion method) was followed by determination of 28 elements: four major elements (Al, Fe, Ca and Mg), five minor elements (Na, K, Ti, P and Ba), twelve trace elements (Mn, Co, Cr, Cu, Li, Ni, Sc, Sr, V, Y, Zn and Zr) and seven rare earth elements (La, Ce, Nd, Sm, Eu, Dy and Yb). Rb was determined separately by AAS.

The samples were analysed in fifteen batches between 2000 and 2005. Long-term reproducibility of data was monitored by including at least two ceramic standards – Edinburgh Standard Clay and

(a) Edinburgh Standard Clay

Date	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Cr	Cu
ICP-ES													
Feb-01	19.47	6.87	0.63	0.34	0.04	0.97	1.15	0.08	0.03	379	19	89	27
Dec-01	22.19	7.76	0.66	0.39	0.05	1.11	1.27	0.05	0.03	394	18	103	36
July 03	21.09	7.65	0.63	0.37	0.09	1.03	1.23	0.05	0.030	364	17	92	30
“	22.28	7.44	0.67	0.40	0.09	1.10	1.31	0.05	0.025	384	18	82	30
Jul-04	21.09	7.65	0.64	0.37	0.09	1.04	1.23	0.05	0.029	377	17	93	28
“	21.74	7.56	0.66	0.39	0.1	1.07	1.28	0.07	0.026	369	18	97	29
Aug-04	21.28	7.30	0.66	0.41	0.07	1.07	1.23	0.07	0.025	405	20	103	30
“	21.39	7.55	0.68	0.44	0.07	1.07	1.26	0.08	0.028	427	21	76	32
Nov-04	21.74	7.19	0.67	0.45	0.06	1.09	1.29	0.05	0.024	395	17	103	30
“	21.30	7.46	0.67	0.43	0.06	1.06	1.26	0.05	0.025	381	19	102	32
Sep-06	21.09	7.26	0.65	0.40	0.08	1.04	1.21	0.05	0.027	377	20	88	27
“	22.07	7.81	0.69	0.46	0.08	1.09	1.27	0.06	0.029	381	19	98	30
Mean	21.4	7.5	0.66	0.4	0.07	1.06	1.25	0.06	0.027	386	19	94	30
s.d.	0.75	0.27	0.02	0.04	0.02	0.04	0.04	0.012	0.002	17	1.3	8.9	2.5
NAA													
Mean		6.84			0.073	0.973			0.0245		17.4	112.5	

Table 2. The compositions of (a) the Edinburgh Standard Clay and (b) BM Standard Pottery determined by ICP-ES at Royal Holloway College over the period 2001 to 2006 (oxides in %, the remainder ppm), and by NAA at SUERC (mean values supplied by Dr. J. Tate, National Museum of Scotland Laboratory).

Li	Ni	Sc	Sr	V	Y	Zn	Zr	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Rb
ICP-ES																
113	51	24	52	155	35	50	158	39	79	40	8.0	2.0	5.9	3.8	64	
133	56	26	56	166	35	60	169	41	85	44	6.7	2.0	6.0	3.8	23	64
152	63	31	66	198	41	67	182	46	96	50	7.7	2.1	6.7	4.2	27	77
125	54	25	55	160	31	58	146	45	77	47	10.5	2.2	5.7	3.6	41	
133	56	26	55	161	33	61	156	49	78	52	10.6	2.3	5.9	3.7	38	
111	53	25	55	158	31	56	145	45	84	43	8.4	1.8	5.4	2.9	20	66
114	55	26	57	163	32	57	152	44	81	42	8.1	1.8	5.6	2.8	22	62
113	55	24	54	155	35	56	182	42	70	45	8.1	2.3	5.4	4.0	31	
95	55	26	55	168	35	52	177	38	81	42	5.4	1.4	6.6	3.8	34	
85	56	25	55	171	33	53	150	41	78	44	5.1	1.4	6.2	3.6	26	66
114	50	25	53	163	34	56	139	39	78	41	8.9	1.6	4.5	3.0	29	66
109	53	27	55	173	35	67	148	40	77	42	9.0	1.8	4.6	3.3	24	58
116	55	26	56	166	34	58	159	42	80	44	8	1.9	5.7	3.5	32	66
18	3	1.9	3.5	12	2.7	5.3	10	3.4	6.2	3.7	1.7	0.31	0.68	0.45	12	5.8
NAA		24.4						41.1	79.1		7.35	1.87				69.9

(Other NAA determinations in ppm: Hf 6.59, Ta 1.35, Th 13.2, Np 3.5, Lu 0.526, Yb 3.8, Sb 0.741, Au 10.0, As 8.1, Tb 5.0)

(b) BM Standard Pottery

	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	P_2O_5	MnO	Ba	Co	Sr	V	Y	Zn	Zr
ICP-ES (data from J.N. Walsh)	19.14	7.15	0.75	0.32	0.12	2.35	1.22	0.09	0.02	544	6	129	153	31.5	66.8	
ICP-ES (this study) Mean (5)	19.3	6.76	0.74	0.31	0.11	2.61	1.08	0.05	0.02	629	8.5	134	149	30	72	76
s.d.	0.76	0.25	0.05	0.04	0.005	0.11	0.11	0	0	35	0.58	7	10	7	2.6	26
NAA		6.21			0.14	2.62				580	9.4	132			83	281

	La	Ce	Nd	Sm	Eu	Dy	Yb	Rb
ICP-ES (data from J.N. Walsh)	52	99.8	41	7.88	1.15	3.28	1.73	
ICP-ES (this study) Mean (5)	56	105	56	7.8	1.5	4.2	2.3	149.5
s.d.	3	5.5	2.8	0.6	0.2	0.7	0.6	9
NAA	51	106	44	8.9	1.9		4.5	161.0

the British Museum Standard Pottery in each batch, coupled with Royal Holloway's own internal standards. Particular attention was paid to the reproducibility of elements, notably chromium, which are problematic from an analytical point of view, yet very important as geochemical discriminators. The compositions of these two standards, together with the means and standard deviations, are given in Table 2. Reproducibility is good, <10%, for all elements apart from Li, Sm, Zr and Pb.

ICP-MS analyses were carried in the same laboratory on a few batches submitted in 2003-4, thereby providing characterisation with respect to the following sixteen additional elements: U, Th, Rb, Nb, Cs, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Dy, Ho and Er. These element contents are not included in Database 3.

2. Inter-Technique and Inter-Laboratory Comparability

The issue of chemical inter-technique and inter-laboratory comparability is necessarily taken increasingly seriously in archaeometry laboratories throughout the world undertaking ceramic analysis. Two recent studies are mentioned here because of their direct relevance to the present project. That by Hein *et al.* (2002a) setting out in detail the results of a large inter-laboratory calibration study involving data generated by INAA, XRF, ICP-ES and ICP-MS, carried out within the context of an EU-funded project (GEOPRO) which linked laboratories in Athens (NCSR Demokritos), Barcelona (Equip de Recerca Arqueometrica de la Universitat de Barcelona), Palermo (Dipartimento Chimica e Fisica della Terra ed Applicazioni alle Georisorce e ai Rischi Naturali, Università di Palermo) and Bonn (Helmholtz Institut für Strahlen u. Kernphysik, Universität Bonn). The samples analysed were soil and ceramic standards, as well as some BA pottery from Thebes in Central Greece. Generally good agreement between the data sets was apparent; what discrepancies there were could be smoothed with the use of correction (or calibration) factors which were derived from average ratios between median values. The authors concluded on an optimistic note that application of these factors allowed data to be used interchangeably and with some confidence between techniques. The second study, by Tsolakidou and Kilikoglou (2002), evaluated the performance of ICP-ES (and MS) in relation to INAA and XRF by comparing the respective classifications of data obtained for a group of Minoan pottery samples. The respective classifications agreed well; the membership of the main chemical groups was almost identical. The study highlighted Ti, Zr, Cr, Lu and Yb as problematic elements for ICP owing to the acid digestion procedure.

Here we examine a number of related aspects of comparability that directly concern the chemical data during the course of the present project:

1. Lefkandi Brick Standard
2. Comparability of (a) AAS and XRF data, and (b) INAA, ICP-ES and PIXE data.
3. Podmore Standard
4. Comparability of INAA data sets.
5. Italian pottery
6. Comparability of (a) ICP-ES data sets, (b) INAA and ICP data, and (c) INAA and XRF data.

1. Lefkandi Brick standard

Jones' (1994) contribution to the first European Meeting on Ancient Ceramics held in Rome in 1991 was a review of current trends and issues in Mediterranean ceramic studies. That contribution included a statement on standards and inter-technique and inter-laboratory comparisons with particular reference to a programme of analysis of a new ceramic standard prepared by the writer and Dr. Helen Hatcher, then at the Research Laboratory for Archaeology and the History of Art at Oxford. Since it has not unfortunately been possible to publish the results of that programme, the opportunity is taken of doing so here.

Background

In 1983 the Fitch Laboratory (FL) decided to make an addition to its series of ceramic standards for use in its chemical characterisation work on Greek pottery. The Laboratory was interested in a Greek clay that was available commercially and therefore in bulk, whose composition had the following requirements: CaO <5%, MgO <3%, Cr and Ni oxides <0.030%. As a result of analyses carried out by both the FL and the Research Laboratory for Archaeology at Oxford (RLAHA) on pottery from the prehistoric and Dark Age site of Lefkandi, it was recognised that the clay of the Lelantine plain in Euboea, north of Athens, adequately met these requirements. This high quality clay (Jones 1986a, 144f) is extracted today on a large scale for brick making.

Bricks made of this clay at Vasiliko within the Plain and recently fired at a large brickery near Chalkis were collected and taken to the laboratory. The preparation, which was undertaken by Helen Hatcher, involved crushing fragments of the brick in an agate mortar and collecting, in one container, the powder from 300μ sieving. The final weight was *c.* 750 gm. The powdered sample was then subdivided into a number of 30 gm containers and one large container holding *c.* 350 gm. A 2 gm sample which had been dried at 110°C was then sent to the British Ceramic Research Association in Stoke-on-Trent for analysis by XRF (Bennett 1980). The resulting composition proved to be satisfactory, whereupon the material was adopted as a ceramic standard (called Lefkandi Brick) by the FL and RLAHA. The FL undertook to distribute the standard to any laboratory engaged in chemical analysis of Greek pottery during the period 1986-1991, and the present author agreed to collate the results. No work has yet been done on testing the homogeneity of the standard at the trace element level. Participating laboratories are arranged according to technique in Table 3. Djingova *et*

Technique	Laboratory/ Institution	Analyst; reference to analytical procedure; laboratory; technical information provided with analytical data	Number of samples analysed (date)
AAS	FL	D.J. Liddy; Liddy 1989, 1996; Fitch Laboratory; see above in this Appendix.	15 (1988)
	RLAHA	H. Hatcher; Hatcher *et al.* 1980; Research Laboratory for Archaeology & the History of Art, Oxford.	5 (1987)
XRF	British Ceramic Research Association	Bennett 1980. Laboratory number T5051/83.	1 (1983)
	Venice	L. Lazzarini; Lazzarini, Calogero 1989; Laboratorio Scientifico, Soprintendenza per i beni artistici e storici di Venezia, Italy. Analysis made on beads obtained by melting the ceramic powder with Li2B4O7 (1:7). USGS rock and Venetian brick standards were used.	1 (186)
	Berlin	G. Schneider; Schneider 1978; Free University of Berlin (Arbeitsgruppe Archäometrie, Institut für Anorganische und Analytische Chemie), Germany. Beads obtained by melting the ceramic powder (ignited at 859^{o}C) 1:4 with a Lithium tetraborate-Lithium metaborate mixture (Spectromelt A12, Merck). Calibration based on about 50 international geochemical and other reference samples, including clays and ceramics. Analysis is calculated back to non-ignited sample normalised to 100% (the original sums of the measurements were 100.47 and 100.79%). Mean of two samples (analysed in 1983 and 1989). Values for Si to Mn are % element oxides; the remaining elements are expressed as ppm of element.	2 (1983, 1989)
INAA	East Kilbride-Ascot	Topping and MacKenzie 1988; see above in this Appendix; Scottish Universities Research & Reactor Centre, East Kilbride, Scotland. Later irradiations done at Imperial College's Research Centre, Silwood Park, Ascot, UK.	6 (1993-96)
	Manchester	J.E. Tomlinson; Tomlinson 2002, Newton 2007; Chemistry Department, University of Manchester, UK. Podmore standard.	20 (1991)
	British Museum	M.J. Hughes; Hughes *et al*. 1991; British Museum Research Laboratory, UK. Single sample analysed. Five portions of BMRL standard pottery were included in the irradiation, giving estimated of accuracy: *c*. 2-3% for Na, Cs, Sc, La, Ce, Eu, Cr, Fe, Co, Sm and Yb, *c*. 3-5% for K, Rb, Lu, Hf, Th, Ta, *c*. 5-10% for Ba, Sb, U, Ca, As and Tb. Na, K, Fe and Ca are % element oxides; the remaining elements are expressed as ppm of element.	1 (1989)
	Demokritos	V. Kilikoglou; Kilikoglou *et al*. 2007; Archaeometry Laboratory, NCSR Demokritos, Athens, Greece. Standards were SOIL-5 and SOIL-7 (IAEA); sample weight 150 mg; six separate samples were analysed in different batches.	6 (1991)
	Bonn	H. Mommsen; Mommsen *et al*. 1987; Helmholtz Institut für Strahlen und Kernphysik der Universität Bonn (HISKP), Germany. In Table 5 the figures in brackets refer to either the spread or the average statistical error marked *, whichever is larger. Bonn pottery standard.	2 (1991)
	Sofia	I. Kuleff *et al*. 1986; Radioanalytical Laboratory, Department of Analytical Chemistry, Faculty of Chemistry, University of Sofia, Bulgaria. SRM of IAEA: Soil 5 and Sl 1 standards were used. In brackets are the standard deviations from three parallel determinations. For technical procedures see Kuleff *et al*. (1986) and Penev *et al*. (1985). The full results and comparisons with the Perlman/Asaro and Ohio Red Clay standards are given by Djingova *et al*. (1990).	1 (1989)

INAA	Jerusalem	J. Yellin; Yellin *et al*. 1978; Archaeometry Laboratory, Institute of Archaeology, The Hebrew University of Jerusalem, Israel. Nine subsamples were analysed in the same batch. The values are relative to Perlman & Asaro standard. Fe, Ca, Na and K are % element, the remaining elements being ppm.	9 (1989)
	Toronto	R.V. Hancock; Hancock 1976; SLOWPOKE Reactor Facility, University of Toronto, Canada. Two subsamples were analysed, with multiple countings. Al, Fe, Ca, Mg, Na and K are % element, the remaining elements being ppm.	2 (1990)
	Missouri	M.D. Glascock; Glascock 1992; Missouri University Research Reactor, USA. Two irradiations and three measurements made on five 100mg aliquots analysed, using five SRM-1633a Flash standards and five SRM-688 Basalt Rock standards. The values given (ppm of element except Al, Ca,Fe, Na, K, Ti in %) are the mean and standard deviation of the five compositions.	5 (1993)
ICP-ES	London	J.N. Walsh; Thompson, Walsh 2003; Department of Geology, Royal Holloway College, University of London. See above in this Appendix. Both compositions are included in Table 5, as also are ICP-MS determinations for many elements.	2 (2003)
	Torino	P. Mirti; Mirti *et al*. 2004; Department of Analytical Chemistry, University of Turin, Italy. Both compositions are included in Table 5.	2 (2003)
PIXE	Strasbourg	S.Y. Waksman; Waksman *et al*. 1994, 1995; CNR Analyses par Techniques Nucléaires, Strasbourg, France. Some elements were determined by NAA at the same laboratory indicated in Table 5 by suffix N.	4 (1993)

Table 3. Laboratories contributing to the Lefkandi Brick Standard characterisation.

al. (1990) published their data for this standard together with that for the Asaro-Perlman and Ohio Red Clay standards.

Before commenting on the results, a number of general remarks can be made:

- The data presented in Table 3 were obtained over a fifteen-year period. Some of the laboratories are no longer in operation, in particular those using INAA at the British Museum (Hughes 2007), East Kilbride, the Hebrew University (Yellin 2007), Manchester (Newton 2007) and the Slow Poke Reactor Toronto (Hancock *et al*. 2007).
- The participating laboratories analysed the standard in different ways: single or multiple analyses in one or more batches.
- The performance characteristics are those in force at the time of the analyses. In all cases changes and improvements will have been made since that time.

In the present context the purpose of the comparative exercise is first to look critically at the FL's AAS data in relation to that from other laboratories using AAS or XRF, and second to look for trends in the INAA (and PIXE) data. It is not intended here to arrive at a 'preferred' or 'agreed' composition of the Lefkandi Brick standard.

(a) Comparing the FL's **AAS** data with that from other laboratories using **AAS** and **XRF**, Fig. 1 indicates adequate, encouraging agreement for the major and minor elements. As for the trace elements, the agreement is again satisfactory while recognising that the reproducibility of the Cr and Ni determinations by AAS is less good than it is with other techniques. Hatcher *et al*. (1995) who made a comparison of AAS at the RLAHA (using the acid sample dissolution method described above) and ICP-ES, showed that the former technique tended to give higher concentrations of the major, minor and Mn, Cr and Ni contents than ICP-ES. Table 1 gives the values of the reproducibility of measurement by AAS over several batches, expressed as the coefficient of variation.

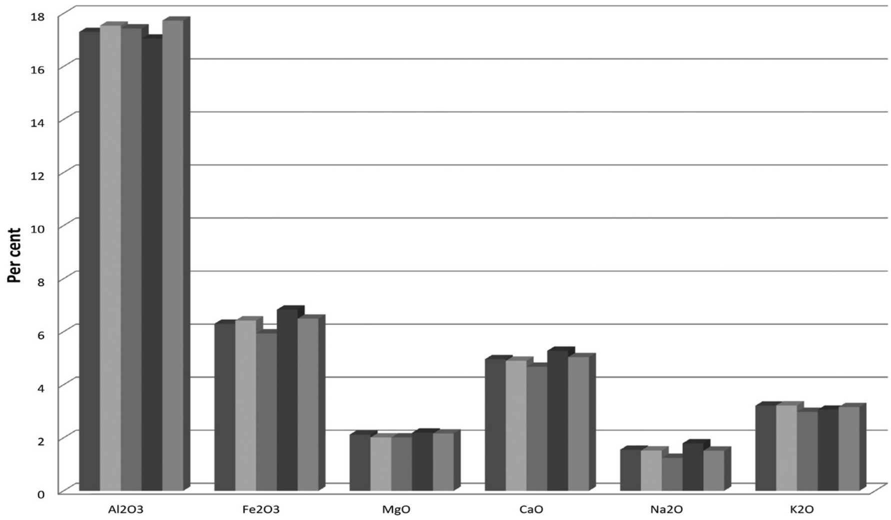


Fig. 1. Comparison of six element oxide determinations in the Lefkandi Standard, made by (from left to right) FL, RLAHA (AAS); BCRA, Venice and Berlin (XRF).

	BCRA	RLAHA	FL	Venice	Berlin
SiO_2	62.3		56 (1.4)	61.8	62.1
Al_2O_3	17.3	17.54 (0.75)	17.43 (1.81)	17.05	17.73
Fe_2O_3	6.3	6.42 (0.48)	5.94 (0.37)	6.83	6.49
MgO	2.12	2.01 (0.11)	2.01 (0.10)	2.19	2.16
CaO	4.96	4.9 (0.16)	4.68 (0.16)	5.28	5.04
Na_2O	1.55	1.52 (0.1)	1.24 (0.11)	1.79	1.51
K_2O	3.21	3.22 (0.1)	2.98 (0.25)	3.06	3.16
TiO_2	0.81	0.71 (0.04)	0.86 (0.04)	0.84	0.799
P_2O_5	0.15			0.15	0.148
MnO	0.11	0.115 (0.003)	0.117 (0.002)	0.09	0.114
Ba	0.06				533
Ce					69
Co					20
Cr_2O_3/Cr	0.03 (0.0187 el)	0.028 (0.008) (0.0175 el)	0.031 (0.006) (0.019 el)		146
Cu					69
La					29
Nb					11
NiO/Ni	<0.01	0.010	0.009 (0.001) (0.007 el)	0.006	82
Zr	0.03				181
Zn	0.01				95
Sr	<0.01				90
V					119
Y					32
Rb	0.01				135
Pb					23
Th					14
LoI	0.74			0.79	0.6

Table 4. The compositions of the Lefkandi Brick Standard as determined by laboratories using AAS and XRF. Figures in brackets are standard deviation; el is element.

