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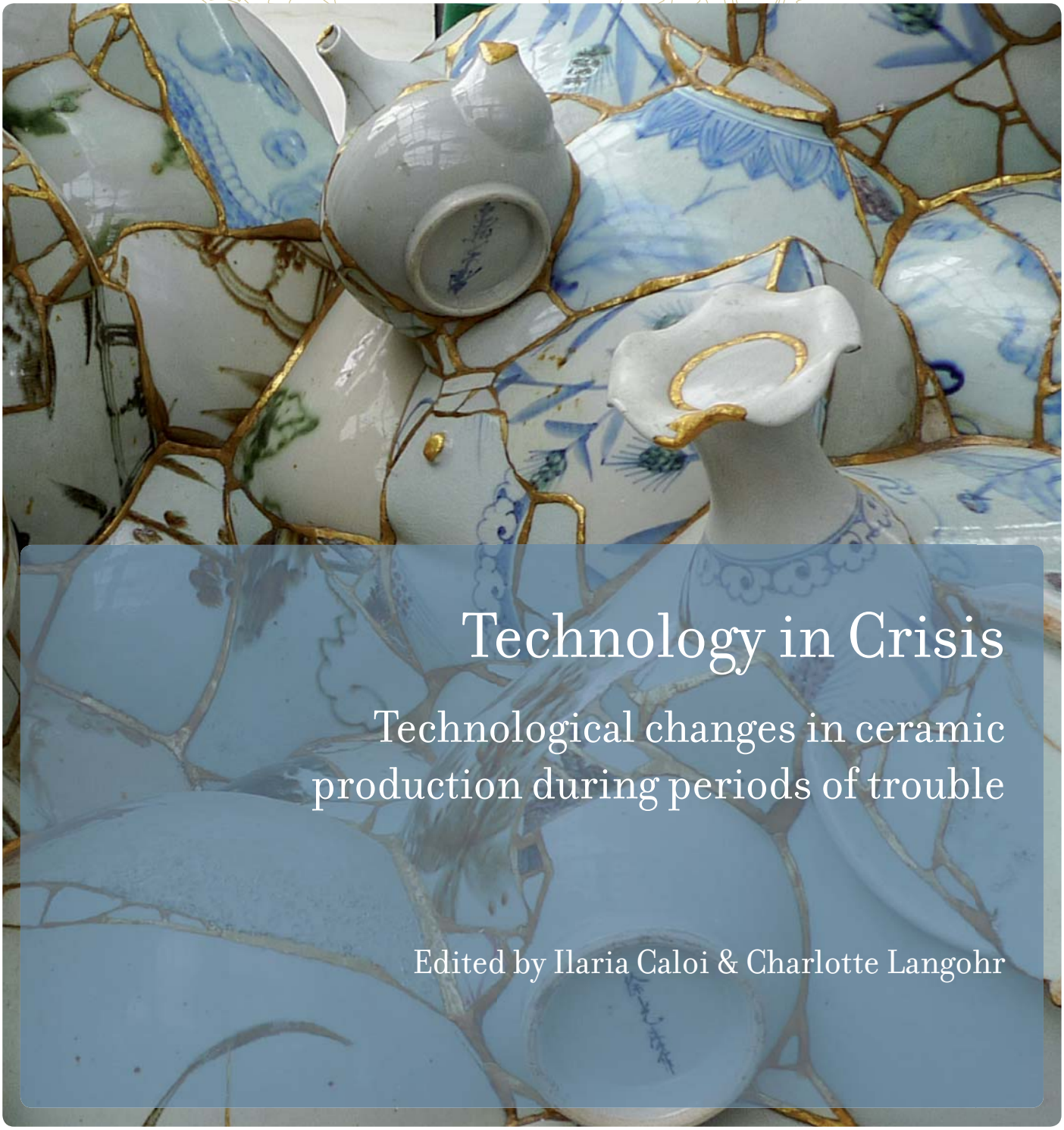

Technology in Crisis

Technological changes in ceramic production during periods of trouble

Edited by Ilaria Caloi & Charlotte Langohr

PUL PRESSES UNIVERSITAIRES DE LOUVAIN

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1. General introduction

Pottery technology is a social product through which it is possible to explore cultural choices (Lemonnier 1993). Technological choices are the outcome of socially understood ways of proceeding (Gosselain 2000; Gosselain & Livingstone Smith 2005). Recent studies have highlighted that **technological change** may result from people who intentionally and persistently choose a new pattern and who desire to achieve specific social goals (Arnold *et alii* 2008). For example, in contemporary multi-ethnic Niger, potters "[…] exploit techniques in order to position themselves socially or economically, and occasionally, build new identities […]" (Gosselain 2008: 78).

In the specific framework of archaeological studies on the **Mediterranean Bronze Age societies**, it has been shown that technical changes in pottery production are best understood when placed in the context of contemporaneous socio-economic developments, and that the conditions and rhythms of these changes are the results of various processes. Among the latter, the adoption of new techniques has been explained in some regions by the growing control of palatial economies on potters' workshops, as part of a general trend driven by the accumulation of wealth (Iamoni 2015; Rutter 2015; see also the concept of 'elite-driven declarative learning' in the adoption of an innovative technology: Knappett 2016).

In the framework of our ARC research project 'A World in Crisis? Archaeological and Epigraphical Perspectives on the Late Bronze Age (13th c. BC) Mediterranean Systems' Collapse: a case study approach' based at UCLouvain (Belgium), we questioned the reliability of archaeological data as **crisis indicators**. Therefore, following the perspective of archaeological and anthropological works that assess pottery technology as a social product, there is an interest to address the social and cultural aspects of *technological change* in pottery production in the specific context of *crisis and period of trouble*. The main goal of such an examination is to detect *whether* and *how* technological choices or changes observed in the archaeological ceramic record may reflect periods of disruption, crisis and/or transformation of social, political, economic, and environmental conditions.

When investigating past societies of the Bronze Age Mediterranean, declines in quality and drops in labour investment in ceramic production (*i.e.* less accuracy in preparing clay, inferior care in forming vases, less interest in decoration, *etc*.) have been interpreted as indices of economic instability and/or political crisis. This is the case in the Intermediate Bronze Age period (*ca.* 2200-2000 BC) in the Southern Levant, a troubled time following the decline of the Early Bronze Age urban era. During this period, previous cities were abandoned and most of the excavated sites correspond to small agricultural villages. There also seems to be a return to simpler hand-made techniques in pottery production for assemblages produced at the household level, and a partial, temporary abandonment of the potter's wheel (Amiran 1969: 80; Gophna 1992: 144-145; see also Ben-Shlomo, this volume). While usually indicative of crisis migrations, invasions or population movements may however lead to contrasting reactions. In some cases, ancient communities may adopt new shapes and techniques, and the spread of these techniques was triggered by such processes. For instance, in Late Cypriot IIC-IIIA Cyprus (*ca.* 1325-1100 BC), pottery assemblages show both new shapes and new manufacturing techniques, including the category of cooking vessels. These significant changes are understood as new ideological aspects that accompanied the Mycenaean immigration on the island (Jung 2017). Alternatively, social groups may choose to cling to traditional manufacturing techniques, in order to maintain and express their group identity despite a new and

more advantageous technological innovation. This was the case on Bronze Age Melos, where local populations seem to have continued producing traditional hand-made pottery in order to demonstrate their identity despite important contacts with, and possibly the arrival of, Minoans who produced wheel-made pottery (Berg 2007; see also Berg, this volume). Finally, elaboration in ceramic shape and decoration, experimentation in clay recipes, and technological change or innovation are often considered to reflect a time of prosperity and flourishing of society. The high-quality Kamares Ware in Crete, the production of which in the Middle Bronze Age matches the acme of the First palaces, is surely an evocative example.