(b) The **INAA** data sets from East Kilbride-Ascot and three laboratories whose data is referred in Chapter 4 – Bonn, NCSR Demokritos and Manchester – are treated first. There is a wide dispersion of iron and to a lesser extent calcium contents (Fig. 2). For the trace elements, the East Kilbride-Ascot determinations tend to be on average 10% higher, more so in the case of Sm (25%). There is a wider than average range of Cr values across the four laboratories probably due to the many interferences of the Cr peak at 320 KeV (H. Mommsen pers. comm.), and the same applies to Yb and Rb. Drawing in the multi-element data from the other INAA laboratories, the picture is generally encouraging. Reasonably well measured elements are Sc, La, Ce, Co, Eu, Dy, Th, Lu, Hf and U. Poor elements appear to be Zr (but only two determinations), Ni, Cr and Cs. As regards PIXE, it gives satisfactory agreement with XRF for the major and minor elements, although it overestimates Ca (Waksman 1995, 61), and the few PIXE-determined trace elements (Ni, Zn, Sr, Nd, Rb, Ga) agree reasonably well their INAA-determined counterparts.

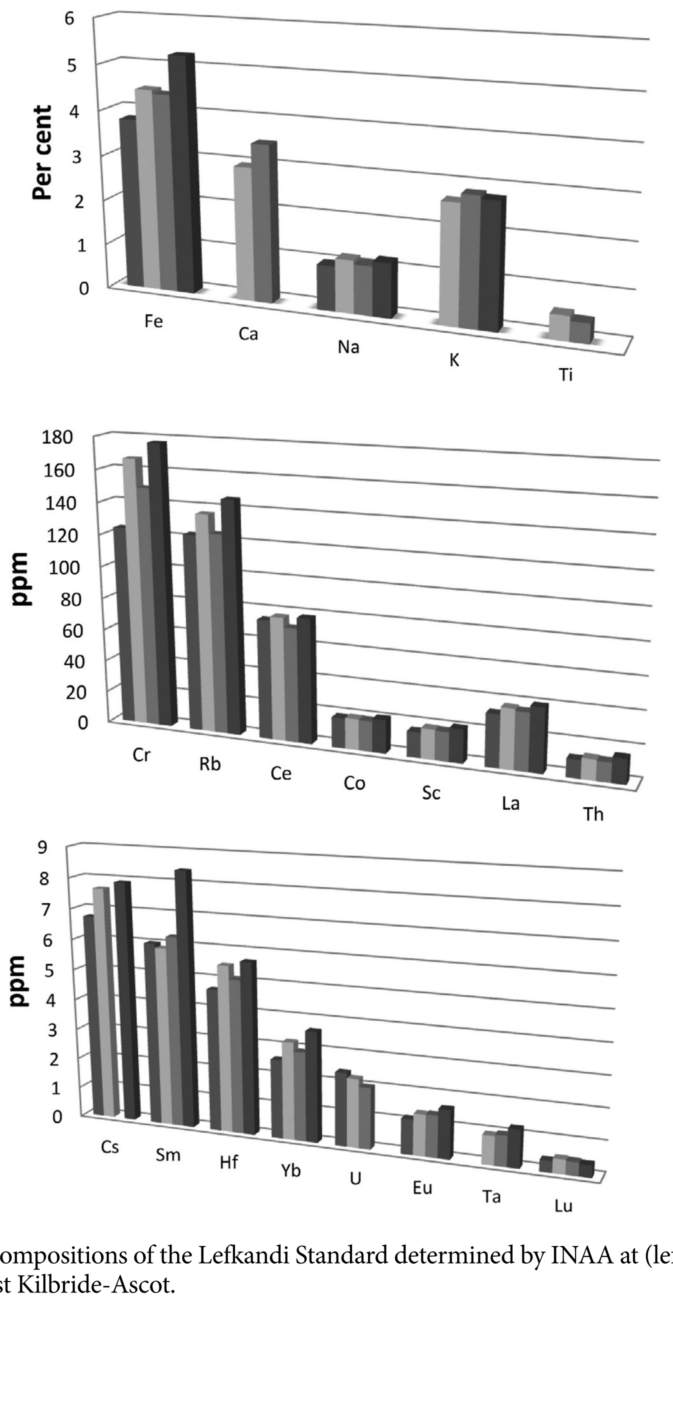


Fig. 2. Comparison of the compositions of the Lefkandi Standard determined by INAA at (left to right) Demokritos, Bonn, Manchester and East Kilbride-Ascot.

LK std	EK-Ascot	Demokritos	Bonn (see Table 3 for value in brackets)	Missouri	Manchester	British Museum
INAA						
Al_2O_3/Al				9.11 (0.13)		
Fe_2O_3/Fe	5.25 (0.16)	3.79 (0.24)	4.47 (0.02*)	4.46 (0.12)	4.392 (0.169)	6.68 (ox)
MgO/Mg						
CaO/Ca			2.96 (0.36)	3.42 (0.18)	3.49 (0.173)	3.38 (ox)
Na_2O/Na	1.21 (0.08)	1.00 (0.07)	1.165 (0.005)	1.07 (0.01)	1.098 (0.047)	1.82 (ox)
K_2O/K	2.768 (0.03)		2.646 (0.016*)	2.66 (0.22)	2.837 (0.394)	3.22 (ox)
TiO2/Ti			0.54 (0.04)	0.43 (0.05)	0.442 (0.034)	
P_2O_5						
MnO/Mn				932 (9)	861 (33)	
Ba		583 (115)	570 (36*)	544 (45)		591
Ce	78 (5.9)	74.5 (6.0)	77 (4.5)	78.5 (2.8)	71.16 (4.35)	74.8
Co	20.9 (0.5)	18.7 (1.1)	19.32 (0.14*)	19.9 (0.6)	19.01 (0.58)	20.4
Cr	177 (8)	124 (7.7)	148 (13.5)	151 (7)	149.6 (9.25)	165
Cu						
La	39.9 (1)	32.7 (2.2)	37.1 (1.8)	37.5 (1.1)	35.94 (1.51)	36.7
Li						
Mo						
Nb						
Ni			92 (10*)	88 (16)		
Sc	20.9 (0.6)	15.9 (0.7)	18.75 (0.09)	17.8 (0.5)	18.28 (0.72)	18.1
Zr			238 (30*)	152 (18)		
Zn			104 (4)	112 (7)		
Sr				66 (21)		
V				114 (12)		
Y						
Nd			29.2 (2.1*)	36.5 (1.5)		
Sm	8.4 (1.4)	6.00 (0.49)	5.96 (0.24)	6.82 (0.3)	6.27 (0.3)	7.37
Eu	1.6 (0.03)	1.15 (0.15)	1.36 (0.06)	1.41 (0.02)	1.38 (0.13)	1.58
Dy				5.37 (0.25)	5.38 (0.43)	
Yb	3.63 (0.01)	2.59 (0.24)	3.39 (0.12)	3.11 (0.13)	2.92 (0.425)	3.12
Rb	146 (8.9)	123 (7.0)	136 (3*)	135 (2)	124.6 (7.57)	153
Th	15.5 (0.6)	11.3 (5.4)	12.82 (0.08*)	12.4 (0.5)	12.21 (0.475)	13.7
As		21.3 (1.6)	26.81 (0.12)	26 (3)		31
Sb	2.01 (0.46)	1.92 (0.2)	2.18 (0.10*)	2.20 (0.07)		
Cs	7.9 (0.16)	6.73 (0.4)	7.66 (0.11*)	7.6 (0.3)		8.21
Tb	1.54 (0.52)		0.898 (0.035*)	0.95 (0.16)		1.07
Lu	0.4 (0.14)	0.37 (0.04)	0.470 (0.016*)	0.442 (0.012)	0.44 (0.02)	0.495
Hf	5.66 (0.26)	4.67 (3.6)	5.49 (0.29)	5.567 (0.17)	5.06 (0.27)	5.87
Ta	1.24 (0.05)		0.940 (0.11)	1.07 (0.05)	0.998 (0.077)	1.03
U		2.4 (0.4)	2.25 (0.07)	2.08 (0.16)	2.01 (0.23)	1.9
Ga			18.6 (1.2)			

	Toronto	Jerusalem	Sofia	EK-Ascot	Strasbourg PIXE (or INAA N)	Royal Holloway (ICP-ES)	Turin (ICP-ES)
Al_2O_3/Al	9.4 (0.2)		18.3 (1.1) ox		18.6 (0.2) ox	18, 17.2	17.6, 17.3
Fe_2O_3/Fe	4.6 (0.3)	5.15 (0.33)	8.15 (0.43) ox	5.25 (0.2)	6.8 (0.2) ox	6.8, 6.5	6.45, 6.88
MgOMg	1.1 (0.1)		2.22 (0.3)		2.7 (0.2) ox N	2.2, 2.1	2.01, 2.09
CaO/Ca	3.8 (0.2)	2.9 (0.5)	5.3 (0.2) ox		6.1 (0.06) (4.7 (0.2) N) ox	5, 4.8	4.79, 4.9
Na_2O/Na	1.05 (0.06)	1.041 (0.036)	1.48 (0.11) ox	1.22 (0.08)	1.6 (0.01) ox N	1.43, 1.4	1.61, 1.58
K_2O/K	2.8 (0.1)	2.69 (0.37)	2.45 (0.24) ox	2.77 (0.03)	3.2 (0.02) ox	3.27, 314	3.23, 3.07
TiO_2/Ti	4400 (200)		0.774 (0.102) ox		0.81 (0.03)	0.72, 0.68	0.78, 0.79
P_2O_5						0.12, 0.12	750, 610
MnO/Mn	870 (20)		886 (23)			0.117, 0.11	872, 907
Ba	720 (70)	549 (24.3)	550 (90)		507 (72) 531 (46) N	549, 540	537, 549
Ce	76 (3.6)	78.7 (2.0)	73 (5)		83 (3) N	68, 61	
Co	20.3 (0.5)	23.59 (1.47)	23.9 (1.8)	21 (0.5)	19.9 (0.5) N	17, 16	
Cr	167 (9)	165.2 (16.0)	148 (23)	178 (8)	126 (5) N	131, 113	140, 151
Cu					66 (7)	72, 67	69, 70
La	36.7 (0.6)	36.23 (1.17)		40(1)	39 (1) N	38, 39	33, 36
Li						65, 60	
Mo							
Nb						11.2, 12.8	
Ni	<46	151.2 (29.3)			77 (23)	89, 85	92, 79
Sc	17.6 (0.9)	23.60 (1.13)	16.2 (0.8)	21 (0.6)	17.6 (0.1) N	17, 17	16.6, 16.4
Zr						57, 29	
Zn					115 (5)	102, 98	
Sr	<90				88 (8)	90, 89	84, 96
V	118 (9)		114 (4)		108 (5) N	112, 107	116, 129
Y					38 (4)	19, 16	28.9, 29.8
Nd	31 (2)	29.92 (1.28)	41 (6)		42 (5)	40, 40	
Sm	6.2 (0.2)	6.49 (0.17)	6.5 (0.4)	8.4 (1.4)		6.5, 6.8	
Eu	1.4 (0.1)	1.316 (0.028)	1.11 (0.02)		1.4 (0.1) N	1.3, 1.3	
Dy	5.8 (1.2)		7.6 (0.5)			4.2, 3.8	
Yb	3.7 (0.4)	3.13 (0.22)	1.9 (0.1)	3.6 (0.1)	3.4 (0.3) N	2.2, 1.8	
Rb	149 (8)	114.6 (24.6)	101 (22)	146 (9)	131 (8)	121, 123	114, 109
Th	13.3 (0.7)	12.12 (0.43)	13.3 (.18)	15.5 (0.6)	13 (0.5) N		
As	25.9 (0.3)		23.6 (1.4)			35.1, 31.3	
Sb	2.03 (0.06)		3.9 (0.2)	2.01 (0.5)		2.6, 3.5	
Cs	8.3 (0.5)	7.94 (0.41)	7.0 (0.4)	7.9 (0.2)	7.3 (0.3) N	7.2, 17.1	
Tb	0.94 (0.07)		0.8 (0.2)	1.54 (0.5)			
Lu	0.51 (0.04)	0.499 (0.026)		0.4 (0.14)		0.18, 0.18	
Hf	5.4 (0.3)	5.24 (0.37)	4.8 (0.7)	5.7 (0.3)	5.6 (0.2) N		

Ta	1.3 (0.09)	1.001 (0.028)	1.39 (0.38)	1.24 (0.05)	1.17 (0.05) N		
U	2.5 (0.2)	2.25 (0.17)	3.0 (0.2)		2.6 (0.2) N	1.5, 14.8	
Ga	<21				24 (2)		

Table 5. The compositions of the Lefkandi Brick Standard determined by INAA and PIXE (mean and standard deviation (in brackets)) and ICP-ES (individual values). INAA determinations are % element for Al to Ti unless otherwise stated, otherwise ppm of element. PIXE and ICP-ES determinations are % element oxide for Al to Mn, thereafter ppm element. See Table 3 for the number of (sub-) samples analysed.

2. Podmore standard

The Manchester group routinely adopted this ceramic standard whose composition is compared with that determined at East Kilbride-Ascot in Table 6. Agreement is good, apart from the discrepancy (>10%) for K, Ta and Eu.

Laboratory	Al	Ca	Mn	Na	K	Sm	La	Cr	Fe	Co	Ta	Th	Sc	Yb
EK-Ascot mean of 10				657	11608	7.80	42.818	131.6	58291	20	1.455	15.93	27	3.37
s.d.				26	1244	0.55	2.54	7.83	4377	1.3	0.165	1.08	2	1.15
Manchester	11.44	1.824	404.9	686	13500	7.35	41.91	121.4	54820	20	1.294	14.01	26	3.384

Laboratory	Rb	Sb	Cs	Ce	Eu	Tb	Lu	Hf	Fe	Co	Ta	Th	Sc	Yb
EK-Ascot mean	87.67	1.563	7.623	78.0	1.86	1.175	0.549	5.65	58291	20	1.455	15.93	27	3.37
s.d.	9.41	2.14	0.28	7.74	0.1	0.144	0.074	0.46	4377	1.3	0.165	1.08	2	1.15
Manchester	84.54		7.87	80.1	1.55		0.527	5.484	54820	20	1.294	14.01	26	3.384

Table 6. Compositions of Podmore Standard determined by INAA at East Kilbride-Ascot and Manchester (Al and Ca in % element, the rest as ppm). Data from Manchester kindly provided by Dr. S.M.A. Hoffmann.

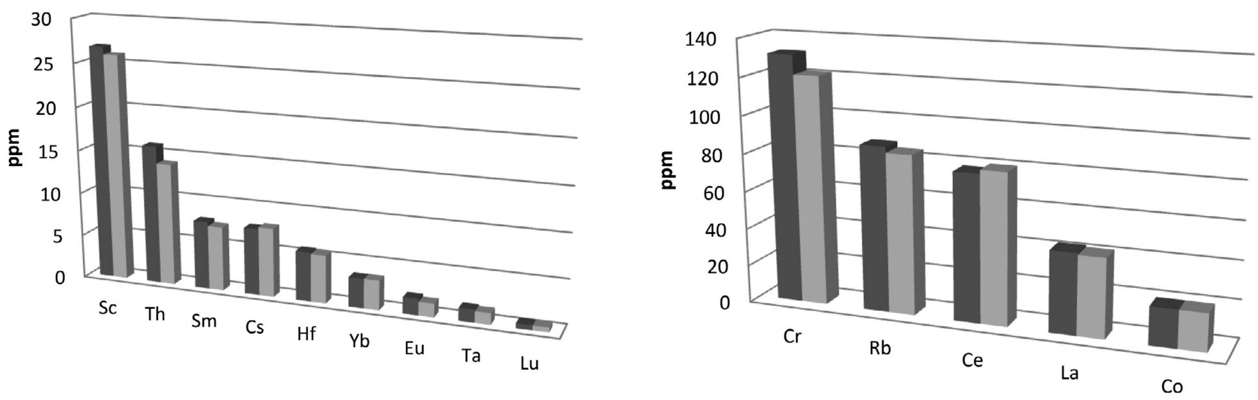


Fig. 3. Comparison of the compositions of the Manchester's Podmore standard determined by INAA at East Kilbride (left) and Manchester (right).

3. (a) ICP-ICP

As an on-going contribution to this issue of comparability, a cooperation was set up in 2003 with Professor Piero Mirti's laboratory, Dipartimento di Chimica Analitica at the University of Turin.

Together with Sara Levi and M. Gulmini, he selected three series of samples for analysis:

1. Prehistoric pottery from Broglio di Trebisacce and other sites in the Plain of Sybaris area;

2a. Campanian A pottery found in Calabria: CN2A, TC7A, TC8A, R1A and TC5A in Table 7 (Mirti *et al.* 1998, Table 2);

2b. Campanian C pottery found in Calabria: L13C, TC3C, TC5C, TC1C and TC7C in Table 7 (Mirti *et al.* 1998, Table 2);

2b. Red Figure vases found at Locri Epizephiri in Calabria (L24, L25, L29, L30, L33, L34, L35, L39, L43 in Table 7) (Mirti *et al.* 2004, Table 3);

2. A series of ceramic standards, including the Lefkandi Brick (see Table 5).

Collectively, this material presented a suitably wide range of concentrations in nineteen elements. Series 1, which included samples from Broglio di Trebisacce, had previously been the object of a comparative exercise between laboratories using INAA as well as between ICP and INAA (see next sections). All samples were analysed in 2003 before and after heat treatment (1000ºC for 2 hours); there were duplicate analyses of eight samples in the Turin laboratory, and one triplicate analysis.

The compositions of the heat-treated samples are set out in Table 7: eleven samples from the Bay of Sybaris, the nineteen from Campania and four standards (Edinburgh Standard Clay, British Museum Standard Pottery, Lefkandi Brick and Knossos 38).

At a general level, the data sets from the two laboratories are encouragingly compatible. Agreement between the respective element determinations is better than 10% for the majority of elements, and in many cases better than that; on the other hand, agreement between Cr values varies from 5 to 35% and between Ni values up to 20%. In terms of their correlation, sigma 2-tailed Pearson correlation coefficients are >0.90 for all elements except P (and Y), and the corresponding R^2 values from linear regression analysis are also good (Table 8). Two samples, BT43 and TdM10, proved problematic, there being poor concordance in the respective contents of many elements. London's determination of Ni in TC7AX and Rb in TB043 appear anomalous.

Expressed in a different way, element determinations agreeing to within 10% are Al, Cr, Sr, Ba, Mn, Mg, Ca; up to 20% Fe, Sc, La, Cu, Rb, K, Ni, V; and up to 30% Y, P, Ti, Na.

Element	2-tailed Pearson correlation coefficient	R^2 linear regression analysis
Al	0.91	0.82
Fe	0.91	0.83
Ca	0.95	0.91
Mg	0.96	0.92
P	0.90	0.13
Rb	0.93	0.86
Cr	0.95	0.90
Ni	0.98	0.97
Mn (ex. BTF043)	0.96	0.81
La	0.98	0.96
K	0.95	0.90

Table 8. Statistical comparison of ICP determinations in two laboratories (Turin and Royal Holloway, London).

Table 7a.

	Al_2O_3	Fe_2O_3	CaO	MgO	K_2O	Na_2O	TiO_2	P_2O_5	MnO	P	Mn	Ba	Sr	Rb	Cr	Ni	V	Cu	La	Y	Sc
SERIES 1 analyses 2003: Grey Torino, White Glasgow																					
BTF043	20.2	8.34	5.76	4.04	1.85	0.91	1.06	0.26	0.152	1120	1180	1270	264	55	161	91	102	47	44	29.4	18.1
BTF043	17.59	6.79	7.23	2.68	2.57	0.82	0.76	0.29	0.078			783	325	118	102	49	138	41	45	23	15
BT60	18.9	6.96	2.01	1.35	2.93	0.85	0.69	0.16	0.084	720	654	1980	169	145	*86*	*50*	105	38	36	26.0	14.5
BT60	18.66	6.97	1.90	1.16	2.87	0.73	0.54	0.11	0.088			1905	170	139	76	43	103	31	40	20	13
BT219	19.5	7.34	2.75	2.02	2.70	0.88	1.00	0.28	0.088	1240	680	1150	251	123	132	*57*	146	46	47	29.6	15.6
BT219	18.09	6.98	2.52	1.73	2.51	0.70	0.81	0.18	0.078			1090	250	115	121	46	134	36	50	23	14
BT854	16.2	6.12	7.96	2.13	2.62	1.14	0.81	0.20	0.089	880	687	1530	267	109	101	*50*	90	31	38	30.0	13.5
BT854	15.35	5.83	7.85	1.85	2.45	0.93	0.61	0.14	0.084			1476	267	92	88	47	81	42	39	23	12
BT904	18.9	7.63	4.60	3.08	2.68	0.94	1.00	0.26	0.117	1130	907	1360	265	108	144	76	118	33	43	31.1	16.3
BT904	18.45	7.30	4.45	2.79	2.58	0.79	0.79	0.18	0.111			1296	267	100	91	67	113	28	46	22	15
BT907	18.7	7.24	8.43	3.05	2.71	1.00	0.92	0.57	0.092	2500	709	892	338	100	145	61	148	35	45	28.8	16.2
BT907	17.92	7.37	1.99	1.46	2.84	0.85	0.62	0.69	0.103			859	477	117	108	53	131	75	57	34	15
BT909	15.2	6.21	9.62	2.47	2.59	1.35	0.69	0.25	0.092	1110	714	2270	371	93	115	*45*	122	38	36	26.4	13.0
BT909	15.17	5.78	8.55	2.39	2.66	1.13	0.63	0.30	0.082			1181	320	116	96	47	110	49	39	23	13
BT919	16.7	6.69	9.99	2.87	2.57	1.33	0.89	0.22	0.089	980	688	375	291	106	120	*59*	117	34	40	28.4	15.1
BT919	16.70	6.52	9.36	2.62	2.47	1.14	0.72	0.14	0.085			355	291	105	110	48	113	41	43	26	14
BT932	16.8	6.12	5.61	2.20	3.22	1.83	0.68	0.24	0.093	1050	721	1470	267	108	162	83	91	23	35	22.9	12.8
BT932	15.59	5.11	5.30	1.88	2.96	1.63	0.53	0.15	0.084			1199	257	109	67	47	87	26	34	19	11
BT941	15.3	5.93	10.2	2.85	2.79	1.30	0.80	0.24	0.086	1040	665	916	322	120	96	57	98	30	37	27.7	13.8
BT941	15.18	5.77	8.66	2.51	2.68	1.10	0.66	0.16	0.078			868	310	119	73	45	97	28	39	20	13
BT962	18.0	6.48	5.16	2.14	2.96	1.15	0.79	0.22	0.111	950	857	1310	266	116	105	*60*	117	43	33	24.6	13.1
BT962	17.46	6.36	5.94	2.16	2.81	1.04	0.64	0.14	0.144			1286	277	115	115	55	115	35	40	23	14
BT977	20.7	8.69	5.27	2.43	2.38	0.93	1.03	0.22	0.077	960	596	888	280	89	144	*60*	129	43	44	27.6	15.8
BT977	19.83	8.25	5.10	2.28	2.38	0.83	0.89	0.16	0.074			828	294	97	127	54	131	46	51	23	16
BT978	18.4	7.25	8.38	3.09	2.51	1.43	0.90	0.22	0.107	950	826	763	305	101	118	*68*	124	37	41	27.2	14.8
BT978	18.14	7.16	7.84	2.84	2.49	1.26	0.78	0.15	0.106			805	317	97	119	56	119	49	44	24	15
BT989	18.3	6.20	5.52	2.91	3.09	2.15	0.83	0.40	0.104	1760	804	661	281	114	97	*60*	103	37	43	26.0	14.0
BT989	17.64	6.36	5.28	2.99	3.06	1.85	0.64	0.22	0.102			830	287	110	76	49	101	29	42	26	15
TDM10	18.7	7.41	1.98	1.45	2.87	0.97	0.89	1.83	0.108	8000	834	856	451	118	111	*59*	132	37	49	33.5	15.1
TDM10	20.54	8.37	5.51	3.63	1.83	0.80	0.91	0.18	0.144			1250	272	56	154	87	95	45	48	21	18
TDM13	18.5	6.89	1.69	1.49	2.68	1.28	0.97	0.18	0.143	770	1110	733	234	127	101	*46*	138	37	60	33.6	13.7
TDM13	20.72	8.07	1.96	1.72	2.88	1.25	0.84	0.11	0.155			830	281	132	111	51	144	39	72	38	16
TUM3	17.5	7.13	4.11	2.76	2.74	1.26	0.88	0.25	0.117	1090	906	1100	222	101	122	80	123	34	35	29.6	14.5
TUM3	16.53	6.97	3.73	2.87	2.65	1.07	0.74	0.15	0.118			1049	224	102	114	64	107	29	39	19	14
TUM5-1	17.1	6.60	6.61	2.56	3.06	1.21	0.82	0.62	0.109	2700	847	1570	266	117	119	73	125	36	37	27.8	14.8
TUM5-2	17.9	6.86	6.76	2.56	3.21	1.27	0.85	0.64	0.110	2800	853	1690	278	125	125	*66*	141	38	39	30.1	15.7
TUM5	17.22	6.70	6.35	2.68	2.96	1.04	0.74	0.21	0.111			1105	255	120	121	59	120	37	42	20	15
TUM6-1	18.8	7.69	7.73	2.64	2.98	1.03	0.86	0.53	0.099	2300	770	873	294	108	143	78	162	42	37	26.5	16.6
TUM6-2	17.8	7.30	7.14	2.47	2.95	1.00	0.82	0.48	0.096	2100	745	841	281	103	127	*61*	156	41	35	26.5	16.3

TUM6	17.86	7.27	6.57	2.58	2.86	0.88	0.79	0.26	0.093			773	286	110	128	59	146	36	38	24	16
TUM8	17.5	6.95	5.19	2.01	2.84	0.99	0.79	0.48	0.104	2100	807	633	223	108	118	71	125	36	36	28.8	14.8
TUM8	16.15	6.44	4.61	1.87	2.57	0.79	0.67	0.25	0.101			615	225	99	118	64	110	34	40	22	14

Table 7b.

	Al_2O_3	Fe_2O_3	CaO	MgO	K_2O	Na_2O	TiO_2	P_2O_5	MnO	P	Mn	Ba	Sr	Rb	Cr	Ni	V	Cu	La	Y	Sc
LEFK-1	17.6	6.45	4.79	2.01	3.23	1.61	0.78	0.17	0.113	750	872	537	84	114	140	92	116	69	33	28.9	16.6
LEFK-2	17.3	6.88	4.90	2.09	3.07	1.58	0.79	0.14	0.117	610	907	549	96	109	151	79	129	70	36	29.8	16.4
LK_1	17.99	6.79	5.00	2.19	3.27	1.43	0.72	0.12	0.117			549	90	121	131	89	112	72	38	19	17
LK	17.18	6.47	4.81	2.10	3.14	1.41	0.68	0.12	0.110			540	89	128	117	85	107	67	39	16	17
BMSP-1	19.0	6.51	*0.26*	0.68	2.50	0.077	1.25	*0.08*	0.019	*340*	145	565	112	126	122	-	150	-	47	52.2	17.3
BMSP-2	18.8	6.47	*0.25*	0.68	2.49	0.12	1.25	*0.06*	0.019	*270*	148	577	131	118	135	*42*	137	33	51	52.8	17.2
BMSPSTD	18.48	6.35	0.24	0.66	2.40	0.11	1.05	0.04	0.017			568	123	129	92	42	137	32	55	33	16
BMSPSTD	18.51	6.40	0.25	0.69	2.43	0.12	1.05	0.04	0.018			581	125	141	117	43	138	33	56	30	17
EDIN	20.7	7.11	0.35	0.59	1.01	*0.02*	1.22	*0.06*	0.031	*280*	237	343	44	54	97	*57*	158	30	35	30.6	22.0
EdSTD	21.18	7.53	0.38	0.65	1.03	0.08	1.17	0.05	0.030			360	53	62	99	56	161	30	43	20	23
EdSTD	21.73	7.51	0.37	0.66	1.07	0.08	1.24	0.05	0.026			389	56	63	83	56	161	30	44	25	24
KN38	16.5	9.17	8.90	8.34	2.91	0.84	0.76	0.18	0.103	780	799	393	211	110	457	470	177	48	25	21.2	21.1
KN38_1	16.50	9.05	8.78	8.62	2.94	0.77	0.75	0.12	0.102			410	229	136	382	451	172	69	27	19	21
KN38	16.09	8.81	8.52	8.52	2.87	0.77	0.72	0.12	0.099			396	226	160	374	440	162	68	27	17	21

Table 7c. Series 2 2004 X after heating

	Al_2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	P2O5	MnO	P	Mn	Ba	Sr	Rb	Cr	Ni	V	Cu	La	Y	Sc
TC5AX	19.16	5.33	4.21	1.76	5.04	2.95	0.71	0.18	0.126			300	212	218	28	47	78	68	82	40	8
TC5A	17.9	4.99	4.20	1.55	4.38	2.96	0.67	0.18	0.125	790	970	272	183	200	*36*	*27*	73	27	70	36.1	7.2
TC7A-1	18.5	5.05	3.71	1.43	4.87	2.98	0.68	0.35	0.136	1540	1050	290	192	230	*43*	*43*	77	33	73	37.2	7.2
TC7AX	19.50	5.37	3.72	1.58	5.60	2.80	0.71	0.32	0.135			318	221	241	27	821	78	##	86	44	8
TC7A-2	18.2	5.20	3.40	1.42	4.79	2.97	0.67	0.32	0.137	1380	1060	294	212	210	*loq*	*loq*	81	38	74	35.7	7.2
TC8AX	18.96	5.30	3.77	1.65	5.43	3.08	0.70	0.23	0.127			295	195	239	26	25	83	39	83	41	8
TC8A	18.9	5.32	3.92	1.52	5.09	3.21	0.70	0.26	0.136	1150	1050	286	181	230	*40*	*28*	78	29	75	39.0	7.5
TCICX	14.73	6.66	12.73	2.04	2.40	0.83	0.78	0.34	0.074			639	576	74	66	43	114	54	40	24	13
TC1C	14.2	6.53	13.1	2.02	1.89	0.70	0.79	0.40	0.076	1730	585	597	520	68	99	*51*	123	32	39	26.1	12.2
TC3CX	15.97	6.69	11.24	2.19	2.37	0.74	0.82	0.32	0.175			627	731	81	68	50	117	43	43	21	14
TC3C	15.3	6.59	12.0	2.08	2.25	0.77	0.86	0.39	0.177	1710	1370	583	633	76	109	57	120	39	39	27.9	13.6
TC5C-1	14.3	6.18	12.3	1.72	1.83	0.59	0.78	0.62	0.098	2700	761	567	723	62	93	54	136	32	37	26.4	12.3
TC5C-2	15.7	6.60	12.9	1.73	2.48	0.80	0.87	1.19	0.104	5200	807	615	795	87	109	39	146	30	40	27.5	13.3
TC5CX	15.39	6.54	12.44	1.82	2.47	0.70	0.81	0.53	0.102			629	860	85	64	57	132	26	41	22	13
TC5C-3	14.1	6.35	12.0	1.65	2.25	0.76	0.77	0.53	0.100	2300	775	575	815	77	99	loq	140	40	38	30.5	12.2

	Al_2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	P2O5	MnO	P	Mn	Ba	Sr	Rb	Cr	Ni	V	Cu	La	Y	Sc
TC7CX	14.31	8.09	14.10	1.89	1.83	0.59	0.74	0.44	0.129			529	689	63	68	43	119	39	38	21	12
TC7C	14.3	8.26	15.1	1.78	1.70	0.63	0.79	0.57	0.130	2500	1010	501	618	47	97	65	127	42	38	25.1	12.1
L13CX	14.12	5.95	12.73	1.77	2.52	0.76	0.76	0.34	0.066			520	426	65	59	37	108	46	39	19	12
L13C	14.2	6.01	13.9	1.71	2.44	0.84	0.81	0.44	0.069	1910	535	507	389	62	98	51	113	51	37	27.0	12.3
CN2A-1	18.9	5.37	3.95	1.61	4.76	2.84	0.67	0.22	0.123	950	956	238	174	220	47	*50*	75	25	70	35.8	8.1
CN2AX	18.87	5.28	3.80	1.68	5.05	2.61	0.66	0.20	0.119			252	191	224	34	25	82	24	80	37	8
CN2A-2	19.5	5.39	3.83	1.62	5.02	2.91	0.69	0.25	0.124	1110	962	247	181	240	47	*28*	88	26	75	38.1	8.1
RIAX	19.61	5.33	3.44	1.54	5.11	3.73	0.70	0.18	0.138			324	210	209	23	27	76	39	82	42	7
R1A	19.9	5.13	3.49	1.53	4.60	3.67	0.70	0.22	0.138	950	1070	296	181	200	35	*41*	77	25	73	37.6	7.0
L20X	18.55	8.88	6.51	5.45	3.61	0.76	0.86	0.20	0.097			605	330	140	363	355	133	79	38	22	22
L20	17.6	8.63	6.39	5.15	3.26	0.73	0.90	0.20	0.095	880	734	569	319	131	532	340	141	-	35	29.3	21.5
L24X	21.28	8.19	9.59	3.12	3.32	0.86	0.83	0.22	0.116			564	403	131	84	69	144	55	49	23	19
L24	19.9	7.78	9.05	2.89	2.90	0.82	0.82	0.23	0.113	1020	876	508	376	115	118	62	141	-	45	28.2	18.2
L25X	21.13	8.09	10.47	3.02	3.38	0.81	0.80	0.23	0.125			589	445	130	84	68	141	82	48	22	
L25	20.2	7.84	10.3	2.86	3.08	0.77	0.80	0.24	0.123	1050	955	556	433	117	124	69	147	-	46	27.8	18.4
L29X	22.71	8.72	8.05	3.19	3.26	0.95	0.81	0.21	0.122			785	371	115	95	84	121	75	53	22	20
L29	21.6	8.41	7.82	3.00	3.10	0.89	0.82	0.22	0.120	960	932	752	362	108	131	67	129	-	51	30.8	19.2
L30X	23.35	8.58	6.60	3.11	3.71	0.93	0.79	0.20	0.106			804	327	172	91	64	126	55	60	24	21
L30	22.5	8.26	6.43	2.89	3.55	0.92	0.81	0.20	0.105	880	815	786	327	173	133	65	132	-	55	34.1	20.0
L34X	19.86	7.55	6.21	2.77	3.11	0.84	0.72	0.21	0.110			557	299	131	86	114	140	58	46	21	19
L34	20.6	7.90	6.49	2.83	3.38	0.88	0.80	0.23	0.122	1020	942	558	304	154	124	77	157	-	48	29.4	18.8
L35X	20.57	7.89	9.14	2.67	3.29	0.79	0.77	0.35	0.110			869	459	141	87	65	168	44	48	22	19
L35	20.4	7.78	9.05	2.56	3.18	0.80	0.80	0.40	0.115	1730	888	828	445	136	118	60	175	-	45	28.9	18.3
L39X	21.19	7.93	7.06	3.05	3.52	1.10	0.85	0.23	0.105			974	339	138	82	75	120	66	55	26	19
L39	20.2	7.72	6.85	2.86	3.39	1.08	0.85	0.27	0.103	1160	799	931	332	141	108	58	119	-	49	30.4	17.5
L43X	19.09	7.40	11.60	2.74	2.77	1.00	0.83	0.22	0.133			656	521	112	81	66	89	51	46	27	17
L43	18.1	7.14	11.0	2.55	2.59	0.98	0.84	0.23	0.129	1010	997	619	500	96	109	59	84	-	44	28.3	15.9

(b) INAA-INAA

Table 9 presents the compositions of thirty samples from Broglio di Trebisacce analysed at both **East Kilbride-Ascot** and **NCSR Demokritos** in 1995. Buxeda i Garrigos *et al.* (2003, 264) have described the procedure used at the latter laboratory. Overall, there is some agreement between the two data sets, yet as the values from statistical tests in Table 10 indicate there are particularly poor results for Rb, Eu, Ta, Lu, Sm, Sb and Tb.

Sample	*Na D*	*Na A*	*Sm D*	*Sm A*	*La D*	*La A*	*Cr D*	*Cr A*	*Fe D*	*Fe A*	*Co D*	*Co A*	*Rb D*	*Rb A*	*Sb D*	*Sb A*
BTA001	8600	7484	6.8	5.6	38.9	33.8	92.5	109.8	40100	40989	14.8	13.1	110	128	0.6	0.8
BTA003	8400	9079	5.3	5.6	27	31.0	295	427	51000	59145	30.8	33.6	130	143	0.6	0.6
BTA004	8300	8701	6.9	8.1	41.8	44.1	93.6	137.1	42400	50134	15.3	16.2	190	147	0.6	1.2
BTA005	7700	7579	6.7	7.4	39.6	41.15	83.8	119.5	41110	49565	13.6	14.6	170	171	0.6	1.2
BTA068	4800	5140	5.3	6.0	31.4	34.9	199	287.4	54400	60969	31.8	32.0	200	175	0.8	0.7
BTA069	7000	6261	5.9	5.5	33.2	29.8	84.7	99.8	38400	39455	11.7	11.6	170	143		0.6
BTD030	11600	10878	5.1	6.1	32.2	34.3	84	115.5	36600	42894	13.4	14.6	120	128	0.9	0.9
BTD034	7800	8227	6.1	6.4	36.2	37.7	84.8	132.7	39900	45712	13.7	15.5	120	138	0.5	0.5
BTD035	4500	5309	7.9	7.3	50.6	57.5	114	170.3	49700	56029	20.0	20.1	140	160	0.9	
BTD036	9000	8701	6.5	7.2	36.6	36.7	85.7	124.9	40300	47087	12.5	13.0	130	154	0.6	
BTD062	4600	5568	7.3	7.3	48.3	53.1	111	154.1	46400	50397	20.3	20.1	160	168	0.7	0.7
BTD063	7300	7351	7.3	8.4	43.4	44.4	123	179.6	53200	61089	22.5	22.2	130	124	0.6	0.9
BTF021	9000	10312	6.3	6.0	39.3	45.5	110	154.3	45800	51473	15.4	15.7	120	161	0.7	0.9
BTF037	9000	11009	6.2	7.8	38.2	44.4	105	168.4	47200	55427	17.3	18.2	120	109	0.5	0.8
BTF039	6100	9084	6.3	5.6	41.7	31.0	134	187.4	50100	57758	19.1	20.5	100	119	0.5	
BTF041	7800	7153	6.5	6.6	35.5	36.7	69.4	103.8	36900	43652	11.8	12.9	130	146	0.7	1.0
BTF042	7700	8290	6.8	5.4	36	38.8	82.2	114.6	40400	45401	13.2	13.6	110	125	0.6	0.7
BTF043	5800	6756	6.8	6.5	43.2	48.2	135	211.9	56000	64737	22.6	24.5	70	59	0.3	0.5
BTG022	8500	10262	6.6	7.0	32.7	38.5	66.1	113.3	35400	42837	12.7	13.2	120	117	0.5	0.6
BTG024	8200	8111	6.9	7.4	39.4	39.8	94.9	135.4	41800	51262	14.6	15.9	150	183	0.9	0.9
BTG025	10100	10251	7.2	6.1	37.2	39.4	83.8	116.4	38500	44594	13.2	13.0	150	153	0.6	1.3
BTG026	6600	6456	7.2	5.6	41.6	46.8	102	142.2	44500	47884	17.7	16.5	110	142		0.6
BTG067	7900	9550	6.7	8.0	37.4	43.6	93.8	133.6	43900	53393	14.5	15.2	130	173	0.7	0.8
BTG071	8400	8202	7.1	7.2	38.8	38.2	86.4	116.9	40300	46132	13.7	13.6	140	160	0.9	0.8
BTI050	6700	6053	6.4	5.9	35.9	37.9	76	96.7	43600	41044	14.0	12.1	140	128	0.9	0.8
BTI055	9300	9443	7.1	8.7	41.1	45.4	62.4	90.8	39700	46266	12.7	12.1	170	172	0.7	1.2
BTI059	13700	12686	4.8	4.7	31.9	30.6	59.8	82.5	32100	36271	7.8	7.3	130	128	0.4	0.6
BTI065	8900	8644	7.3	7.3	47.2	50.5	61.5	87.2	39100	41908	11.1	11.1	180	166	0.8	
BTI066	7000	6669	6.1	5.9	32.7	36.1	66.9	89.9	36600	36493	12.4	11.0	140	141	0.6	0.7
BTI070	8900	8429	6.7	7.5	38.6	30.1	65.6	93.1	36900	44224	12.9	14.3	120	165	0.6	0.9