While considering technological changes in modern and contemporary societies, however, different behaviours or types of relations have also been acknowledged. Indeed, artistic innovation and technological experimentation have often occurred in tandem with social, cultural, and economic crises (Gerhardus 1979). The phenomenon of *Art Nouveau* (1890-1914), for example, which represented a re-evaluation of craftsmanship, claimed to be a reaction of society against the Industrial Revolution. It mirrored a renewed interest in 'minor arts' against specialisation and standardisation of industrial products, although it remained in the end a rather elitist phenomenon (Adriaenssens & Steel 2006: 106). Even in contemporary Athens, artistic innovation occurs as a response to crisis: "the hardships and unemployment of the Greek economic collapse have led to a new wave of innovative graffiti, which is both politically aware and socially accepted - making Athens a new Mecca for street artists"[1].

Keeping these different case studies and explanatory frameworks in mind, we have delineated different questions for exploring pottery production of Bronze Age Mediterranean societies. Does a crisis or troubled period have, above all, a causal and negative effect on pottery technology, leading to a visibly decreased labour investment in production? Moreover, if a period of crisis/trouble is easily recognisable from other archaeological indicators, can we identify related reactions in the ceramic assemblages, which are conveyed by technological changes or new choices? In contrast, can a crisis or a troubled time represent an impulse for searching for something new and stimulating in terms of technological practices? In this sense, we are urged to explore whether and how a situation of unrest, be it political, economic or environmental, can lead people to take the chance of being more creative and thus more competitive, to adopt new technological innovations or to experiment with technological changes in order to react to crisis conditions. Can we, by exploring whether a tangible relationship exists between technological changes in pottery assemblages and reactions against social, political, economic and environmental troubled situations, observe that similar troubled conditions lead to the same reactions in terms of technological changes/choices?

2. The conference

We proposed to address these questions by bringing together experts in charge of the study of pottery at different Mediterranean sites in order to discuss, confront and contextualise their respective assemblages and associated contexts. The international workshop organised by our Aegis research group at UCLouvain[2], on the 18th and 19th of February 2016, tackled the issue of technological changes in Early, Middle and early Late Bronze Age Aegean, but also specifically focused on the 13th c. BC on the Mycenaean mainland, and in the Eastern and Western Mediterranean. The results of this stimulating workshop are presented in this volume, apart from the ethnoarchaeological and comparative approach respectively proposed by Alexandre Livingstone Smith and Ditlef Fredriksen, and the contribution of Simona Todaro, Roberta Mentesana, Peter Day, and Vassilis Kilikoglou on the technological changes observed on Neolithic to Early Minoan I pottery from Phaistos. Their original papers are, however, available as a podcast, as are all other papers[3]. In the course of this introduction, we will briefly summarise these contributions against the theoretical background of the essential questions we sought to address.

1 The Guardian: http://www.theguardian.com/world/gallery/2014/nov/11/contemporary-graffiti-art-on-the-walls-of-athens-in-pictures.

2 As part of the ARC13/18-049 (concerted research action) of the 'Académie Louvain': *'A World in Crisis?' Archaeological and Epigraphical Perspectives on the Late Bronze Age (13th c. BC) Mediterranean Systems' Collapse: a Case Study Approach (2013-2018)* – crisis.minoan-aegis.net (spokesperson: Jan Driessen).

3 https://uclouvain.be/fr/instituts-recherche/incal/colloque-technology-in-crisis.html.

Our objective in discussing various types of data, contexts and approaches, is to reflect on two issues that we feel are particularly important when addressing the question of technological changes in periods of social trouble and crisis: 1. The methodological approaches we have at our disposal to trace such changes, and 2. Matters of scale, both spatial and temporal.

3. Studies on technological changes

For quite some time, technological changes had been mainly considered the results of evolving traditions and practices towards increasing complexity (that is for example specialisation) and thus as choices on the way to more efficient technologies. In evolutionary terms, the *homo economicus* is guided by principles of productivity and security (Brumfield & Earle 1987). In this perspective, potters make technical choices based on criteria that have a technological explanation, such as energy efficiency, economies of scale, least efforts, or utility maximisation. This has often been associated with a macro-scale approach to the history of techniques, and with a 'diffusionist' model pointing at the role of intercultural contacts as a triggering force for cultural change, as well as, in our case, for technological changes.

By way of contrast, more recent research based on ethnographic data, notably carried out at the micro-scale of individuals and communities, has instead emphasised that technological changes are above all the outcome of social processes (Gosselain 2000; 2008; Gosselain & Livingstone Smith 2005). Technological change may "result from individuals intentionally and persistently choosing to follow a new pattern" and "who choose not to follow traditional patterns" (Arnold *et alii* 2008: 59). Conversely, people may know about a new behaviour or technique but choose not to adopt it, as illustrated by some of the present contributions (see Choleva; Berg, this volume). Likewise, Valentine Roux (2013) has observed in a present-day case study in North-West India that the decision to adopt a new technique depends not just on the existence of relationships between different social groups, but on the *nature* of the contacts between communities and the *social conditions* that trigger both individual and social learning. Finally, and most importantly for our discussions, in those instances where new techniques and practices *do* spread, they may follow different trajectories as we will see in some detail below. On this very issue, a recent volume devoted to "human mobility and technological transfer" (Kiriatzi & Knappett 2016) gave special attention to "*technological* perspectives on the processes of human movement", with the aim of understanding how and why technologies propagate, how they are borrowed, appropriated and transmitted, and whether certain technologies move preferentially into particular contexts.

On the whole, and a fortiori in Prehistoric or traditional societies, a close relationship exists between any utilitarian or craft product and its social milieu (Rice 1987: 461), implying that much attention should be given to the social context that encourages or discourages change. This being said, because of the conservative character of pottery production traditions, and especially shaping techniques, and since the contexts of production between distinct social groups are much diversified, technological changes are particularly difficult to trace in the archaeological ceramic record and even more difficult to interpret. In the words of Olivier Gosselain, who advocates for a dynamic approach to both transmission and appropriation processes in potting practices, "there exists an inherent tension […] between a desire to maintain and reproduce the link with those from whom the knowledge was initially acquired, and the unavoidable adjustments imposed by the social and economic contexts within which individuals carry the craft throughout their life trajectory" (Gosselain 2011: 223).

For archaeologists, these observations lead to a main point. Considering that technical choices are not only driven by rational choices but by also by specific social trajectories, it is a **matter of context** to understand *how* and *under which conditions* changes in ceramic technological practices occur. Consequently, a possible bias in our analyses depends on the *degree of precision* with which we can approach the social and technological context of production of well-defined cultural groups on the basis of our archaeological data.