Sample	*Cs D*	*Cs A*	*Ce D*	*Ce A*	*Eu D*	*Eu A*	*Tb D*	*Tb A*	*Lu D*	*Lu A*	*Hf D*	*Hf A*	*Ta D*	*Ta A*	*Sc D*	*Sc A*
BTA001	7.4	7.4	81.1	65.9	1.2	1.2	0.9	0.9	0.42	0.38	4.9	4.7	1.4	1.2	14.2	15.1
BTA003	8.6	7.2	62.8	54.5	1.2	1.3	0.5	0.8	0.27	0.38	3.5	3.6	1.0	1.0	19.4	23.5
BTA004	10.0	10.6	90.3	84.5	1.3	1.6	0.9	1.1	0.35	0.37	5.6	5.5	1.4	1.8	15.2	18.7
BTA005	7.6	9.2	83.4	80.7	1.1	1.4	0.8	1.0	0.40	0.37	4.9	5.0	1.2	1.6	14.2	17.2
BTA068	22.4	22.2	73.8	61.6	1.3	1.4	0.7	0.7	0.37	0.43	3.0	3.3	0.6	0.9	20.7	24.6
BTA069	8.9	8.0	82.6	61.8	1.3	1.2	1.3	0.8	0.32	0.33	4.6	4.2	0.9	1.2	13.6	14.2
BTD030	5.2	5.5	67.6	69.5	1.3	1.4	0.4	0.8	0.24	0.27	4.1	4.1	0.8	1.1	13.0	15.2
BTD034	6.3	6.9	73.9	74.0	1.3	1.6	0.5	0.9	0.32	0.37	4.6	4.6	1.1	1.3	12.9	15.8
BTD035	8.7	9.3	109.6	122.7	1.5	1.8	0.6	1.1	0.43	0.41	4.9	5.4	1.2	1.9	18.2	21.7

BTD036	6.5	7.5	76.1	74.5	1.4	1.4	0.5	1.0	0.33	0.31	5.1	5.3	2.3	1.6	13.9	16.4
BTD062	10.4	10.1	107.2	103.3	1.4	1.7	1.0	0.9	0.30	0.37	4.3	4.9	1.6	1.7	17.5	20.1
BTD063	6.2	6.2	95.3	86.2	1.6	1.6	1.0	1.1	0.42	0.37	5.7	5.2	1.2	1.7	17.1	20.3
BTF021	8.0	8.3	87.0	96.6	1.4	1.6	0.8	1.0	0.39	0.39	4.1	5.1	0.9	1.4	15.6	18.6
BTF037	5.2	6.4	86.7	86.0	1.3	1.6	0.6	1.1	0.35	0.41	5.1	5.7	1.8	1.6	14.9	18.5
BTF039	5.5	5.6	94.8	91.3	1.3	1.5	1.1	1.1	0.38	0.46	5.3	5.8	1.6	1.7	16.0	19.2
BTF041	6.4	6.6	78.9	63.5	1.2	1.3	0.5	0.9	0.36	0.30	5.2	5.1	1.2	1.6	13.0	15.4
BTF042	6.8	5.9	83.3	81.1	1.3	1.5	0.5	1.0	0.39	0.45	5.6	6.3	1.1	1.5	13.2	15.6
BTF043	2.2	2.5	101.5	101.0	1.4	1.7	0.6	0.9	0.43	0.46	5.4	6.0	1.4	1.7	17.3	21.1
BTG022	6.0	6.9	75.5	85.8	1.1	1.5	0.5	0.9	0.38	0.40	5.0	5.7	1.0	1.5	12.6	15.8
BTG024	8.5	10.2	89.6	76.7	1.3	1.5	1.0	1.2	0.39	0.31	4.9	5.1	1.6	1.8	14.5	18.3
BTG025	7.1	7.7	82.4	76.0	1.2	1.4	1.0	1.0	0.39	0.46	5.5	5.6	1.3	1.5	13.6	15.8
BTG026	7.8	8.2	89.0	71.4	1.2	1.4	1.1	0.9	0.35	0.30	4.3	4.6	1.6	1.4	15.3	16.9
BTG067	9.4	9.9	84.5	93.9	1.2	1.6	1.1	0.9	0.40	0.40	4.8	5.7	1.5	1.5	14.0	17.8
BTG071	8.1	8.4	86.1	75.7	1.3	1.4		1.0	0.38	0.45	4.5	5.1	1.6	1.6	13.9	16.2
BTI050	6.7	7.4	83.8	70.8	1.3	1.2	0.5	0.7	0.33	0.29	5.6	5.4	1.8	1.5	13.1	13.3
BTI055	8.4	8.5	81.5	91.8	1.6	1.5	1.1	1.1	0.38	0.54	6.9	7.2	1.3	1.8	12.8	15.3
BTI059	4.9	4.5	65.5	55.7	0.8	1.0	0.6	0.8	0.24	0.21	6.4	6.2	1.0	1.5	10.8	12.3
BTI065	9.8	9.3	98.0	85.2	1.6		1.0	1.0	0.38	0.33	7.0	7.0	1.8	1.9	12.8	14.2
BTI066	7.5	7.3	81.9	69.6	1.1	1.2	0.5	0.9	0.37	0.29	4.8	5.2	1.3	1.4	12.5	13.3
BTI070	6.3	7.9	93.1	95.2	1.2	1.5	0.6	1.1	0.32	0.34	5.7	5.9	1.5	1.8	12.2	14.7

Table 9. INAA compositions of samples from Broglio di Trebisacce determined at NCRS Demokritos (D) and East Kilbride-Ascot (A). All elements in ppm.

	2-tailed Pearson correlation coefficient	R^2 linear regression analysis
Na	0.869	0.756
Sm	0.551	0.304
La	0.806	0.65
Cr	0.991	0.982
Fe	0.928	0.862
Co	0.984	0.968
Rb	0.693	0.48
Sb	0.332	0.11
Cs	0.975	0.951
Ce	0.809	0.655
Eu	0.666	0.444
Tb	0.302	0.91
Lu	0.564	0.318
Hf	0.902	0.813
Ta	0.572	0.327
Sc	0.958	0.917
Yb	0.396	0.134

Table 10. Statistical comparison of INAA determinations at Demokritos and EK-Ascot.

(c) INAA – INAA – ICP

Table 10 presents the compositions of ten samples from Broglio di Trebisacce analysed by INAA at **Bonn** and **NCSR Demokritos** and by ICP-ES at **Royal Holloway London**. For one sample, Broglio 4, they are presented graphically in Fig. 4. There is comment in section (e) and Table 13.

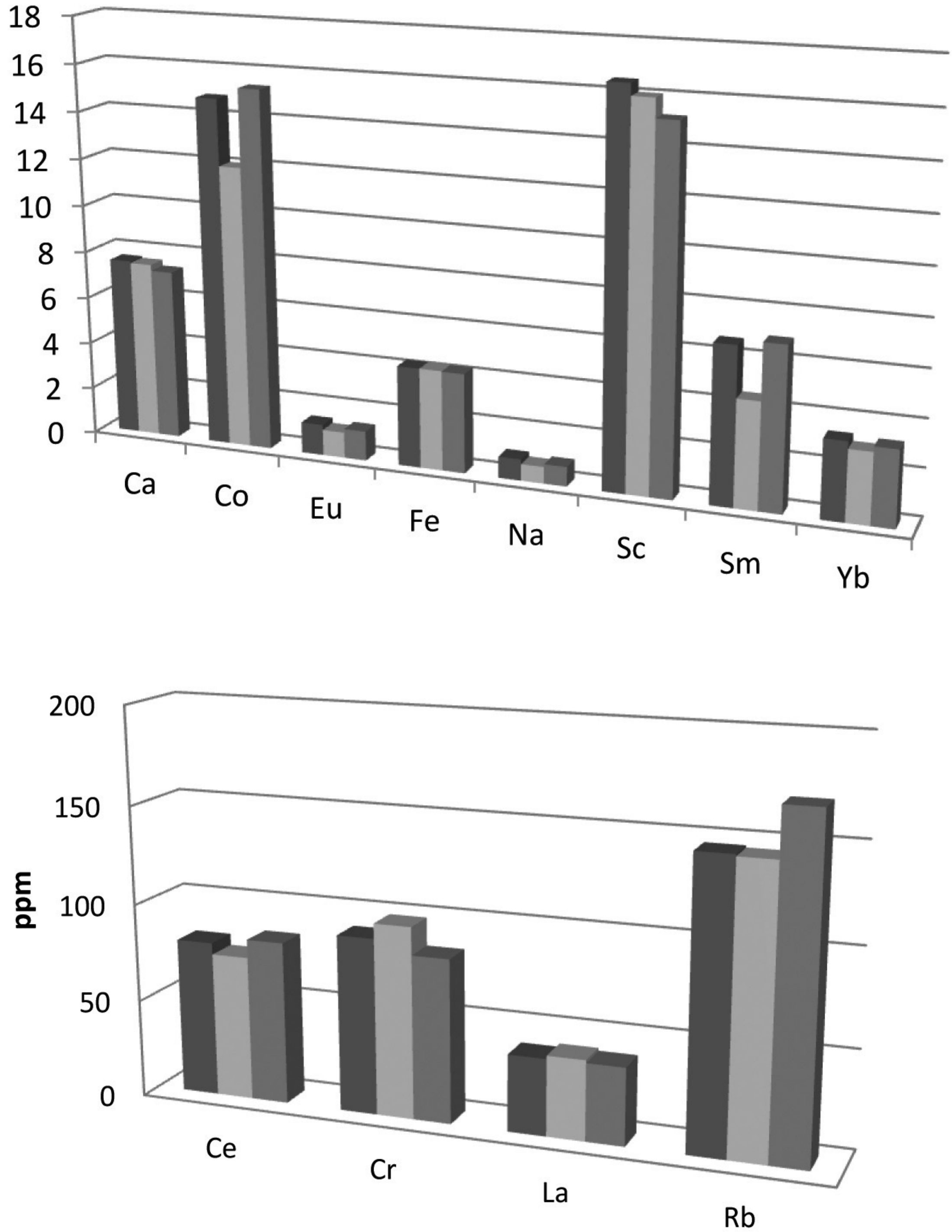


Fig. 4. Comparison of the compositions of Broglio 4 determined by (left to right) Bonn (INAA), Royal Holloway (ICP-ES) and Demokritos (INAA). All element concentrations are in ppm except Ca, Fe and Na (% element).

Table 10. The compositions of samples from Broglio analysed by INAA at Bonn (grey) and NCSR Demokritos and by ICP-ES (RH, London). Concentrations in ppm element apart from Ca, Fe and Na (%).

Sample	Broglio Number	Ba	Ca	Ce	Co	Cr	Eu	Fe	K	La	Na	Nd	Ni	Rb	Sc	Sm	Ti	*Yb*	*Zn*	*Zr*
Bonn	1	877	6.48	83	13.7	99	1.25	4.11	3.71	39.6	0.92	34	81.6	138	15.9	6.47	0.47	3.23	112	167
ICP		963	6.10	77	11	108	1	4.37	4.53	41	0.75	43	47	132	16	4.8	0.27	2	100	47
Demokritos			5.56	81	14.8	93	1.21	4.01		38.9	0.86			110	14.2	6.83		3.21		
Bonn	3	753	8.25	59	31.3	332	1.16	5.34	2.43	28.3	0.95	26	340	131	21.8	5.22	0.53	2.69	111	113
ICP		730	8.00	53	28	302	1	5.68	2.77	28	0.72	31	276	123	21	3.2		2.5	95	40
Demokritos			8.07	63	30.8	295	1.16	5.1		27	0.84			130	19.4	5.28		2.52		
Bonn	4	472	7.57	86	14.8	105	1.32	4.26	2.74	41.6	0.91	37	77.6	167	16.5	6.65	0.57	3.31	120	146
ICP		472	7.50	77	12	111	1.1	4.26	3.26	42	0.71	45	47	161	16	4.5		3	105	80
Demokritos			7.25	90	15.3	94	1.26	4.24		41.8	0.83			190	15.2	6.87		3.22		
Bonn	5	1041	6.91	80	13.5	90	1.26	6.3	2.54	39.3	0.82	32	84.6	146	15.4	6.1	0.57	2.95	126	153
ICP		1131	6.70	74	11	98	1.1	4.41	3.12	41	0.68	43	46	145	14	4.8		2.3	114	62
Demokritos			6.78	83	13.64	84	1.07	4.11		39.6	0.77			170	14.2	6.73		3.06		
Bonn	68	653	9.15	69	30.6	235	1.17	5.71	2.84	34	0.52	30	189	178	23.8	5.14	0.51	2.86	118	94.2
ICP		614	9.00	60	26	238	1	5.59	3.33	33	0.4	35	191	163	21	3.9		2.7	104	44
Demokritos																				
Bonn	69	1105	6.55	74	11.6	88	1.13	3.8	2.24	32.9	0.77	27	51.3	152	14.4	5.41	0.46	2.81	156	122
ICP		1187	9.39	68	10	94	0.9	3.97	2.66	33	0.61	35	42	149	14	4.8		2.1	143	53
Demokritos																				
Bonn	25	991	6.17	82	12.8	98	1.26	4.01	2.7	39.6	1.14	35	55.1	147	15	6.51	0.53	3.22	117	169
ICP		922	5.70	70	10	99	1	4.08	3.18	40	0.91	42	43	137	14	5		2.3	101	61
Demokritos			5.43	82	13.2	84	1.22	3.85		37.2	1.01			150	13.6	7.16		3.06		
Bonn	34	779	3.99	68	13.8	99	1.28	4.03	2.19	34.7	0.89	31	76.6	127	14.2	5.29	0.38	2.59	90.3	176
ICP		865	4.10	64	11	112	1.1	4.43	2.72	37	0.73	39	51	137	14	4.5		2.1	86	70
Bonn	43	1291	4.23	96	21.9	148	1.43	5.61	1.56	44.9	0.64	39	134	54.4	18.6	6.86	0.59	3.16	144	137
ICP		1346	5.70	87	20	167	1.3	6	1.83	47	0.51	49	92	51	18	5.6		2.5	139	73
Demokritos			3.90	102	22.55	135	1.41	5.6		43,2	0.58			70	17.3	6.81		3.3		
Bonn	70	1481	1.16	91	12.7	71	1.22	3.64	2.32	39.9	0.91	32	79.5	149	12.8	6.37	0.38	3.06	87.4	159
ICP		1690	1.54	83	11	78	1.1	4.11	2.99	42	0.78	44	35	149	13	5.8		2.4	83	97
Demokritos				93	12.91	66	1.2	3.69		38.6	0.89			120	12.2	6.7		3		

(d) INAA – ICP- ICP

Table 11 presents the compositions of nine samples from Broglio di Trebisacce analysed by INAA at **Bonn** and by ICP-ES at **Royal Holloway London** and **Torino**. For one sample, Broglio 941, they are shown graphically in Fig. 5. There is comment in section (e) and Table 13.

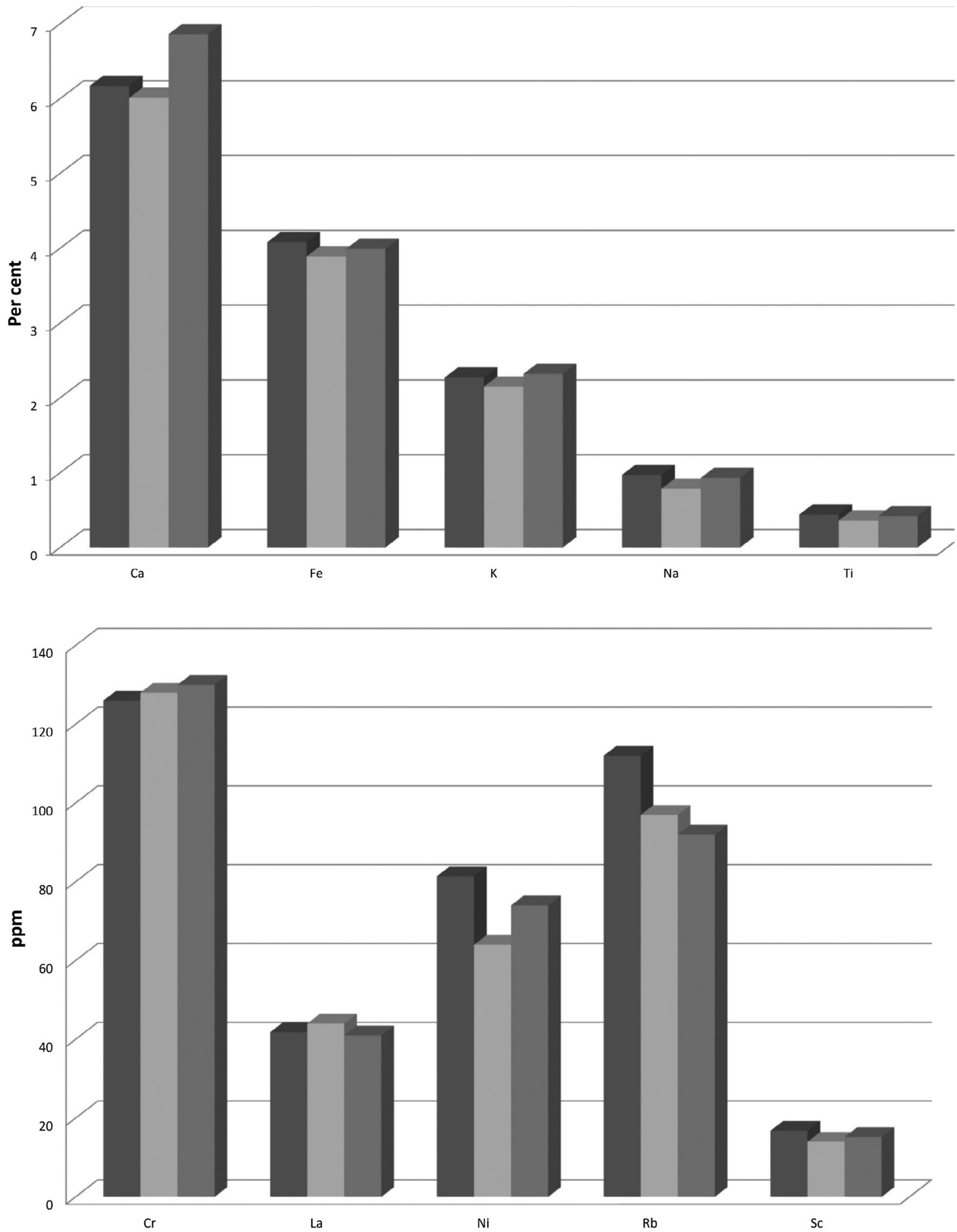


Fig. 5. Comparison of the compositions of Broglio 941 determined by (left to right) Bonn (INAA), RH and Torino (ICP-ES).

Table 11. The compositions of nine samples from Broglio di Trebisacce analysed by INAA at **Bonn** (grey; values quoted with (dilution correction) factor 1.000) and by CP-ES at **Royal Holloway London** and **Torino**. Ca, Fe, Na, K, Ti are expressed as %, the remainder as ppm.

Sample	Number	Ba	Ca	Ce	Co	Cr	Eu	Fe	K	La	Na	Nd	Ni	Rb	Sc	Sm	Ti	Yb	Zn	Zr
Bonn	60A	1660	1.35	82	12.5	76	1.08	4.36	2.36	34.4	0.6	26	50	150	13.9	5.55	0.37	2.59	96.3	202
ICP London		1714	1.36	81	11	74	1.1	4.33	2.39	36	0.49	38	38	130	12	6.1	0.27	2	91	105
ICP Torino		1840	1.27			77		4.59	2.34	35	0.59		51	126	12.9		0.34			
Bonn	219A	1060	1.6	96	15.4	110	1.49	4.6	2.17	44.6	0.65	35	40.8	123	15.5	6.94	0.46	2.88	115	178
ICP London		1021	1.8	89	13	116	1.6	4.54	1.92	47	0.47	49	43	108	14	7.2	0.43	2.4	107	134
ICP Torino		1121	1.86			117		5.1	2.18	45	0.62		64	112	14.8		0.51			
Bonn	904A	1231	3.17	86	18.2	126	1.34	4.85	2.2	41.8	0.68	36	81.4	112	16.8	6.43	0.51	3.14	119	184
ICP London		1256	3.18	78	15	128	1.4	4.78	2.02	44	0.55	45	64	97	14	7.2	0.42	2	108	40
ICP Torino		1310	3.15			130		5.14	2.11	41	0.67		74	92	15.2		0.51			
Bonn	919A	438	7	90	15.1	114	1.38	4.69	2.21	42.6	1.02	35	73	124	16.6	6.57	0.72	3.08	120	89.8
ICP London		355	6.69	74	11	113	1.2	4.37	2.03	43	0.83	45	48	100	14	6.9	0.4	2.4	103	65
ICP Torino		367	6.81			120		4.59	2.18	38	0.98		57	108	14.1		0.46			
Bonn	932A	1164	3.5	63	12.4	81	1.1	3.43	2.59	30.8	1.36	26	39.2	123	12.2	4.79	0.37	2.2	97.2	130
ICP London		1199	3.79	55	10	81	1	3.36	2.33	33	1.16	34	44	44	10	5.7	0.29	1.8	87	42
ICP Torino		1320	3.57			87		3.72	2.51	31	1.3		52	52	11.6		0.35			
Bonn	941A	815	6.17	79	12.6	96	1.22	4.08	2.27	37.7	0.97	29	72.4	135	14.8	6.19	0.44	3.04	117	146
ICP London		819	6.19	75	10	93	1.2	3.89	2.15	36	0.79	38	42	114	12	6.3	0.36	1.8	103	41
ICP Torino		876	6.86			93		3.99	2.32	34	0.93		58	121	12.9		0.42			
Bonn	962A	1068	4.04	77	15.8	99	1.29	3.93	2.23	33.8	0.82	26	46.9	121	13.7	5.06	0.45	2.56	91.3	110
ICP London		1162	4.24	76	14	118	1.3	3.97	2.12	40	0.69	42	50	108	12	6.4	0.3	1.9	87	70
ICP Torino		1220	3.48			110		4	2.34	33	0.77		59	95	12.4		0.39			
Bonn	978A	676	5.8	88	17.2	116	1.39	4.81	2.13	41.5	1.05	36	79.4	108	16.6	6.59	0.55	2.99	123	189
ICP London		751	5.6	75	14	119	1.4	4.73	1.98	42	0.9	44	52	94	14	6.8	0.42	2.4	115	56
ICP Torino		756	5.66			118		4.72	2.02	37	1.01		53	100	14.5		0.47			
Bonn	989A	849	4.1	121	14.8	97	1.44	4.28	2.63	58.1	1.57	47	64.4	124	16.5	7.71	0.48	2.95	108	155
ICP London		783	3.77	69	12	97	1.3	4.25	2.45	39	1.4	41	56	109	14	6.9	0.46	2.2	97	33
ICP Torino		663	3.86			91		4.17	2.56	45	1.56		48	108	14.2		0.36			

(e) INAA - ICP-ES

A comparative exercise was carried out in 2004 between **Bonn** and **RH** on samples of LH III pottery from:

- *Peloponnese* - Berbati (12 samples), Asine (2) and Tiryns (2);
- *Athens* (5 samples) (LH IIIA1-IIIB plain unpainted pottery from the Athenian Acropolis and Alimos LH described in Mommsen 2003);
- *Aegina* (5 samples) (Mommsen 2003).

The ICP-ES series was run as a single batch. The results (Table 12) appear in summarised form in Table 13, from which attention is drawn to the poor comparability for Ni, Sm, Ti and especially Zr (cf. Tables 2 and 5 above, and Tsolakidou and Kilikoglou (2002)). Considering the series of samples as a whole, the level of comparability for many elements, such as Ni, Co and La, is maintained, but there are other elements, notably Ca and to a lesser extent Cr, where this is not the case. Although there is a significant error in the Ca determination by INAA at Bonn (H. Mommsen, pers. comm.), the comparability for this element is good in all samples except those from Athens and Aegina samples for which there are significant discrepancies.

Element	Inter-comparison of INAA-ICP-ES data for Broglio samples	Inter-comparison of INAA-ICP-ES data for N.E. Peloponnese, Attica and Aegina samples
Ba	Good; ICP slightly higher than INAA; agreement within 10%	Same
Ca	Good; agreement within 10%	Same, but not consistently so
Ce	ICP values consistently lower by 10%	Same
Co	ICP values lower by up to 15%	same
Cr	Good; ICP values generally higher by 10%	ICP values generally lower by up to 10%
Eu	Good; ICP values generally lower by 10-15%	Same
Fe	Generally within 10%	Same
K	Agreement within 10% in one batch, but ICP up to 10% higher in other batch	No consistent pattern but agreement to within 10%
La	Agreement to within 10%	Same
Na	ICP lower by up to 20%	ICP values lower by up to 10%
Nd	ICP generally up to 25% higher	Same
Ni	Poor; INAA values up to 50% higher	INAA values higher by up to 15%
Rb	Agreement to within 10%	Same
Sc	Agreement to within 10%; INAA values higher	Same
Sm	Inconsistent ICP values; in one batch ICP consistently lower by >10%, but in other batch ICP higher and agreement to within 15%	ICP lower by up to 10%
Ti	ICP values lower by up to 25%	No consistent pattern but agreement to within 20%
Yb	ICP values lower generally within 20% but sometimes greater	Agreement to within 10%
Zn	ICP 10% lower	Same
Zr	INAA values up to 4 times higher than icp	Same but discrepancy may be larger

Table 13. INAA-ICP-ES comparisons.

Table 12. The compositions of pottery from sites in the Aegean determined by ICP-ES (Royal Holloway) and INAA (Bonn) (values quoted with (dilution correction) factor 1.000). Ca, Fe, Na, K, Ti are expressed as %, the remainder as ppm.

Site	Sample	Ba icp	Ba	Ca icp	Ca	Ce icp	Ce	Co icp	Co	Cr icp	Cr	Eu icp	Eu	Fe icp	Fe	K icp	K	La icp	La
Berbati	13	405	375	8.8	8.1	60	62.9	25	29.4	246	240	1.1	1.16	5.9	5.7	2.92	2.89	32	33
Berbati	16	489	446	9.8	9.7	56	58.6	25	28	241	248	1	1.15	5.0	5.0	2.47	2.46	30	29.9
Berbati	21	406	375	9.4	9.2	61	64	25	28.9	220	207	1.1	1.23	5.4	5.3	2.89	2.79	32	33
Berbati	22	426	425	9.7	9.5	58	63.2	23	27.3	212	209	1.3	1.28	5.2	5.2	2.5	2.49	31	32
Berbati	24	394	381	10.1	10.0	57	62.4	22	25.5	204	210	0.9	1.32	5.0	4.9	2.46	2.43	29	31.3
Berbati	30	414	407	9.2	8.9	63	68.3	26	30	227	223	1.1	1.26	5.5	5.4	2.63	2.65	33	34.6
Berbati	32	473	445	9.1	8.3	61	63	24	26.7	183	211	1	1.34	5.1	5.0	2.48	2.39	32	32.2
Berbati	33	455	427	9.7	9.1	60	62.5	26	29.7	297	--	1.1	1.1	5.7	5.5	2.87	2.72	33	32.4
Berbati	39	535	534	10.3	9.8	59	66.3	23	28.6	192	203	0.9	1.24	5.1	5.3	2.68	2.83	31	33.6
Berbati	41	423	366	9.5	9.3	59	65.9	24	28.5	217	219	0.9	1.13	5.5	5.4	2.62	2.71	31	32.2
Berbati	28	280	253	9.7	9.7	54	58.4	27	30.2	240	263	1	1.08	5.4	5.1	1.57	1.33	28	29
Berbati	31	347	350	10.6	10.6	59	65.9	28	32.6	268	271	1	1.2	5.3	5.7	0.78	0.85	33	33.4
Tiryns	8	481	453	8.8	8.9	60	67.4	19	22.4	168	161	1.1	1.36	5.1	4.9	2.28	2.16	30	30
Tiryns	9	585	550	9.6	9.7	59	62.5	19	21.8	154	165	1.1	1.29	4.7	4.7	2.46	2.35	30	29
Tiryns	12	524	529	8.9	9.3	63	71.5	21	24.3	168	176	1.2	1.37	5.3	5.3	2.23	2.21	32	31.9
Asine	1	552	544	7.8	7.6	62	72.7	20	23.9	164	194	1.1	1.35	5.1	5.1	2.05	2.13	31	32.6
Asine	9	558	540	8.6	7.8	60	63.8	19	22.4	168	187	1.1	1.24	4.8	4.7	2.1	2.06	30	30.1
Attica	25	434	387	5.2	11.7	65	73.6	34	37.7	570	593	1.2	1.36	6.2	5.9	2.7	--	32	32
Attica	27	446	506	3.7	6.2	67	75.9	33	36.5	565	607	1.1	1.39	6.4	6.0	2.82	--	33	39.4
Attica	28	510	525	5.7	10.5	70	80.2	39	43.8	583	597	1.2	1.34	5.8	5.6	2.78	--	34	36.5
Attica	29	407	446	6.0	10.6	66	79.4	36	40	567	587	1.2	1.37	6.0	6.0	2.65	--	31	34.3
Attica	31	491	502	6.7	7.1	64	74.8	32	35.6	5331	563	1.2	1.35	6.1	5.9	2.64	2.61	31	31.7
Aegina	44	418	442	10.0	14.7	45	50.5	26	30.2	360	461	0.8	1.01	5.1	4.8	1.86	--	23	23
Aegina	45	425	407	12.4	16.8	42	49.8	18	21.3	345	428	0.8	0.93	4.4	4.2	1.73	--	22	24.1
Aegina	46	291	234	9.9	13.4	38	40.7	15	18.1	373	418	0.8	0.86	4.1	3.9	2.02	--	19	20.2
Aegina	49	305	288	11.4	13.8	38	43.8	16	18.8	320	350	0.8	0.92	4.1	3.9	1.63	--	21	20.1
Aegina	51	230	218	9.5	12.9	41	45.8	17	20.5	359	461	0.9	0.92	4.6	4.3	1.51	--	23	25.6

K icp	K	La icp	La	Na icp	Na	Nd icp	Nd	*Ni icp*	*Ni*	*Rb icp*	*Rb*	*Sc icp*	*Sc*	*Sm icp*	*Sm*	*Ti icp*	*Ti*	*Yb icp*	*Yb*	*Zn icp*	*Zn*	*Zr icp*	*Zr*
2.92	2.89	32	33	0.38	0.45	34	27.9	207	272	152	173	22	23.1	3.2	5.03	0.45	0.55	2.7	2.82	100	119	55	
2.47	2.46	30	29.9	0.38	0.45	32	27.1	200	219	130	149	19	20.7	3.8	4.79	0.41	0.45	2.7	2.79	92	105	46	156
2.89	2.79	32	33	0.35	0.43	35	29.1	176	214	146	166	21	22.3	4.3	5.09	0.44	0.55	2.9	2.82	100	114	61	162
2.5	2.49	31	32	0.41	0.5	34	27.8	166	198	139	152	18	20.8	4	5.17	0.42	0.51	2.8	2.89	86	99.9	61	110
2.46	2.43	29	31.3	0.49	0.58	32	26.6	160	193	134	139	18	20.2	4.4	4.9	0.43	0.43	2.6	2.86	94	109	54	96.4
2.63	2.65	33	34.6	0.45	0.54	36	29.6	180	206	156	157	20	22.5	4.4	5.35	0.47	0.52	2.6	3.15	98	113	44	130
2.48	2.39	32	32.2	0.46	0.54	35	28.4	177	191	143	140	19	20.4	4.4	5.09	0.45	0.48	2.6	2.85	92	113	52	143
2.87	2.72	33	32.4	0.29	0.32	35	27	226	267	160	160	22	22.6	3.8	4.85	0.45	0.46	2.7	2.83	102	110	51	114
2.68	2.83	31	33.6	0.34	0.43	33	27.8	166	192	147	156	19	22.2	4.3	5.18	0.43	0.5	2.6	2.88	92	111	47	98.2
2.62	2.71	31	32.2	0.44	0.55	33	27.3	165	192	164	161	21	22.5	3.9	4.85	0.45	0.44	2.7	2.72	96	115	61	104
1.57	1.33	28	29	0.8	0.97	31	24.9	203	247	107	107	20	21.5	3.8	4.68	0.41	0.48	3.1	2.71	95	112	76	139
0.78	0.85	33	33.4	1.14	1.33	36	28.5	235	301	120	123	21	24.4	4.2	5.14	0.43	0.48	3.2	3.08	105	145	63	192
2.28	2.16	30	30	1.23	1.31	33	29	131	172	103	111	19	19.5	4.5	5.7	0.43	0.35	2.9	2.98	76	--	60	--
2.46	2.35	30	29	1.04	1.14	33	27.5	132	181	104	108	17	18.9	4.4	5.37	0.42	0.32	2.7	2.72	80	--	54	--
2.23	2.21	32	31.9	1.2	1.38	35	28.7	144	173	119	126	19	21.3	3.9	5.86	0.45	0.35	3	3	76	--	70	--
2.05	2.13	31	32.6	0.93	1.09	34	29.3	155	183	109	109	18	20.1	4.8	5.77	0.45	0.46	2.6	3.05	73	86.3	63	--
2.1	2.06	30	30.1	0.82	0.94	33	29	147	174	100	102	17	18.4	3.8	5.44	0.43	0.5	2.4	2.88	73	81.3	52	--
2.7	--	32	32	0.44	--	35	31.8	430	481	146	156	23	24.5	4.9	6.1	0.51	--	3.1	2.95	151	165	65	205
2.82	--	33	39.4	0.46	--	36	31.8	433	476	159	161	24	24.9	3.9	--	0.5	0.37	2.6	3.18	144	162	39	237
2.78	--	34	36.5	0.41	--	37	32.8	431	493	148	160	23	23.8	4.9	6.08	0.5	--	2.6	2.92	114	124	34	204
2.65	--	31	34.3	0.4	--	35	31.6	402	465	148	163	23	24.8	4.1	6.8	0.5	--	3.1	3.07	137	155	65	161
2.64	2.61	31	31.7	0.43	0.52	34	29.5	415	483	143	160	22	23.9	4.4	5.64	0.49	0.66	3	2.98	146	150	47	149
1.86	--	23	23	0.85	--	26	22.2	361	397	76	85.5	18	18.7	3	4.45	0.38	0.28	2.5	2.51	82	89.9	56	177
1.73	--	22	24.1	0.7	--	25	20	275	332	66	69	16	16.7	3.2	4.02	0.35	0.37	2.3	2.29	70	75.8	55	185
2.02	--	19	20.2	0.92	--	21	18.6	272	300	58	64.8	15	15.2	2.4	3.54	0.31	0.31	2.2	2.18	80	87.9	46	175
1.63	--	21	20.1	0.75	--	23	20.4	244	278	63	66.6	15	15.6	2.9	3.7	0.33	0.59	2.3	2.24	74	80.5	45	150
1.51	--	23	25.6	0.89	--	25	18.6	294	360	60	65.4	15	16.4	2.8	3.95	0.34	0.33	2.4	2.53	83	88.5	47	163

(f) INAA-XRF

Two Aegean-type and six *impasto* samples from Coppa Nevigata were analysed by INAA (EK-Ascot) and wavelength-dispersive XRF (Boccuccia *et al.* 1995; see Chapter 4: Coppa Nevigata). Their compositions are shown in Table 14 for the common elements, Na, K, Fe, Rb, Ce, La and Cr. For all elements but Na, the XRF values are commonly 10-15% higher than the corresponding INAA values, but sometimes the discrepancy is considerably higher (eg. Ce in *impasto* 115, and K in *impasto* 11). Correlation is good between the two data sets for La, Rb, Fe and Na (R^2 values of 0.96, 0.90, 0.98 and 0.87 respectively), much less good for Cr, Ce and K (0.59, 0.45 and 0.40 respectively).

Sample	Type	*LoI*	*Na*	*Na naa*	*K*	*K naa*	*Fe*	*Fe naa*	*Rb*	*Rb naa*	*Ce*	*Ce naa*	*La*	*La naa*	*Cr*	*Cr naa*
CN71	Italo-Mycenaean	7	0.62	0.69	2.1	2.36	3.89	3.23	109	98	65	60	34	29	93	94
CN72	Italo-Mycenaean	8	0.52	0.76	2.21	2.25	3.24	2.78	100	100	74	51	22	27	75	82
CN2	*Impasto*	16.2	0.73	1.08	2.72	2.36	2.92	2.01	95	58	83	53	39	31		32
CN11	*Impasto*	4.3	0.51	0.69	4.3	2.76	6.23	5.3	157	160	223	175	89	69	115	104
CN21	*Impasto*	9.1	0.79	1.18	2.95	2.97	4.34	3.96	151	134	91	82	47	41		99
CN36	*Impasto*	11.5	0.43	0.62	2.53	2.37	5.15	4.44	163	147	145	212	67	55	101	157
CN98	*Impasto*	11.9	0.77	1.26	2.93	2.78	3.66	3.27	161	146	99	90	52	38	50	78
CN115	*Impasto*	4.3	0.49	0.7	3.01	2.86	5.13	4.83	185	200	225	115	79	57		70

Table 14. Compositions of pottery from Coppa Nevigata analysed by XRF and INAA. Na, K and Fe contents expressed as %age oxide, the other elements in ppm. LoI is loss on ignition.

ABBREVIATIONS AND BIBLIOGRAPHY

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Periodicals abbreviations conform the current *American Journal of Archeolology* list. Recurrent titles not included in *AJA* list are indicated below, together with other special abbreviations used in the present monograph.

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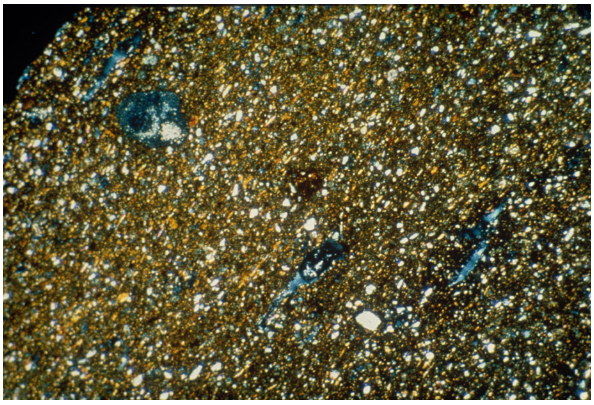
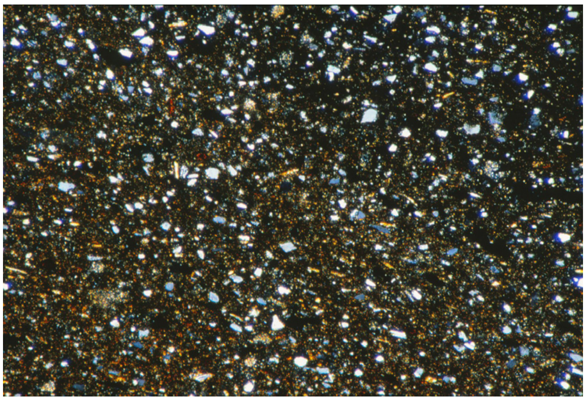
COLOUR PLATES

The photomicrographs, which are all 10x and XPL (except for MIC from Lipari which are XPL and PPL), are arranged according to site: site code, sample number and class/ware.