This issue forces us to address the **matter of scales** in our inquiry. In a paper by Carl Knappett & Sander van der Leeuw on a developmental approach to ancient innovation, the authors start with the observation that "archaeology is uniquely placed to observe some of the most profound socio-cultural changes in humanity's deep history", being able to "assemble macro-scale data", which eventually bring to light very widespread

changes (Knappett & Van der Leeuw 2014: 65). As they put it, these profound, macro-scale transformations "are ultimately all closely related to micro-scale practices too, as individuals altered their daily routines, making subtle changes, the consequences of which they could hardly have foreseen" (Knappett & Van der Leeuw 2014: 65). Advocating the challenge of articulating these seemingly quite distinct scales they argue for the need of a meso-scale approach to archaeological data, which, in the particular case of pottery traditions and technological change, may mobilise the concept of **communities of practices**. This approach supports that "learning takes place in, and is deeply connected to, specific social settings" (Knappett & Van der Leeuw 2014: 69). In this way, it prompts us to consider the transmission processes and potting practices from a dynamic perspective, but also infers that skill and knowledge acquisition goes along with the development of group identity, since, through the process of learning, one increases his/her integration in a community (Gosselain 2011: 219). Such an approach can eventually help archaeologists to think across different scales, from the micro-scale of potting practices to the macro-scale of cultural evolution.

With this perspective in mind, *i.e.* that promoting a meso-scale approach to archaeological data enables a more comprehensive understanding of the very different trajectories of technological changes in ancient societies, as archaeologists we are invited to pay attention to the *method* used in the various works presented in this volume to outline or characterise ancient *communities of practices*, that is, understanding technical traditions as both individual and social processes.

3.1. Social/political/economic/environmental mutation and technological change

Moving to the contexts of crisis and the questions of social, political, economic or environmental transformations and their impact on pottery production, our main questions in preparing this volume were the following:

- Can technological changes observed in the archaeological ceramic record reflect periods of crisis and/or transformation of social, political, economic, and environmental conditions?
- And are the specific nature and context of these changes indicative for a certain type or degree of social crisis or transformation?

It may be assumed that a period of unrest or social upheaval has an impact on the modes of pottery production and distribution. This could imply a reduction in the production output, a simplification of the typological and/or stylistic repertoire, but also perhaps a decrease in workspace and a change in demand and distribution patterns (Rice 1987: 454), all effects that are more or less detectable in the archaeological record. Significant transformations of technological practices could, however, follow a less straightforward chain of events. Here, we may first draw upon or find inspiration in general models developed in fields outside archaeology, before coming back to the observable data in our various archaeological contexts.

In order to qualify the nature and dynamic process of change in cultural practices, studies by Roux (2010; 2013) and Courty (Roux & Courty 2013) have differentiated change as *continuous* and *discontinuous*. This may be transposed to technological practices so that a technological change can be defined as a continuous and discontinuous process. Confronted with archaeological data and contexts, this distinction may ultimately help us to dissociate different degrees of transformations in social systems and to define how deeply social structures may have been affected by disruptive events.

A **change is said to be continuous** when it concerns one technical trait and when "there is continuous social learning between generations and among peers" in a social group (Roux & Courty 2013: 189). This signals circumstantial events, occurring at the level of middle or short-term history, for example, the borrowing and adoption of a more efficient exogenous instrument within a socially homogenous context.

On the contrary, **a change is discontinuous** when "there is a complete cessation of transmission" (Roux & Courty 2013: 189) and the change concerns the entire technical system. This includes a complete arsenal of techniques, instruments, skills, knowledge and representations. Such a major discontinuity is indicative of deep mutations, which affect the societal structure of a population as well as the long-term history, and which may reasonably be qualified as a '**crisis'**.

In short, in characterising discontinuous change in social and event-based terms, and a complete cessation of transmission in particular, at least two kinds of scenarios may occur. For each situation, we can suggest a corresponding archaeological context of 'crisis', which may be a potential 'activator' of a discontinuous technological change.

In the first scenario, a discontinuous technological change may occur when the transmission units disappear and are replaced. In historical terms, this means that the population is moved in some way, such as in the case of invasion or migration, creating a potential for change.

This is the case, for example, in the Southern Levant at the beginning of the second millennium BC, where ceramic assemblages are characterised by the combined arrival of new forms and the wheel-coiling technique. This appears in the first phases and "is so widely disseminated that it seems to be adopted more or less instantly" (Roux 2013: 320). In this Southern Levantine context, this major discontinuous technological change is explained by the arrival of new groups from the North, who were the main agents for the emergence of new settlements and the construction of monumental buildings.

In the second scenario, the transmission units correspond to social or institutional components that disappear. In this case, the disappearance of these structures, induced by the failure or collapse of a political system, may trigger the emergence of new ones, generating a potential for change (Roux 2010). This is the case on Crete at the end of the Middle Bronze Age, when Middle Minoan III early ceramic production is characterised by poorly manufactured and less accurately decorated vases. Assessing this decline in pottery production Aleydis Van de Moortel (2002) has explained it as a consequence of the political and economic instability after the destruction of the First Minoan palaces (see also Girella 2010).

Assuming that in periods of crisis/unrest/instability the occurrence of a discontinuous technological change is a possibility, we would expect the introduction of new technological lineages, which break with tradition. With the very topic of the present volume in mind, we think that the real challenge for archaeologists is first to properly assess the effective occurrence of a technological change within the ceramic assemblages. This involves an agreement on some empirical methods that have demonstrated their reliability in assessing the *degree* of technological change (*i.e.* it concerns only one technical trait *vs*. it relates to the entire technical system). Only then would we be able to consider and interpret its possible causes, based on the distinction between a technological change connected to *local* historical dynamics – a continuous change – *vs*. that one related to a major historical and/or social change.

To that end, the consideration of local contextual data combined with a fine-tuned stratigraphic resolution as well as issues of scales considering intra- and interregional comparisons is crucial. This is precisely what the different contributors to this volume have endeavoured to achieve. The main result of these varied efforts, related to disparate case studies, is that a *discontinuous technological change* can properly be recognised and addressed in the case of the adoption of the potter's wheel in Central Greece during the Early Bronze Age (hereafter EBA) (Choleva, this volume). The introduction of the potter's wheel first implied the use of the wheel in combination with the hand-building technique, known as the wheel-fashioning technique. In Central Greece the introduction of this new technique between late EBA II and early EBA III occurred in a time of trouble and change for the Aegean communities. New exchanges and networks did increase the circulation of people, objects, technologies, and ideas throughout the Aegean (Choleva, this volume). It is worth mentioning that, on Crete, the potter's wheel was introduced later, in the early Middle Bronze Age (Middle Minoan IB phase, *i.e*. 19th c. BC), a time that corresponds to the emergence of the First Minoan Palaces (Knappett 1999). In the case of Crete, the wheel-fashioning technique also constituted a *discontinuous technological change* but one following different trajectories. According to recent studies, in North/North-East Crete, this technique went on to be used until the Late Bronze Age, *resisting* the introduction of new technological innovations (Jeffra 2013; Knappett 2016: 101). On the contrary, in Southern Crete, especially at Phaistos (Caloi 2011) and neighbouring sites (*i.e.* Haghia Triada and Kommos: see Baldacci 2013; Van de Moortel 2006), the use of the wheel-fashioning technique did not prevent the introduction of a new technological change in MM IIA (*ca.* 18th c. BC), when the wheel-throwing technique was adopted for the production of specific shapes (*e.g.* standardised conical cups in Fine Plain Ware)

and wares, like the Polychrome on buff-reserved surface Ware (Caloi 2011: 93-96, fig. 8). The adoption of the wheel-throwing technique, which is a new technical system that entails the *exclusive* use of the potter's wheel to throw from a mass of clay, exemplifies another *discontinuous technological change*. It appears that a new group of potters arrived at Phaistos along with a technological innovation in MM IIA, when the settlement was significantly re-organised, as the monumentalisation of the First Palace demonstrates (Caloi 2018; forthcoming). In this *transitional phase,* together with the new group of potters using this innovative technique, local potters continued to use the traditional wheel-fashioning technique to produce the well-known Kamares Ware (Caloi 2018).