CN62: IM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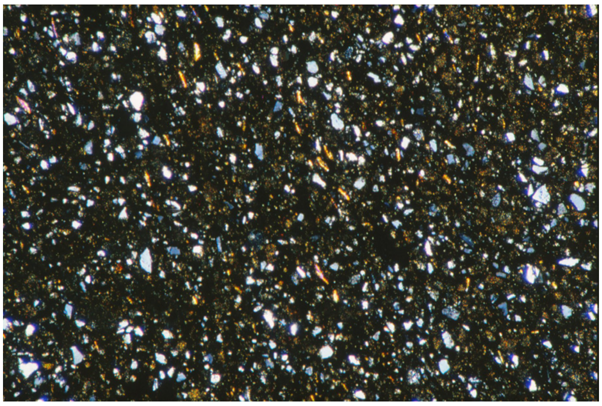
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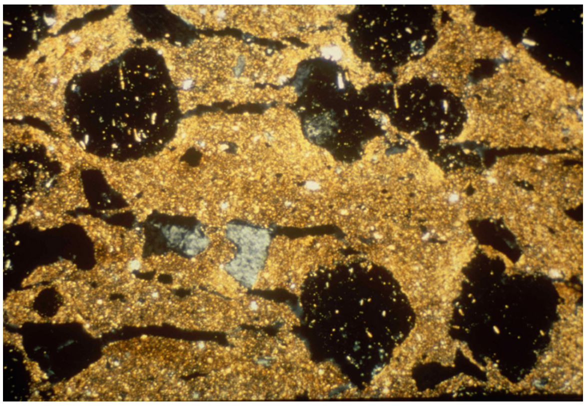
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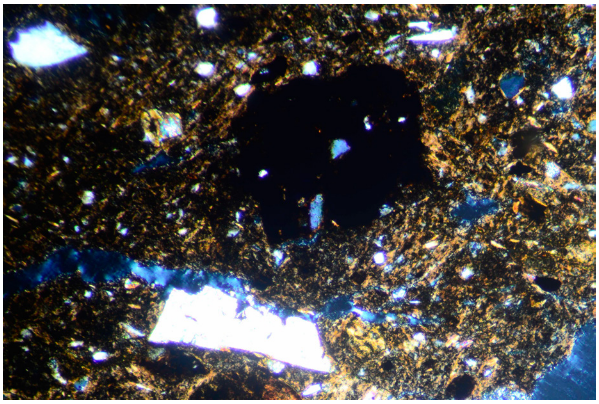
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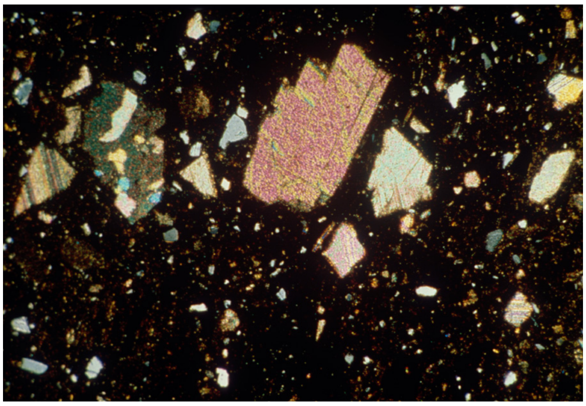
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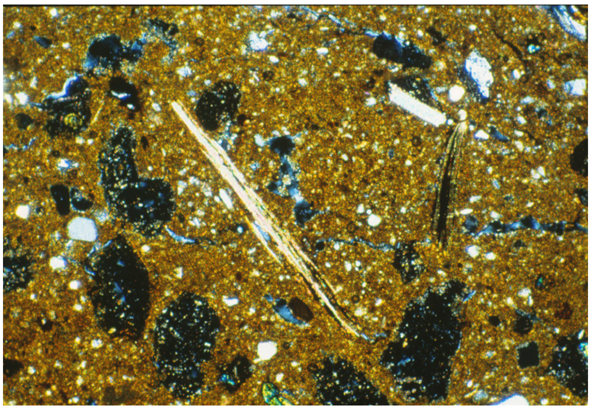
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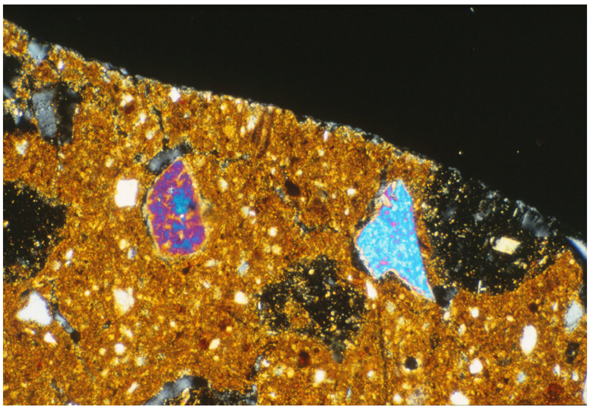
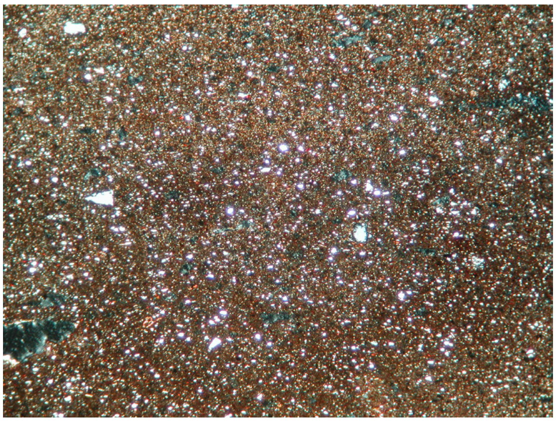
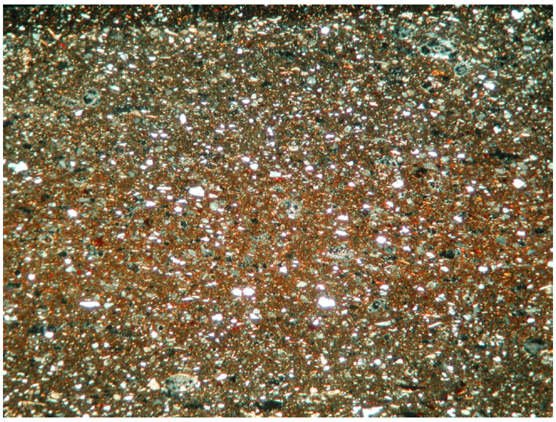

CN98: I

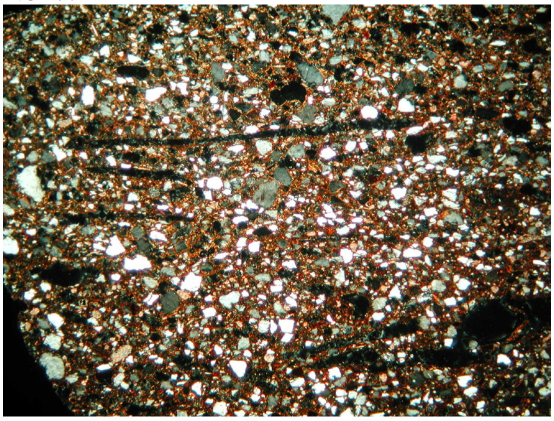
Photomicrographs of thin sections of Italo-Mycenaean and *impasto* from Coppa Nevigata (10x, XPL).



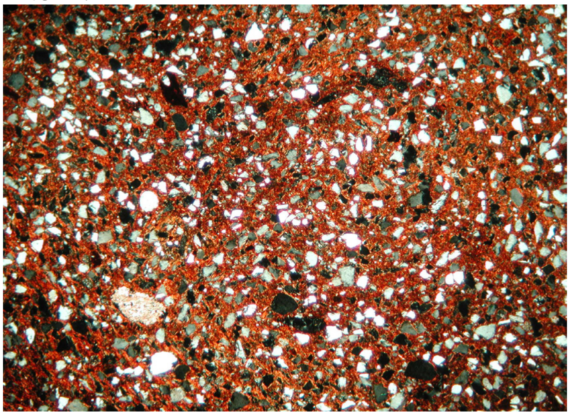
RO25: M



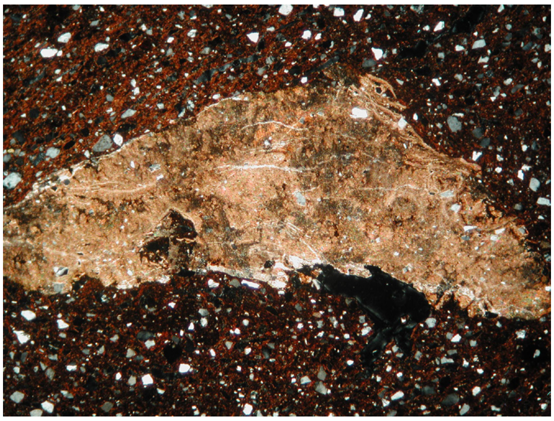
RO22: IM



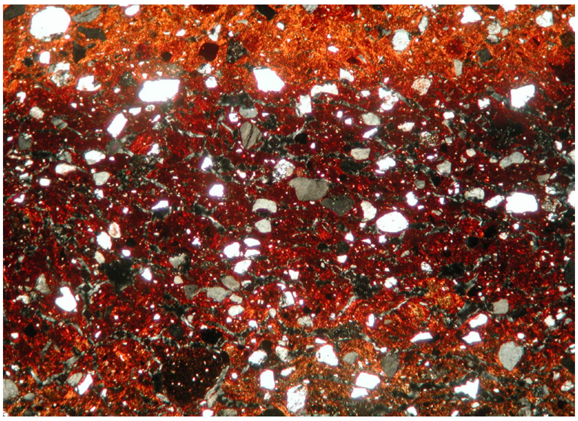
RO3: I



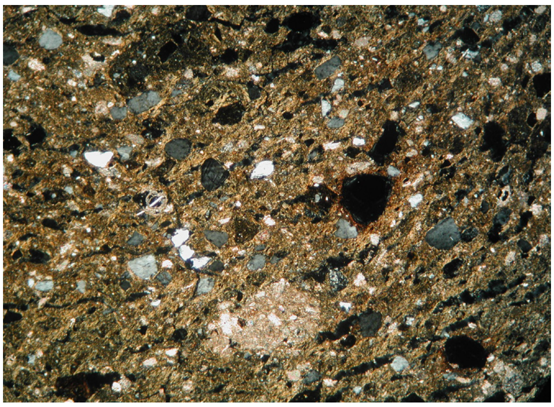
RO4: I



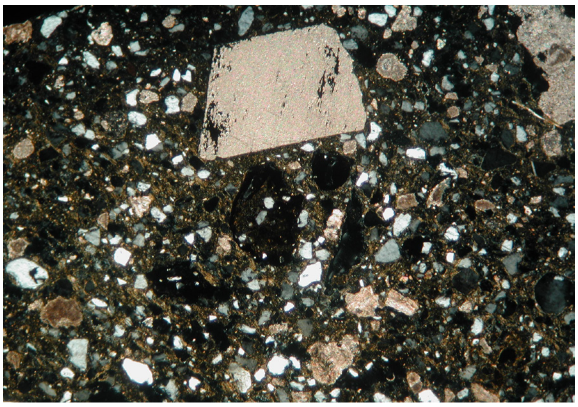
RO6: I



RO8: I

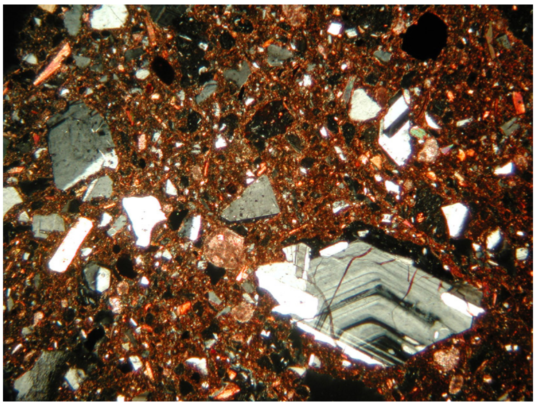


RO9: I



RO18: I

Photomicrographs of thin sections of Mycenean, Italo-Mycenaean and *impasto* from Rocavecchia (10x, XPL).



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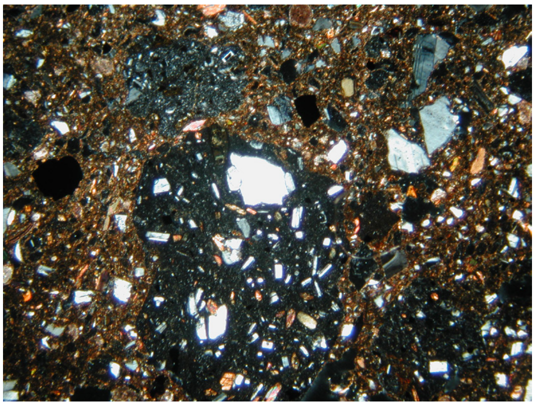

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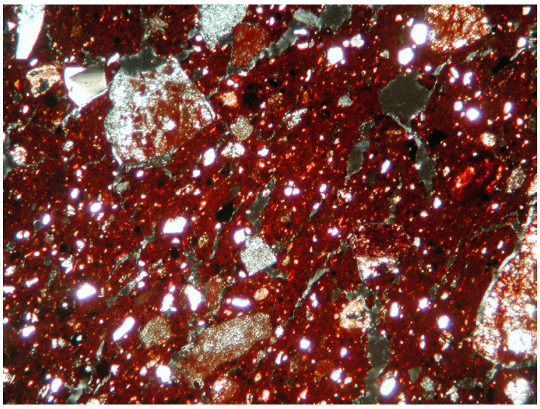
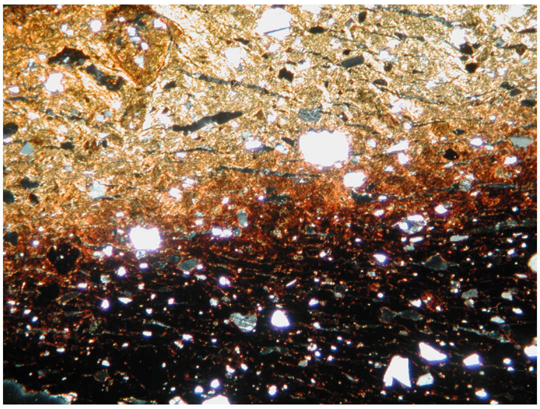


ST84: CW



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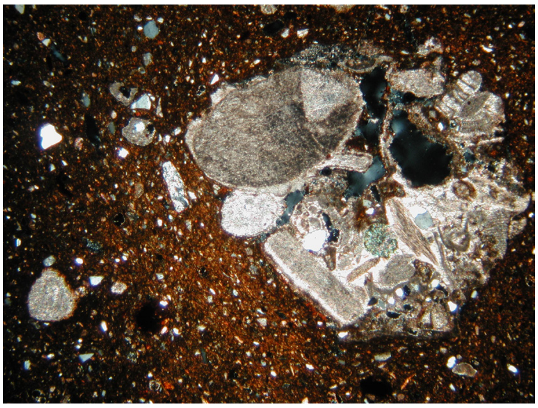

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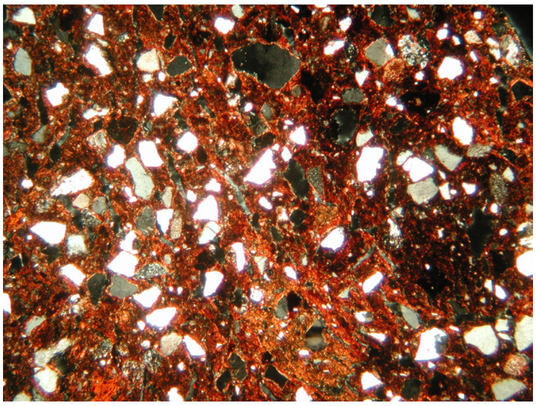

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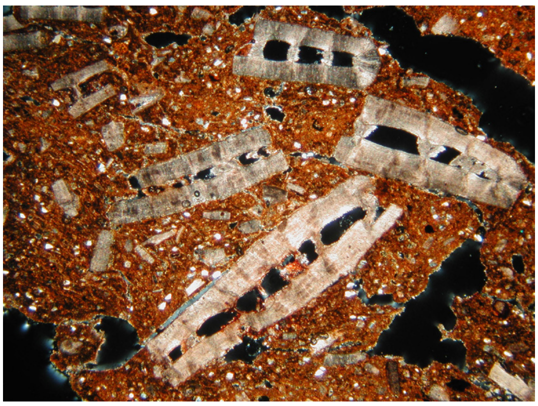

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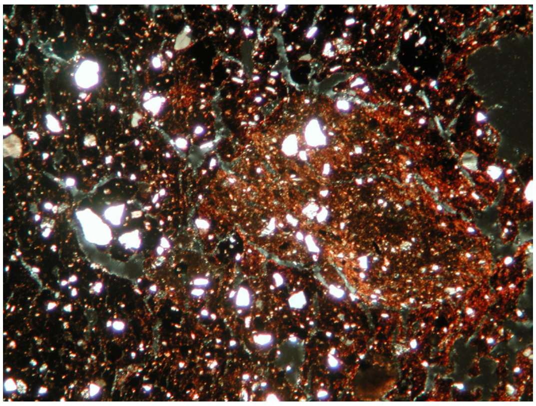
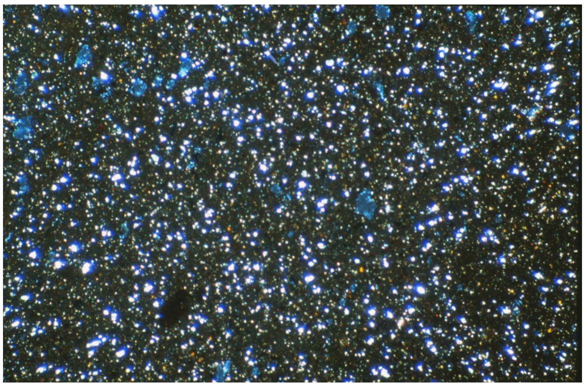
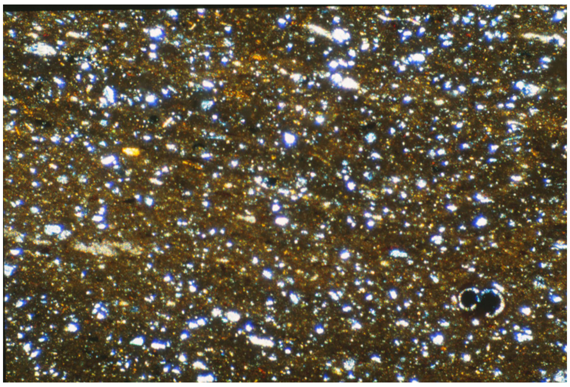


ST79: I

Photomicrographs of thin sections of Coarse ware, dolia (in *figulina* and *impasto*) and impasto from Scoglio del Tonno (10x, XPL).