3.2. Broadening the horizon

Broadening our horizon of research to contemporary times, *i.e*. 20th c. AD America, historical literature has suggested that crisis periods are also periods of significant innovation. Two scholars in economics (Joel Mokyr and Naomi Lamoreaux) have documented the rise of important innovations like the incandescent light, the steam turbine, and the transformer precisely during the Long Depression. Economic historian Alexandre Field even recognises the 1930s as the "most technologically progressive" decade of the 20th c. AD[4]. Current research on the economic and social crisis in the United States has shown that in the last years "American innovation has shifted and become more geographically concentrated. Places like Silicon Valley have seen a steady increase in innovation while older, industrial centres have declined significantly or stagnated"[5]. And maybe more significant, in terms of actors, Alexandre Field points that the innovation in America "has grown increasingly dependent on non-resident, foreign inventors", concluding that "anything that might slow the immigration or inflow of foreign inventors – or redirect their inventions and patents – would undoubtedly damage the rate of American innovation." These observations are somewhat provocative because of their obvious anachronistic component. However, they prompt us to address the following question, highly relevant for our main issue: if discontinuous technological change is a phenomenon that breaks with tradition, may we hypothesise that this process is more easily or even mainly initiated or activated by people who are not rooted in one community's traditions? By people who do not know the traditional lineages of the community within which they integrate, such as foreigners?

3.3. What do we mean by foreigners in Ancient times?

By foreigners in Ancient times, we consider people coming from *abroad*, such as immigrants, refugees, invaders, but also captives. This first type of 'foreigners' is discussed in the papers by Maria Choleva, Ina Berg and Artemis Georgiou, in this volume, where the authors illustrate different cases of adoption/rejection of a new technique imported from *abroad*, attempting to explain local reactions to the technological innovation. The difficulty of identifying involuntary relocation of social groups, or captive potters, on the basis of archaeological material has recently been addressed, using the Italo-Mycenaean pottery from Southern Italy as a case study (Lis 2018). In broader terms, however, and in close consideration of the nature of our archaeological records, a 'foreigner' can correspond to a specific social component with distinct cultural traits living *inside* a broader community, but in a marginal way that can be inferred from the identification of distinctive social practices (Lis 2016). Finally, and most importantly, 'foreigners' may also be a specific part of a community that did not experience the aforementioned transmission units (in pottery technological terms, these could be paste recipes or shaping techniques) due to various reasons that may be social, political, or economic. These 'foreigners' are best exemplified in the present volume by the agents of change in cooking pot production within the EM IIA community at Mochlos (Crete), discussed by Brogan, Kaiser & Nodarou.

The context of the Eastern Mediterranean in the 13th c. BC offers the best ground for the study of this specific issue of 'foreignness' (see especially Lis; Georgiou; Ben-Shlomo; Bettelli, Borgna & Levi, this volume). In a general atmosphere of increasing socio-political unrest, against a backdrop of long-standing and long-distance

4 (http://www.creativeclass.com/_v3/creative_class/2009/07/page/2/)
5 (http://www.creativeclass.com/_v3/creative_class/2009/07/18/innovation-and-economic-crises/)

contacts of different sorts, this century saw the rise of a complex phenomenon, which progressively prompted the reconfiguration of different networks and the movements of social groups. In this particular context, distinguishing locally and non-locally produced ceramic objects in the archaeological record remains a continuing source of debate. In many instances, a given foreign tradition may be imported to area X, may be imitated locally by area X potters, or a group of foreign potters may newly reside in area X and produce their native styles and tradition, all along with the continuation of local practices. Being one of the first to address these questions in the framework of pottery analysis, Prudence Rice asserted that "imitation, innovation, elaboration, material entanglement or syncretism all play roles in these circumstances, but they are difficult to isolate archaeologically" (Rice 1987: 468). She also argued that "there is always a lag between the occurrence of an event and the time when its impact is fully felt, in various alterations to the accustomed pattern", which made her conclude "that it is thus virtually impossible to correlate ceramic changes one-to-one with significant political, economic, or religious events in a culture".-

The efforts which emerged from the broad range of studies and approaches represented by the different contributors in this volume allows an elaboration on these different issues but also a determination of their limits, challenging Rice's somewhat pessimistic conclusion.

4. Summary of the contributions

This book comprises the written versions of ten papers delivered at the invited international workshop '***TIC: Technology in Crisis. Technological changes in ceramic production during periods of trouble***' organised in February 2016. The order of the contributions follows different topics and issues:

1. **Technological changes in periods of trouble and mutation: comparative and ethnoarchaeological approach**: Valentine Roux & Simone Gabbriellini
2. **Technological changes in periods of trouble and mutation: Early, Middle and early Late Bronze Age *Aegean:*** Maria Choleva; Thomas M. Brogan, Luke Kaiser & Eleni Nodarou; Ina Berg
3. **Technological changes in periods of trouble and mutation: 13th c. BC Mediterranean:**
    a. **Mainland Greece:** Elina Kardamaki & Konstantina Kaza-Papageorgiou; Bartłomiej Lis; Salvatore Vitale;
    b. **Eastern Mediterranean:** Artemis Georgiou; David Ben-Shlomo
    c. **Western Mediterranean:** Marco Bettelli, Elisabetta Borgna & Sara Levi.

In the present-day ethnographic case study discussed by **Roux & Gabbriellini,** the authors deal with a period of transition in firing techniques witnessed by potters working in the town of Pachapdra in Rajasthan, North-West India, where until 1987 the pottery production was in the hands of potters belonging to two different communities, the Muslims and the Hindus. Until that date, the vessels produced, and the technical systems deployed distinctly distinguished these two communities: the Muslims were specialised in producing only culinary vessels using open single-hearth triangular firing structures, while the Hindus only produced storage vessels using open multiple-hearth circular firings. The change in the town of Pachapdra occurred in 1987 when the production was reduced to one shape (a water storage vessel), now manufactured by both communities. On that occasion, the firing structures adopted by the two communities changed. In analysing the variability in the adoption of firing structures, the authors highlight two different patterns: in one case there is a statistical correlation between the kinship and diffusion networks, that means a strong relationship between the advice and kinship networks; on the other hand, kinship ties did not favour the adoption of the kiln. They conclude that, in anthropological terms, periods of transition and disorder "are characterised by the introduction of new traits inside communities in which both the ties between the individuals and the various inventors' strategies generate **a variability** in the adoption process with, as a consequence, a strong spatial and temporal variability in cultural traits that does not correspond to the population structure".

Tackling the issues of technological changes in the framework of the **Early, Middle and early Late Bronze Age Aegean**, on the **Mainland**, **Choleva** first addresses two opposing responses to the adoption of a new

technological innovation, *i.e.* the potter's wheel, in Eastern and Central Greece between late EBA II and EBA III. The potter's wheel was imported from Western Anatolia as a technical system implying the use of the wheel-fashioning technique to produce specific classes of pottery derived from Anatolia (*i.e*. the Lefkandi I/Kastri group). At Lefkandi, on Euboea (Eastern Greece), the local communities appropriated the use of the potter's wheel as a new technical system in late EBA II and continued to use it in the successive EBA III phase as a resistant craft practice of Anatolian origin. On the contrary, at late EBA II Pefkakia, in Magnesia (Central Greece), the local communities rejected the new technological innovation and maintained their traditional *habitus* in forming practices, *i.e.* the hand-building technique, but adopted the morpho-stylistic features of the new Western Anatolian pottery. Only in EBA III, was the new technical system also transmitted to Pefkakia through the adoption of a new pottery assemblage, which was inspired by the same Anatolian traditions and habits. Since the use of the new technical system was restricted to the manufacture of vessels of Anatolian origin and never those of Helladic traditions, through this practice, one could recognise a strong social and cultural identity, indicative of potters who were trained in the Western Anatolian technological tradition. As indicated by Choleva, the potters at Lefkandi "negotiated their place in the new Helladic socio-cultural milieu by maintaining their Western Anatolian craft behaviours", while at Pefkakia local potters appropriated the new tool in a successive phase as part of a rooted tradition. Within a historical framework of changes, redefinitions and profound transformations, Choleva suggests that the distinct technical identity underlying the wheel-fashioned pottery was transformed into the means for preserving long-lived cultural meanings and for negotiating social identities.

On **Crete**, **Brogan, Kaiser & Nodarou** deal with the first phases of use, *i.e.* EM I-EM IIA, of the Prepalatial cemetery located on the island of Mochlos, North-Eastern Crete, showing that changes observed in pottery production and consumption can be associated with other significant changes in the local settlement and cemetery. The most significant change from EM I to EM IIA involves the disappearance of locally produced vases and the adoption of new shapes for cooking vessels (dishes and tripod cooking pots), produced in a new fabric by potters working in the region of Gournia and Priniatikos Pyrgos, in the Mirabello Gulf. This change in cooking habits, usually associated with women's role in the households, has been explained by the authors as the result of new marriages between the local population and groups from the Mirabello Gulf, in a period of intensification of exchanges between Mochlos and this part of Crete. If this fascinating hypothesis is correct, the 'foreigners' are an integrated part of the Mochlos community, epitomised by women importing to Mochlos their own cooking pots and habits. In attempting to define the type of technological change that occurred in EM IIA Mochlos, this could exemplify a *discontinuous change*, where the transmission units embodied by a social component of the community disappear and are replaced by the emergence of new ones.

In the **Cyclades**, **Berg** tackles the change in pottery production at Phylakopi, on the Aegean island of Melos, at the time of the arrival of Minoans, to understand how the cultural change occurred on the island and whether it affected the indigenous ceramic production. She clearly indicates that at Phylakopi the change was *continuous* and gradual, as the rebuilding of the town in Late Cycladic I (henceforth LC I) did not alter the trajectory of ceramic change. She states: "The rise of Minoan pottery had already been set in motion in the Middle Cycladic period with Cretan imports and the local production of Minoanising handleless cups but gathered greater speed in LC I as Minoan imports decreased and local production of an ever-wider range of Minoanising shapes filled the gap". It is only the pottery forming techniques that can express the conflict in the society of Phylakopi in LC I, where a clear separation existed between a 'traditional production', which utilises hand-made techniques to produce Cycladic shapes with Cycladic surface treatments and motifs, and a 'Minoanising production', which imitates Minoan shapes, uses the potter's wheel and decorates the vessels with Minoan-style designs. The author points that this separation in Melian society clearly expresses a conflict between those who wanted to align themselves with the Minoan culture, which was probably perceived as culturally superior, and those who preferred to continue their own traditional practices and habits.

In both the cases discussed by Choleva and Berg, the introduction of a new technological innovation into a foreign socio-cultural context produced tensions within the indigenous population. The analysis of the forming techniques in use has helped us to understand the conflict existing within the local communities who chose to adopt or reject the new technique. Both at EBA II Lekfkandi and at LC I Phylakopi, the adoption of the new technological innovations can be interpreted as a tool to negotiate a socio-cultural identity that finds its roots *abroad*, in a foreign place. At Lefkandi, this social identity is represented by the technical identity of a practice

that finds its origin in Western Anatolia, while at Phylakopi is embodied by the adoption of a forming technique (the wheel-throwing technique), which is the prerogative of the Minoan culture of Crete.

Turning to the 13th c. BC and the significant disruptions that lead to the collapse of the Aegean civilisations at the transition between the 13th and 12th c. BC – the central topic of our UCLouvain-ARC research project –, the issue of changes in pottery production within this context is approached from different geographical perspectives and various scales of analysis.

On **mainland Greece**, **Kardamaki & Kaza-Papageorgiou** first present the major pottery workshop that operated at Kontopigado in Attica from the late 14th c. BC until the abandonment of the settlement in the early 12th c. BC, *i.e.* during the Late Helladic (hereafter LH) IIIA2 to LH IIIC Early phases. This industrial installation at Kontopigado is generally linked with the expansion of the Acropolis by that time and the economic organisation of its periphery. There is evidence for two destructions at the site during the later phases of its occupation, precisely at the moment of the collapse of the Mycenaean palaces. The analysis of the pottery assemblages attempts to assess how these disruptive events may have influenced the course of the local production and how this reconstructed local scenario does or does not differ from other regional chains of events, in particular in the North-Eastern Peloponnese. The general development of pottery traditions at Kontopigado is described as continuous between LH IIIA2 and LH IIIC Early. There is evidence for the introduction of new forms and surface treatments, and an increased demand for wheel-made cooking pottery, but these are rather explained by the 'performative aspect' of production, probably suggesting influences from other regions, while the typo-stylistic features of the ceramic repertoire remain on the whole closely connected to the previous trends. The most serious change – the almost complete disappearance of the industrial vases produced at the site –, which appears in the LH IIIC Early deposits, indicates the interruption of some of the specific production activities of the Kontopigado workshops. Kardamaki & Kaza-Papageorgiou conclude that this change is better understood as a local phenomenon and that pottery production in the region of Athens was otherwise not significantly affected by the brutal political and social disruptions that shattered the LH IIIB2 Mycenaean societies, embodied by the destructions of the palaces in the Argolid and Thebes. Contextualising their main observations at the interregional scale, they highlight how a general continuity in pottery traditions at the turn of the century is observed for other Mycenaean regions as well. That the new economic and social environment after the 'crisis' favoured such a continuity may not be totally unconnected, they suggest, to the fact that the base of organisation of the earlier Mycenaean pottery workshops was not entirely dependent on the palatial system.