BT704: M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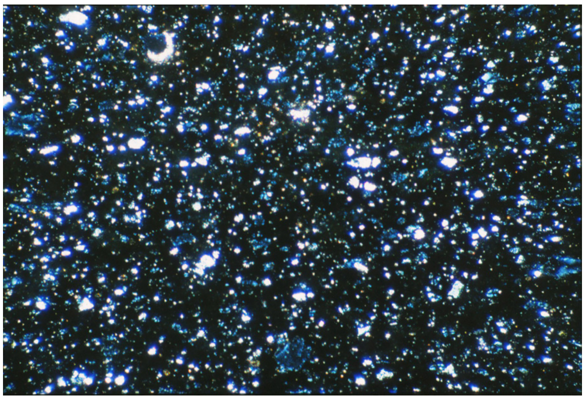
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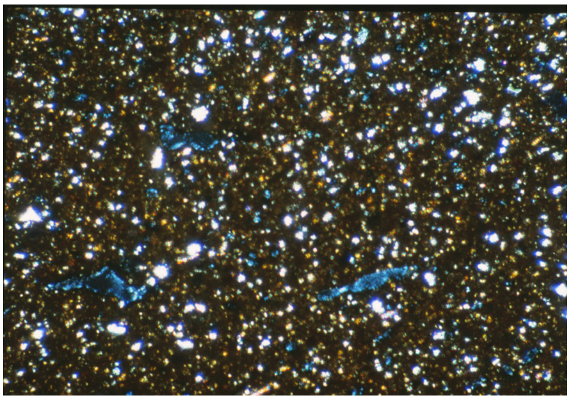
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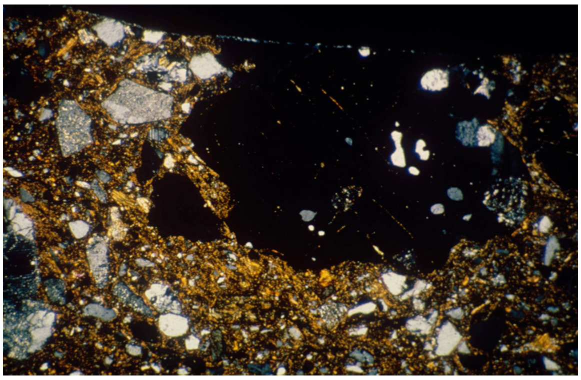
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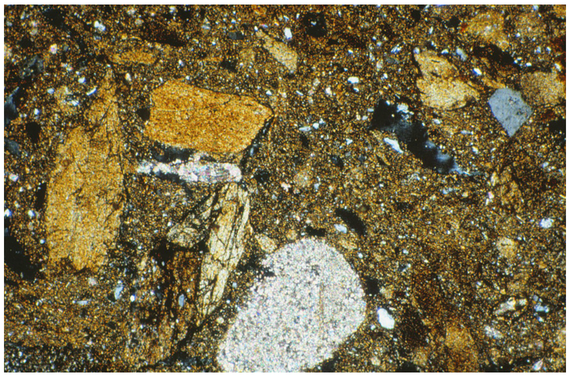
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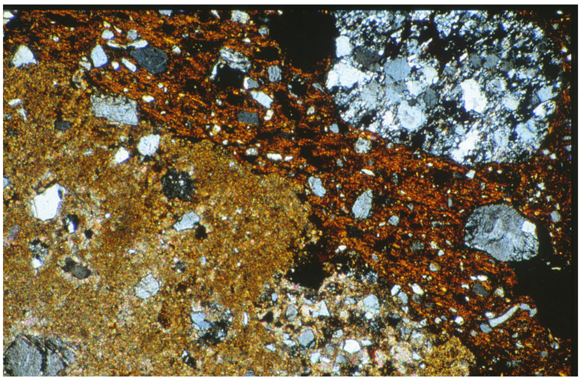
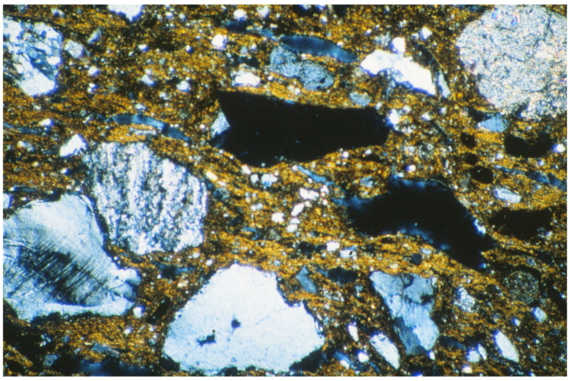
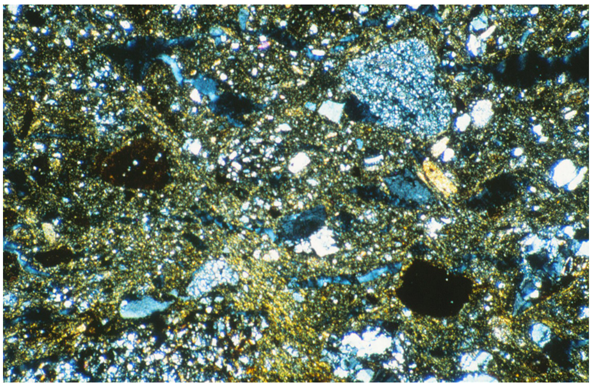
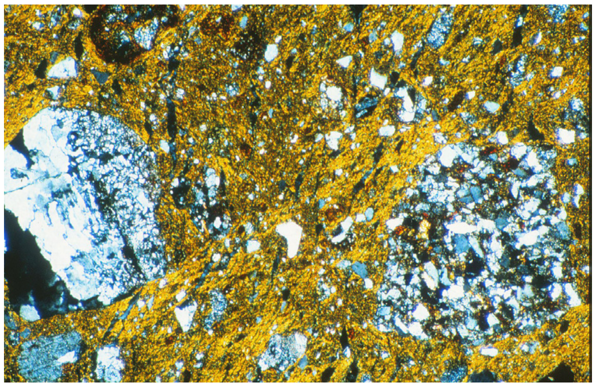

BT435: I


TCF3: I

Photomicrographs of thin sections of Mycenean, Italo-Mycenaean and *impasto* from Broglio di Trebisacce and Timpa Castello di Francavilla (10x, XPL).



FMA9: I



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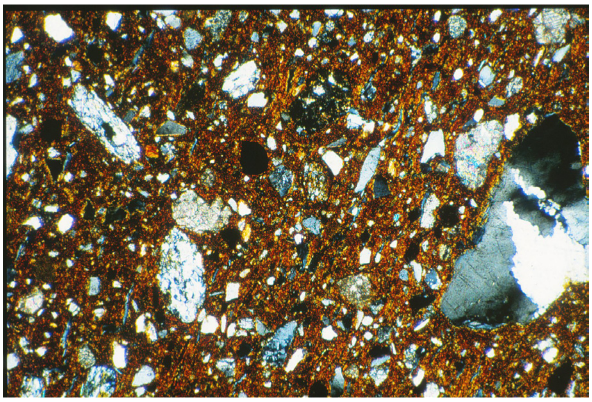
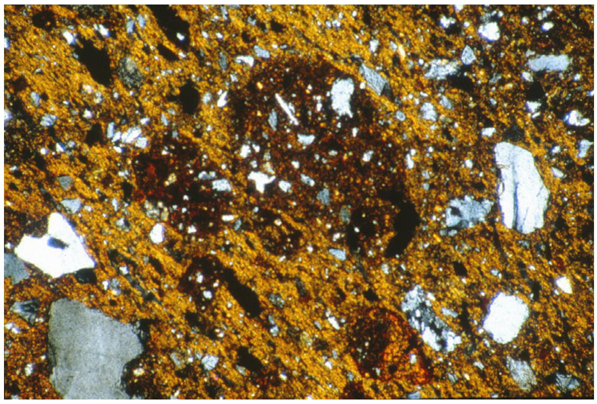


TDM2: I



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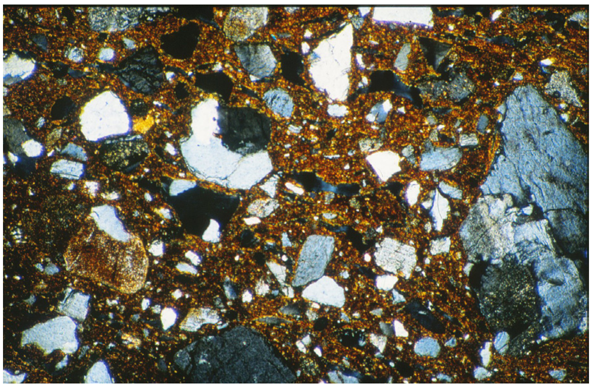
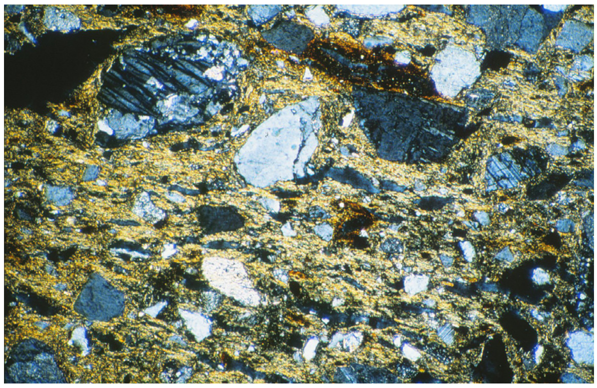
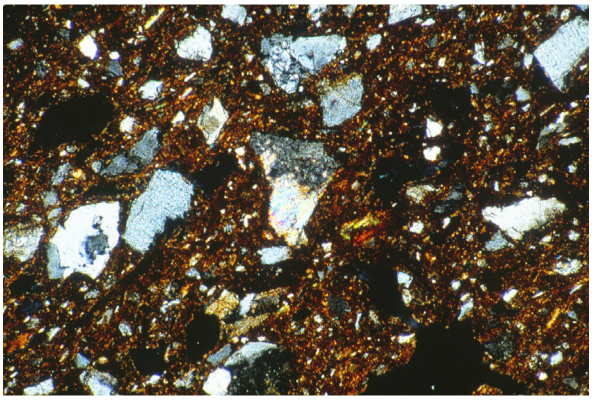


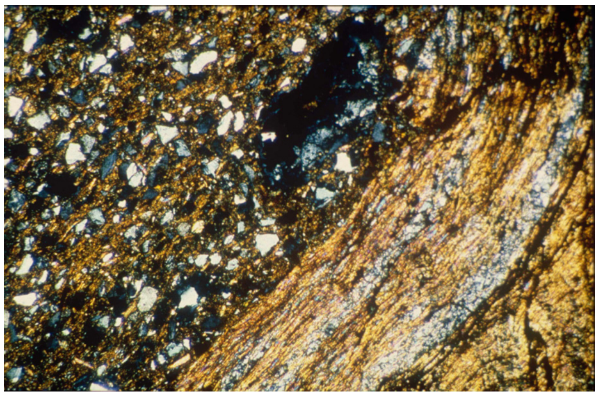
SCG1: I



RR4: I

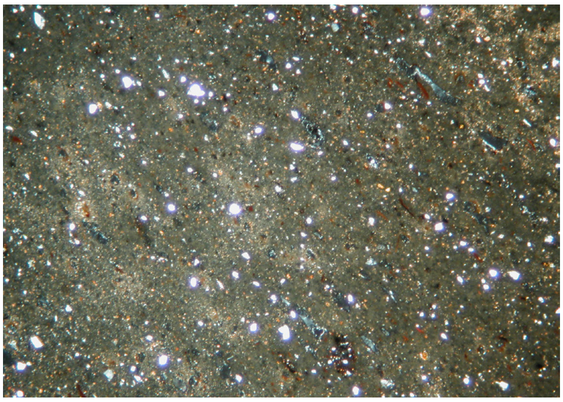


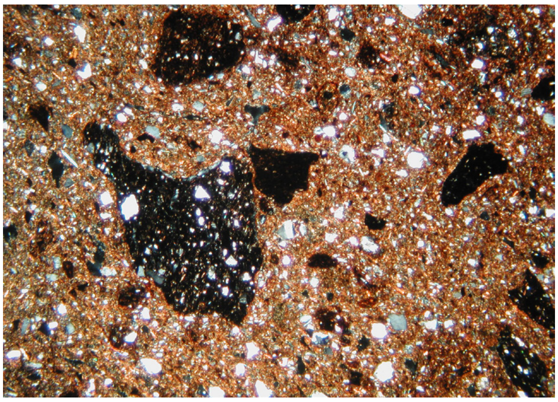
BRS3: I



STR5: I

Photomicrographs of thin sections of *impasto* from Timpone Motta di Francavilla, Torre Mordillo, Serra Cagliano, Rosa Russa, Basili di Rossano and Strange (10x, XPL).


TOL13B: IM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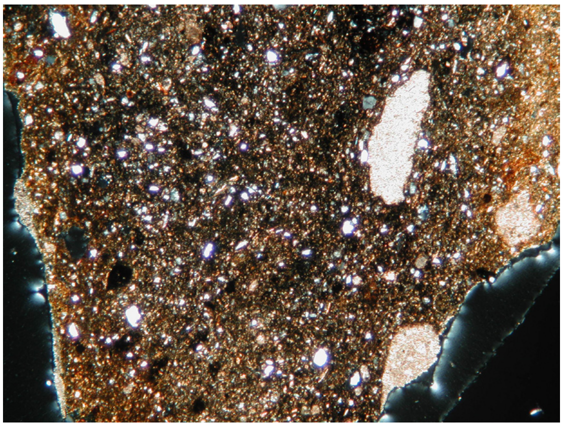
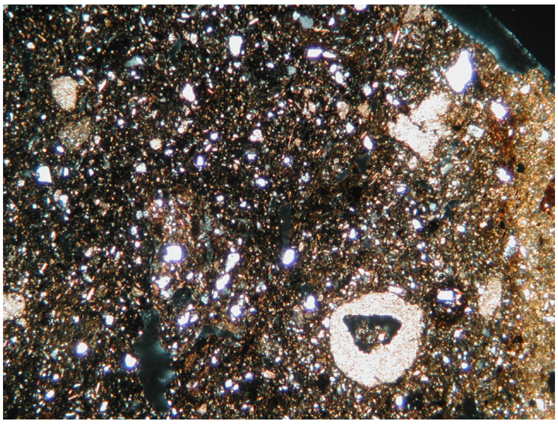
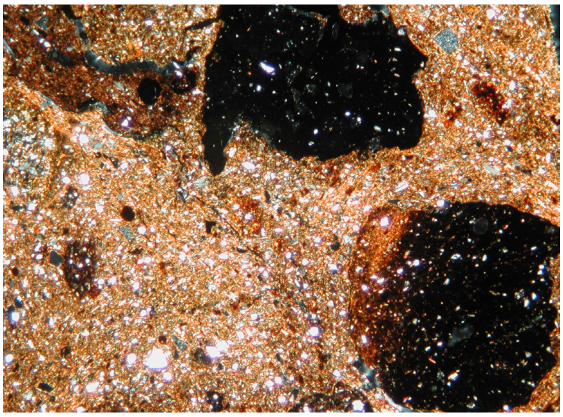

TOL18: I


TOL18B: I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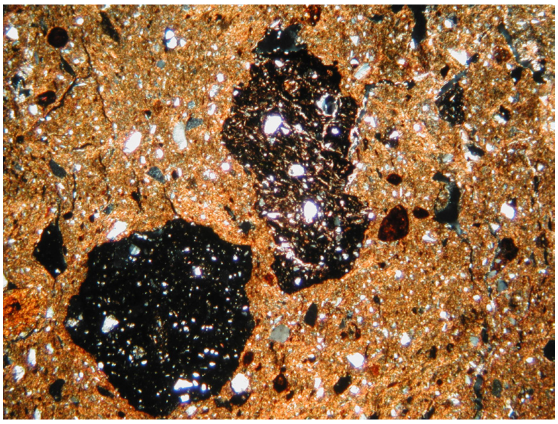
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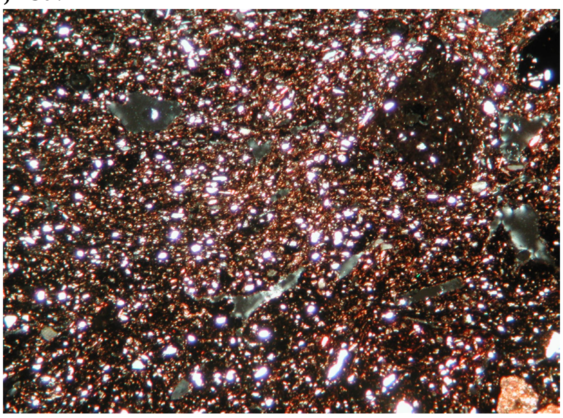
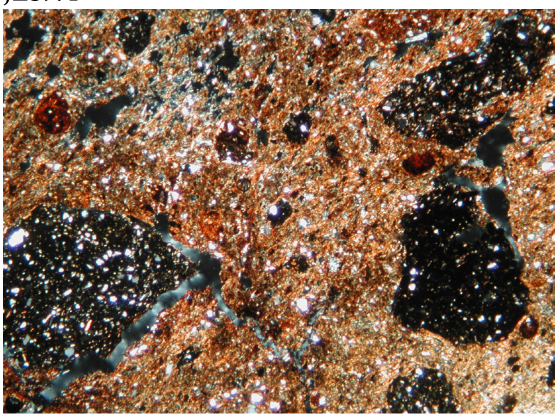
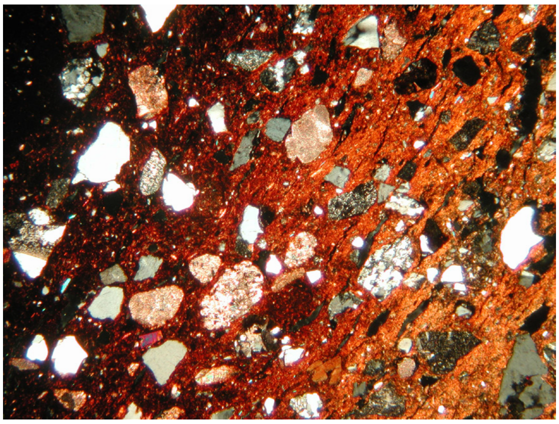
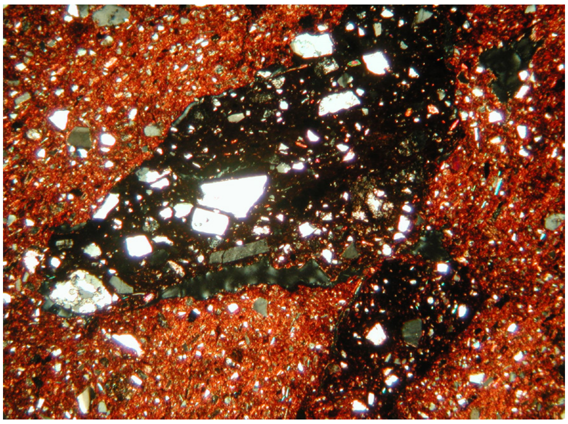
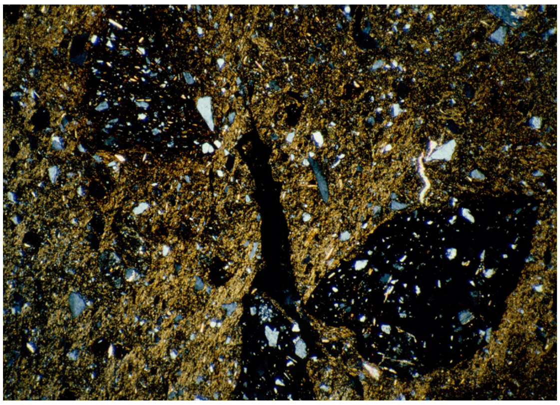

ANC4: I


ANC6: I

Photomicrographs of thin sections of Italo-Mycenaean and *impasto* from Tolentino, Jesi and Ancona (10x, XPL).