Lis tackles the specific and debated topic of 'Hand-made Burnished Ware' in 13th c. BC mainland Greece, a ceramic tradition related to the Subapennine culture in Southern Italy. He highlights how a common heading for hand-made traditions that are, in reality, quite diverse prevent our better and nuanced understanding of the origin and significance of these different groups. Paying close attention to all kinds of hand-made pottery, Lis demonstrates how this major technological change in pottery traditions at the end of the Late Bronze Age is *not* a uniform phenomenon but is tied to different social and economic developments. While its appearance can be quite confidently ascribed to the arrival of relatively small groups of people originating from the Southern Italian Peninsula, other pottery groups most likely result from economic stress and problems with the supply of standard Mycenaean products holding similar functions. Factors like fluctuations in the demand for cooking pottery and disruptions to established exchange networks are pinpointed to explain the interruption in the manufacture of wheel-made cooking pottery by certain workshops on the Mainland, at *different* moments of the advanced or end of the Late Bronze Age. As such, Lis is able to identify *local stories* concerning hand-made pottery, that do not, perhaps, reflect a well-defined and uniform period of trouble, but do definitely indicate *episodes* of trouble.

Vitale examines whether the technological choices in potting practices at the settlement of Mitrou (East Lokris, Central Greece) could be a significant reflection of this troubled period. His method includes the comparison of Mitrou's LH IIIB1 and LH IIIB2 Late ceramic assemblages (mature and final Palatial period) with two previous significant horizons at the site, *i.e.* LH IIA and LH IIIA2 Early (early and final Prepalatial period). The evidence shows a shift from elaborate manufacturing methods in the Prepalatial period towards less labour-intensive methods in the Palatial period. Vitale suggests that this essential transformation in pottery production corresponds to the change of status of Mitrou from an independent settlement in East Lokris to a site dominated by a nearby

palatial polity: possibly Orchomenos, and then Thebes. Significant differences also emerge between the LH IIIB1 and the LH IIIB2 assemblages, the latter characterised by an important simplification of potting practices, affecting different stages of the *chaîne opératoire*. In addition, while LH IIIB1 ceramics largely conform to the so-called Mycenaean *koine*, LH IIIB2 Late pottery shows the development of regionalism. These data reflect different socio-economic and political conditions between LH IIIB1 and LH IIIB2 Late. Vitale scrutinizes the possible factors and contextual background for the important reduction in labour in pottery production at LH IIIB2 Mitrou and for the simultaneous introduction of local preferences in the repertoire. One explanation is the growing competition between Thebes and Orchomenos over the rich agricultural Copaic Basin, a situation that leads to the hostile environment at the origin of the destruction of Gla and the general regional destabilisation. In this case, such regional political upheavals are considered to accelerate a decreasing quality in pottery manufacturing at the local scale, while regionalism probably resulted from a drop in trade networks, and then in cultural interactions, due to more insecure conditions. However, Vitale argues that these two phenomena did not involve any cessation of technological transmission in the pottery manufacturing process at Mitrou, but rather continuity.

These three case studies converge towards the identification of *continuous* changes in Mycenaean mainland pottery productions systems at the close of the 13th c. BC. As **Vitale** puts it for Mitrou, these works have shown how "a holistic approach to ceramic analysis can help in capturing periods of transition, defined as socio-political and economic transformations, but it does not provide valuable data to isolate moments of crisis and/or disruption". He also underlines that this contrasts with other forms of transmitted technological knowledge, such as the use of writing and the ability to build monumental architectural complexes, which have demonstrated *discontinuous* change at the transition of the 13th and 12th c. BC on the Mycenaean mainland.

In the **Eastern Mediterranean**, the aforementioned questions are addressed from a Cypriot and a Southern Levantine perspective.

Georgiou focuses on the transitional phase between the 13th and the 12th c. BC on **Cyprus**, investigating the temporal introduction of the potter's wheel and the dynamic processes by which it was established. Following the words of Georgiou, this transformative period on the island "saw the establishment of wheel-made finewares that principally draw on Aegean prototypes and the gradual abandonment of two Late Cypriot hand-made wares, the Base-ring and White Slip Wares". Although the wheel-made finewares were attested on Cyprus since the early 17th c. BC, the production of Cypriot finewares continued to largely defy the convenience afforded by this technique for at least four centuries. This persistence of hand-made manufacture went hand-in-hand with local wares, *i.e.* the Base-ring and White Slip Wares. The acceleration in the Cypriote production of wheel-made finewares at the end of the 13th c. BC can be explained in the contextual situation of this transformative period. First, Georgiou states that the collapse of the Mycenaean political authorities and the consequent void created by the absence of Mycenaean imports can be considered one of the reasons for the intensification (not the introduction) of the local production of Aegean-style wheel-made finewares. Second, the numerous Aegean immigrants established on the island have certainly stimulated the Cypriot ceramic production of wheel-made finewares. Finally, the establishment of wheel technologies was mainly enhanced by the increasingly urban environment of the Cypriot polities in the post-crisis era during the late 13th-early 12th c. BC. She concludes: "The Cypriot case epitomises how periods of crisis do not necessarily lead to the decay and instability of crafts, considering that amidst an otherwise critical period for the entire Mediterranean, the Cypriot ceramic industry was transformed to endorse wheel-made technology to a hitherto unprecedented extent".

Ben-Shlomo proposes to scrutinize and compare the changes observed among the local pottery traditions and the imported wares in the **Southern Levant** during the Late Bronze Age period (16th-13th c. BC). Locally produced pottery in this region is characterised by an important continuity in technology, typology and styles throughout the period. The imports are characterised by more changes. The ceramic vessels imported from Mycenaean Greece, especially during the 14th c. and the first half of the 13th c. BC (*i.e.* LH IIIA2-IIIB1 pottery), came from the Argolid, while during the latter part of the 13th c. BC there is a shift towards Mycenaean-style wares produced in and imported from Cyprus but also other Aegean areas. At the turn of the century, Mycenaean-style imports towards Levantine sites abruptly stopped. In the 12th c. BC, no substantial disruptions nor changes affected the local repertoires, except the appearance of *locally produced* Aegean-style pottery in the southern coastal plains of Israel. While this tradition is generally associated with the arrival of a new ethnic group, the Philistines, Ben

Shlomo demonstrates how this introduction of new forms and styles again did not involve any significant changes in the local production techniques. On the whole, the author observes that the crisis period of the 13th-12th c. BC transition in Eastern Mediterranean was not accompanied by any discontinuity in potting practices in the Southern Levant, but a tangible breakdown of the maritime trade exchange system. According to Ben-Shlomo, the absence of a centralised palatial economy in Southern Levant during the Bronze Age potentially favoured the very traditional nature of pottery production, in such a manner that technical methods remained particularly stable and possibly much less susceptible to drastic change in case of an economic or political crisis.