LOV8: I


LOV9: I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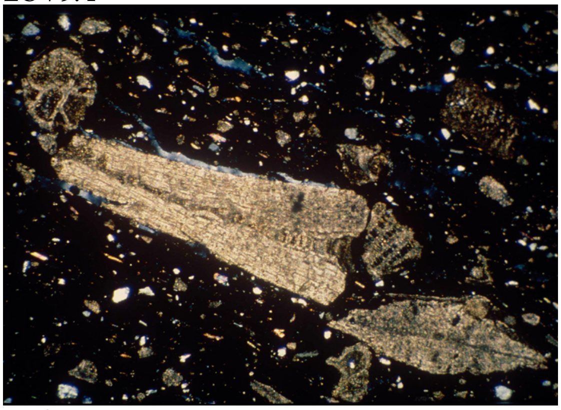
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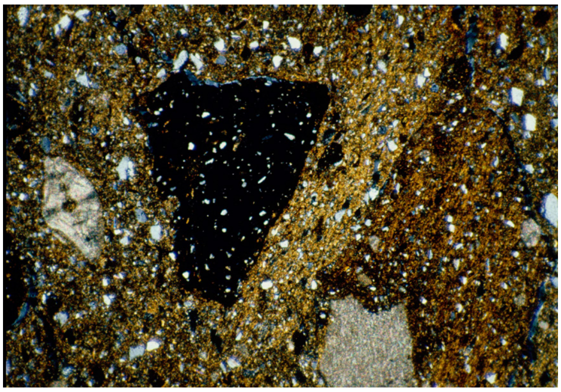
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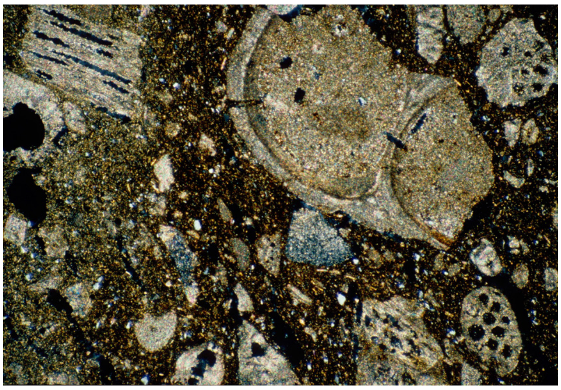
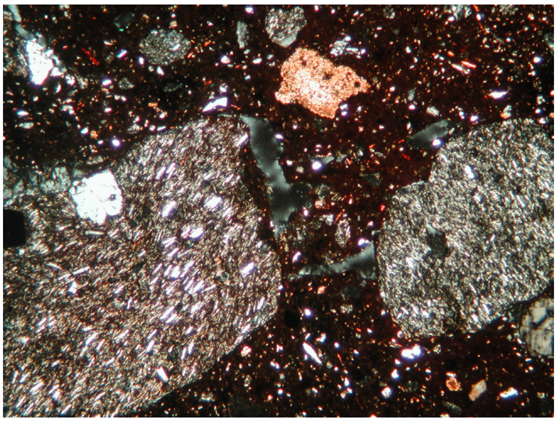
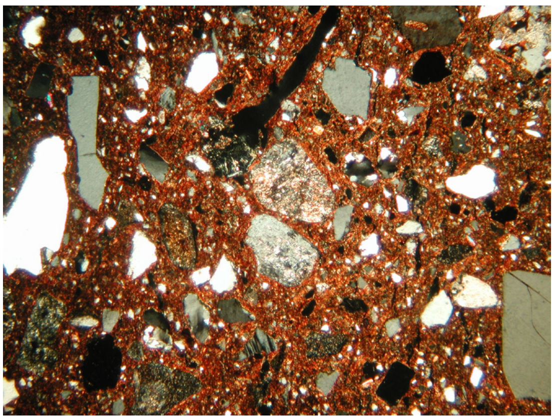
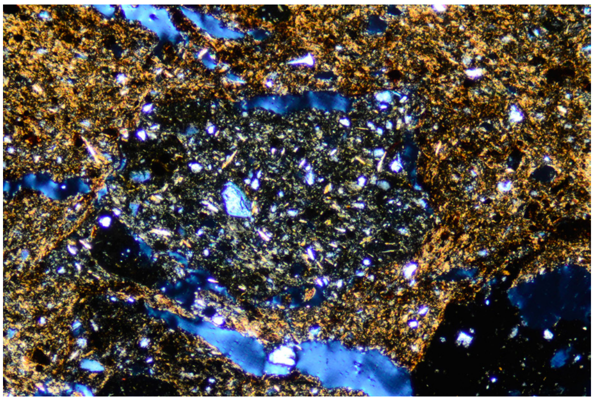
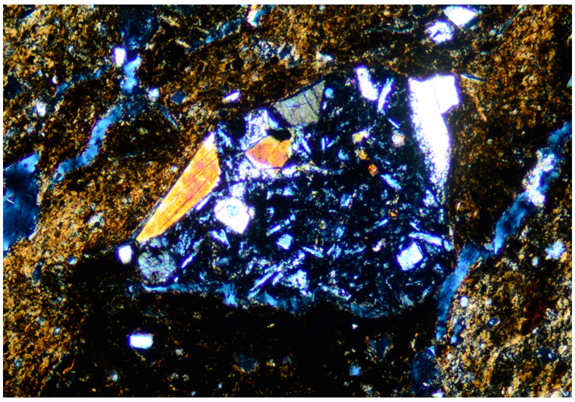

CTA4: I

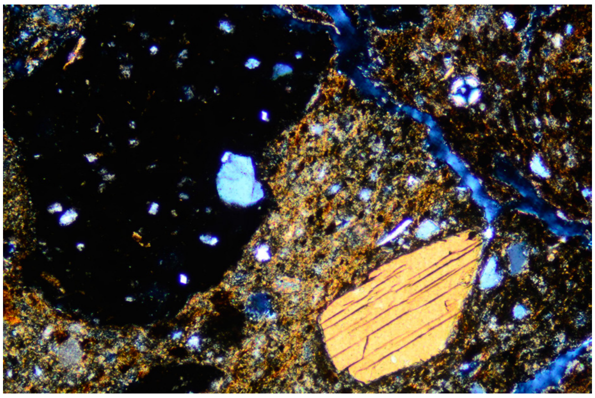

TNE7: I


BOV6: I

Photomicrographs of thin sections of *impasto* from Lovara, Fabbrica dei Soci, Fondo Paviani, Castello del Tartaro, Terranegra and Bovolone (10x, XPL).


THA7: IM


THA14: I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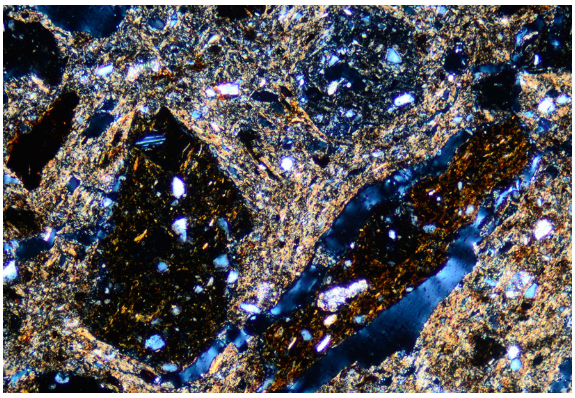
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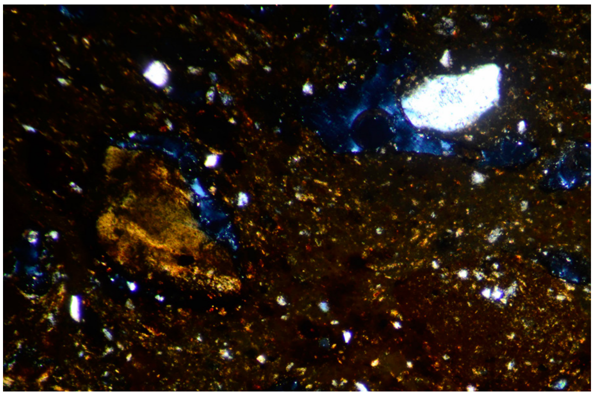
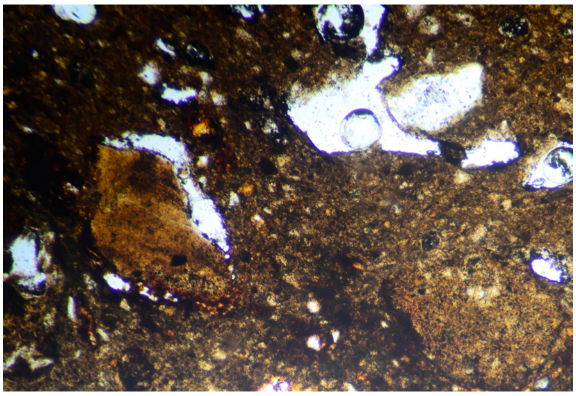

MIC2: M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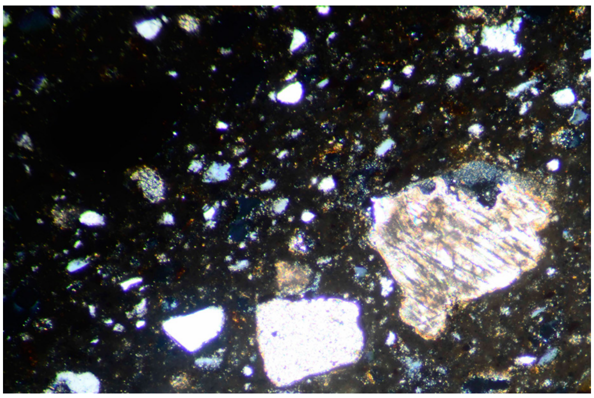
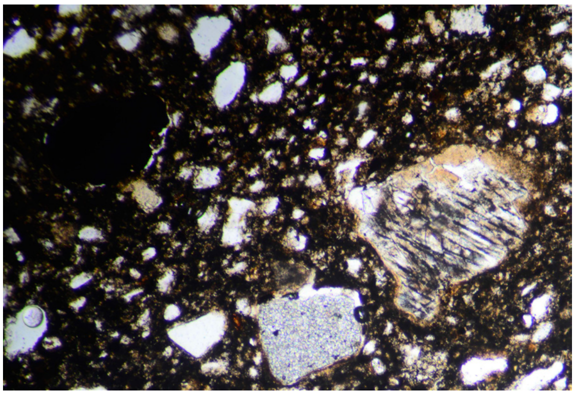
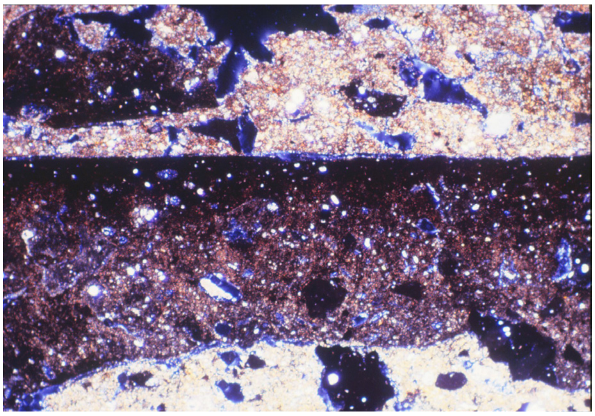

MIC6: M


MIC6: M

Photomicrographs of thin sections of *impasto* from Thapsos (10x, XPL) and of Mycenaean from Lipari (10x, XPL and PPL).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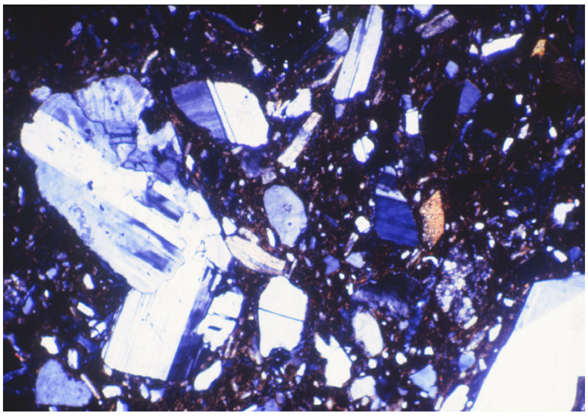
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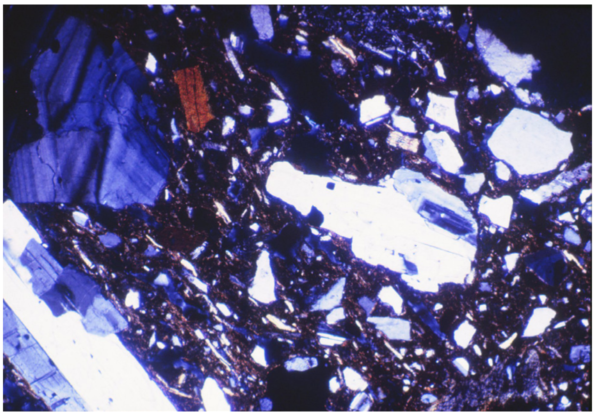
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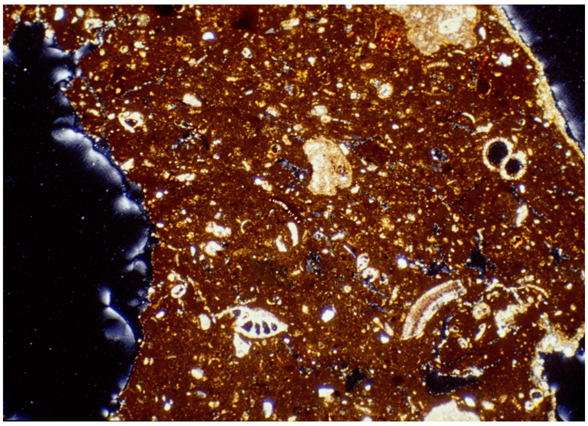
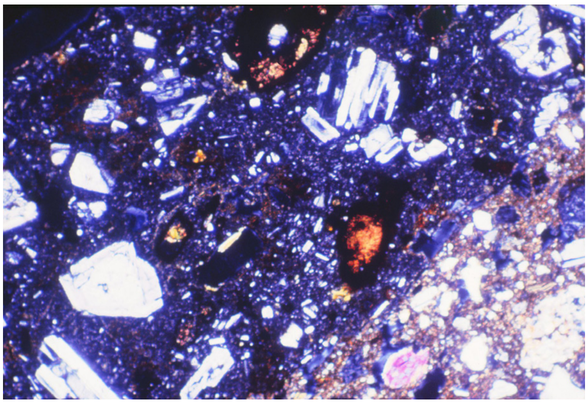
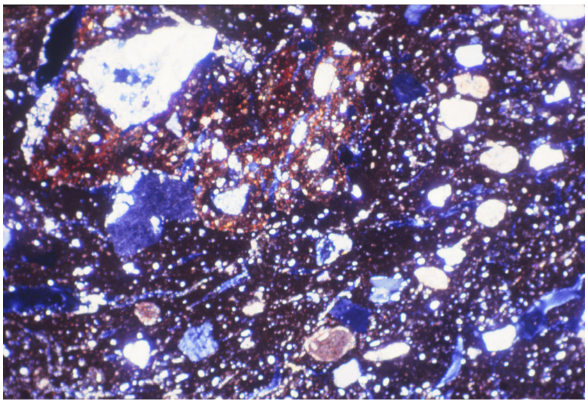
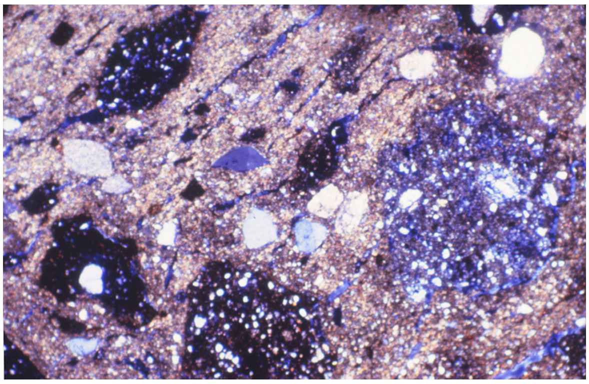

CAN604: I


CAN702: I


CAN804: I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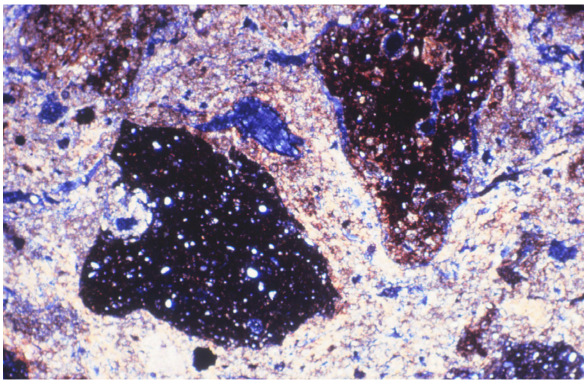
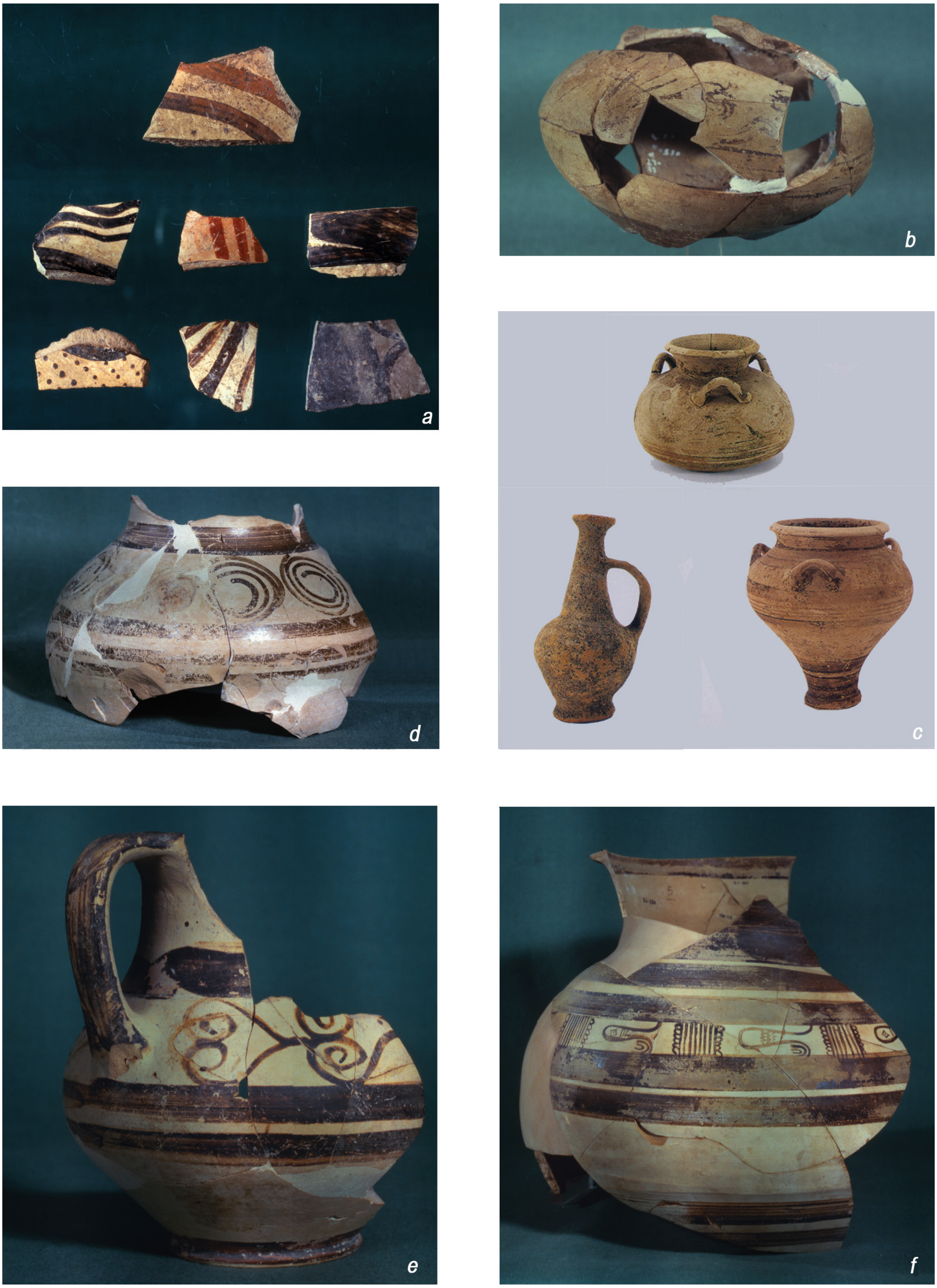

CAN904: I

Photomicrographs of thin sections of dolia (in *impasto*) and *impasto* from Cannatello (10x, XPL).

Plate 10



A-B. Mycenaean pottery from Vivara; C. Mycenaean and Base Ring pottery from Thapsos necropolis; D-F Italo-Mycenaean pottery from Termitito. (A-B, D-F courtesy of Credito Italiano archive; C. after Tusa 1997). Not to scale.

A-C. Italo-Mycenaean pottery from Broglio di Trebisacce; D-E. experimental reproduction of Italo-Mycenaean pottery at Broglio di Trebisacce (courtesy of Broglio di Trebisacce excavation archive).

Plate 12

A-B. Mycenaean and Italo-Mycenaean pottery from Nuraghe Antigori; C. Grey ware from Broglio di Trebisacce; D. *Dolium* from Broglio di Trebisacce; E-F. Experimental reproduction of Grey ware and *impasto* at Broglio di Trebisacce. (A-B courtesy of Credito Italiano archive; C-E courtesy of Broglio di Trebisacce excavation archive). A-B, D not to scale.