In the **Western Mediterranean**, the challenging task of providing a thorough and comprehensive overview on the 'crisis years' from a ceramic perspective in the Late Bronze Age Italian Peninsula, in particular between the late 13th and the first half of the 12th c. BC, has been remarkably taken up by **Bettelli, Borgna & Levi**. While radical changes occurred in settlement patterns and cultural practices in the Italian Peninsula towards the end of the Late Bronze Age (*ca*. 1200-1150 BC) pottery assemblages are not indicative of such a discontinuity in modes of production. Assessing and comparing the major typo-stylistic and technical developments of pottery assemblages within three distinct regional *facies* – the Terramare in the Po Plain, the Castellieri in the Northern Adriatic, and the Subapennine region of the Southern Tyrrhenian and Aeolian Islands – in close consideration to a broader range of archaeological data, Bettelli, Borgna & Levi attempt to address different hypotheses for explaining the potentially various factors that triggered the cultural discontinuity attested in the different Italian regions in the first half of the 12th c. BC. In doing so, they demonstrate how the interpretation of the adoption of foreign stylistic and technological components in potting practices requires the evaluation of a complex set of socio-economic, political, environmental and geographical variables, including the position of some cultural groups at the crossroad of many cultural systems. In particular, the locally produced Italo-Mycenaean pottery in Southern Italy, which contrasts with the local ceramic traditions by its use of fine fabrics, wheel-thrown or wheel-fashioned techniques, and firing in double-chambered kilns, is better explained in the framework of the intense and long-term relations of this region with the Aegean (the establishment and then gradual assimilation of Aegean potters) rather than in the specific context of the troubled conditions that characterised the end of the Late Bronze Age. Indeed, addressing the contrasting responses of the studied regions to possibly comparable critical circumstances in the early 12th c. BC, Bettelli, Borgna & Levi warn us against "automatically correlating transformations in ceramic technology to phases of a more general cultural discontinuity". Again, the historical and social context is crucial. Their case studies show that important technological innovations in ceramic production were more successfully adopted "within those communities that had a more stable and well-rooted relationship with their territory […] overcoming the crisis years that typify other regions of the Mediterranean and remaining essentially unharmed". Like for 13th c. BC Cyprus and Southern Levant, these archaeological contexts demonstrate how periods of crisis do not necessarily lead to the decline or destabilisation of certain crafts production activities, but on the contrary, evidence significant growths.

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2. Firing structures and transition periods in Rajasthan (India, 2005-2015)

Unstable choices before definitive selection

Valentine Roux
Simone Gabbriellini

1. Introduction[1]

In prehistory, the so-called transition periods are framed by a before and an after, periods that are culturally well-identified owing to collections of traits whose inter-site differentiation marks out spatiotemporal outlines. This allows us to characterise cultural groups and give them a cultural and sociological interpretation, that is to say, an interpretation in terms of singular and historical features on the one hand and of population structure on the other. The term 'population structure' refers to "instances where individual subpopulations/groups exhibit low within and high between variability" (Shennan *et alii* 2015: 103). In prehistory, this variability of features clearly distinguishes well-identified chrono-cultural groups. The mechanism underlying the formation of spatial configurations significant to population structure is cultural transmission, which is done by trainers, often parents, who tend to be selected within one's social group. Regarding the transmission of techniques, the consequence is that technological boundaries conform to social boundaries (Lave & Wenger 1991; Stark 1998; Gosselain 2000; 2011) thus revealing population structures.

In contrast, the transition periods, or in-betweens, are characterised by a strong variability in cultural traits, a form of 'disorder' indicated by configurations of old and new traits that do not allow cultural boundaries to be marked out clearly, preventing from any attempt at anthropological interpretation that could identify population structure. In this way, the numerous debates and controversies about transitions, such as the middle/upper Palaeolithic or the Mesolithic/Neolithic, boil down to a problem of interpreting assemblages of which the variability makes attribution to specific populations difficult (Guillomet-Malmassari 2012; Kuhn 2013; Guillomet-Malmassari 2014). Are the populations concerned the same as for the previous period – the new traits corresponding then to local adaptation, the evolution of inherited traits or interactions? Or, on the contrary, are they new populations that share traits with the old populations that live alongside them due to local adaptation and/or interactions?

The difficulty of interpreting variability in cultural and sociological terms is greater still when it is observed on both an intra- and inter-site scale, and when it affects the various cultural domains differentially (Perlès 2013). In order to understand these transition periods better and improve their anthropological interpretation, one of the questions that should be answered is what process creates a variability that succeeds in destabilising a previous form of uniformity and stability. In other words, given the mechanism of transmission that favours meaningful spatiotemporal configurations of cultural groups, the question is the following: what is the process that has for effect that the transmission of technical practices no longer produces, at a given moment, significant configurations of population structure but, on the contrary, a variability non-significant of this structure and, from this point of view, specific to the so-called transition periods?

We should be clear that in asking this question this article does not have the aim of studying the historic dynamic at work on the level of events – of a 'crisis' type – at the origin of transition periods. These dynamics are singular and intrinsically non-reproducible, and so can be studied only on a case-by-case basis. The aim, on the contrary, is to search for *regularities* by examining the process through which intra- and inter-site variability

1 This article is a revised and extended version of a French article: V. Roux & S. Gabbriellini, Structures de cuisson et période de transition au Rajasthan (Inde, 2005-2015). Des choix instables avant sélection définitive, in *Transitions historiques*, edited by C. Müller & M. Heintz, Paris (2016), 157-168. V. Roux, CNRS, UMR 7055, Maison de l'Archéologie et de l'Ethnologie, 21 allée de l'université, Nanterre 92023 cedex, valentine.roux@cnrs.fr - Simone Gabbriellini, CNRS, GEMASS, ISCC, 20 rue Berbier-du-Mets, Paris 75013, simone.gabbriellini@cnrs.fr

perturbs cultural order. In other words, this means casting light on the variability triggering mechanism and the context in which it is set off so as to raise the question of possible regularities underlying the specific dynamics that are at the origin of the so-called transition periods.

This mechanism will be studied by examining in an ethnographic context the introduction of new ceramic firing techniques of which the present consequence is a variability that no longer reflects the population structure.

1.1. Ethnographic data

The region considered is that of Jodhpur (Rajasthan, India) where the ceramic production is in the hands of Muslim and Hindu potters. Until 1987 the vessels produced and the technical systems deployed distinctly distinguished these two communities: the Muslims were specialised in producing culinary ware, the Hindus in producing storage vessels; the former used earthen wheels, paddles with V-shaped rim profiles, and open single-hearth triangular firing structures, whilst the latter used stone wheels, paddles with straight rim profile, and open multiple-hearth circular firings. In this way, the variability in the technical systems reflected the structure of the potters' population.

From 1987, just as the production reduced itself to a single vessel type (*i.e.* the white water jar) now manufactured by both communities (Roux 2015), the firing structures started to change. The kiln was introduced by a Muslim potter who had gone to work in Gujarat where kilns were used. It was then adopted, and it spread progressively inside the Muslim population in the following twenty years. The kiln also spread among the Hindu potters. However, this diffusion did not occur from interactions with their Muslims neighbours – given the well-acknowledged phenomenon of affiliation/differentiation (Roux *et alii* 2017) – but through interactions with the potters of a remote town outside the vicinity of Jodhpur. The Hindu potters' adoption of the kiln also took about twenty years. The result is that in 2015 all the potters in the Jodhpur region use kilns and the spatial variability in firing structures no longer distinguishes between the two communities of potters.

Nonetheless, there is a town, Pachpadra, which is a special case in that three firing structures are found there instead of a single one as before. In other terms, there is a case in which an intra-site variability has appeared that goes beyond the inter-sites variability of the present and previous periods. This begs the question of the cultural meaning of this variability, as this variability is all part of a trend that will ultimately result in the selection of a single firing structure.

2. The narrative of the firing structures in Pachpadra

The town of Pachpadra is a centre well-known for manufacturing water jars for more than 50 years. It is a town with a present population of about 10,000 inhabitants with a close-knit urban fabric and a potters' quarter consisting of 38 households. Nowadays, the 38 households use three firing structures (**Fig. 2.1**): five of them are open firings, 11 enclosed firings, and 22 vertical updraft kilns.

The *open firings* – circular multiple-hearth firings installed over pits and covered with shards – are the traditional firings that were used until the 1990s by all the Hindu potters in the region. They enable several hundred vessels to be fired at one time – up to about 800.

The *enclosed firings* were introduced in 1995 by the Barmer 'Small Industries Craft Organisation' (SICO), a regional organisation working to promote local crafts. Enclosed firing works on the same principle as open firing, also allowing several hundred recipients to be fired at one time. The difference is that the firings are installed on a flat surface and enclosed by a wall *ca.* 60 cm in height, sheltering the vessels from gusts of wind, with 16 to 20 openings (depending on the enclosure's diameter) allowing multiple-hearths firing at once. In order to promote enclosed firings, loans were offered to the potters for both building brick or stone enclosure and buying a new type of wheel. Few of them did so.

Fig. 2.1 The different firing structures used by the potters in Pachpadra: (top) open multiple-hearth circular firings, (middle) enclosed multiple hearts circular firing, (bottom) vertical updraft kiln (©Valentine Roux)

The introduction of the *kiln* started also in 1995 through the Rajasthan SICO, which came to Pachpadra to improve the craft industry. The kiln used was a vertical updraft square kiln with four mouths (4 x 2 m). The floor was made of metallic bars. It could contain 170 jars. Around 15 potters attended the workshop which consisted of building the kiln and firing pots. It took place at Gov's place[2]. However, it was not a success given the difficulty in controlling the fire and therefore the risks of breakage. Nobody took the kiln. By the end of 1997, representatives of SICO came to Pachpadra from Jaipur to initiate the glazing technique which requires firing in a kiln. The kiln floor was under a dome without a central pillar made of superimposed bricks laid in a first stage on jars covered with ash; it was probably the Jaipur type of kiln. Only Gov and Jag made one with the help of Puk, as the latter two were involved in construction work. However, this kiln was not a success given heating difficulties. There were too many losses. A few months later, in February 1998, the SICO representatives from Jaipur came back to Pachpadra to initiate another type of kiln, a smaller version of the kilns currently in use. The kiln's floor is made up of a central platform in the shape of a horseshoe leaning against the wall, and metal bars are placed between the wall and the platform. The workshop was held again at Gov's place. Around 20 potters attended the workshop. After the workshop, three potters made one kiln: Gov, Jag, and Nar (Gov's brother). The kilns were funded by SICO. They used Jaipur's clay for making the glazed figurines. In the end, nobody adopted the glazing technique or the new type of kiln because they did not reach expected profits. Gov used the kiln for two years only, Jag and Nar for four years. Around 2005, Jag decided to make a bigger kiln, with a capacity of 80 to 100 jars, to fire his products. The first person who followed Jag's example and built such a large kiln was Gov. He kept it for a few years but did not use it much and alternated it with open firing depending on the number of pots to be fired. He destroyed it a few years later. The adoption of the kiln by others followed mainly between 2009 and 2011.

Each of the three firing structures has its advantages and disadvantages which the potters put forward to explain why they prefer one or the other. Generally, those who choose the open firings say that they allow the firing of several hundred vessels at the same time and consequently only a single firing per month is required. Furthermore, they also asserted that it saves them from having a fixed structure that occupies space and forces them to fire regularly with only a limited number of vessels included in each firing. Those who choose the enclosed firing prefer it because the enclosure protects the firing from gusts of wind. Moreover, it circumvents the need to cover

2 Gov, Jag, Puk and Nar are abbreviations for potters' names.

the sides of the structure with shards – which saves considerable time in preparing the firing. Lastly, just like the open firings, the enclosed structure lets them fire a sufficiently large number of vessels to make only one or two firings a month. As for those who choose the kiln, they justify their choice by explaining the kiln consumes one and a half times less fuel, that preparing the firing is much quicker since it only takes two hours instead of seven, and that, lastly, the increase in the number of firings per month is not a problem for them.

2.1. The sociological composition of the potters

The potters of Pachpadra, who are all Hindus belonging to the Prajapati caste, are divided between two main endogamous sub-castes: the Bandas (18 households) and the Purubiyas (20 households). Each of these sub-castes consists of clans or *gotrā* that are exogamous. Each of these *gotrā* is formed of a varied number of lineages; a lineage groups together individuals sharing the same clearly identified ancestor and includes a certain number of households.

The Bandas and the Purubiyas each comprise an equivalent number of *gotrā*. However, the Bandas form a more homogeneous group than the Purubiyas in terms of the *gotrā* that groups the most families together. This *gotrā*, Godela, is formed of a single lineage, whereas for the Purubiyas the *gotrā* with most households comprises seven distinct lineages (**Table 2.1**).

Sub-Cast	Clan (*gotrā*)	Households	Lineages
Banda	Godela	9	1
	Kavadia	7	2
	Bidanodhan	2	1
Purubiya	Eniya	18	7
	Sinavida	1	1
	Khator	1	1
Total	6	38	13

TAB. 2.1 NUMBER OF LINEAGES AND HOUSEHOLDS PER CLAN WITHIN THE TWO SUB-CASTES OF THE TOWN OF PACHAPDRA: THE BANDAS AND PURUBIYAS

2.2. The variability of the firing structures in light of the population sociology

The three firing structures are evenly distributed between the two sub-castes (**Fig. 2.2**). Thus, ten Purubiya and Banda households possess a kiln, four Purubiya and five Banda households use an enclosure, four Purubiya and two Banda households have an open firing, while two Purubiya households and one Banda household use two firing structures among which the kiln.

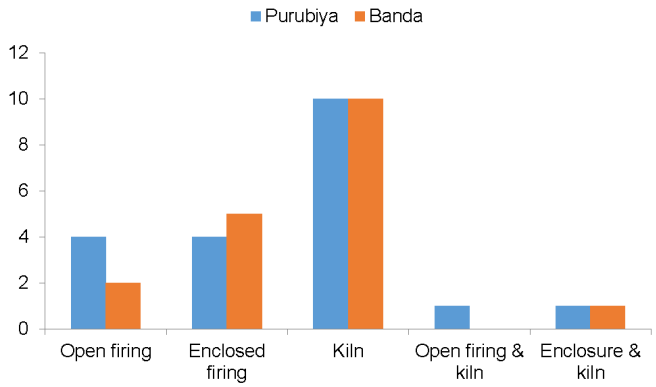

FIG. 2.2 DISTRIBUTION OF THE FIRING STRUCTURES PER SUB-CASTE (BANDA AND PURUBIYA)

The distribution of the firing structures also does not depend on the clans within the Purubiya and Banda sub-castes. **Figure 2.3** highlights the following three points:

- Intra-clan variability in firing structures exists among the Eniyas, the largest clan of the Purubiyas. The various households show five different technical situations: open firing (4), enclosed firing (4), the kiln (8), open firing and the kiln (1), or enclosed firing and the kiln (1). In the last two cases, the use of the two firing structures depends on the type of vessels to be fired, their number, and/or the season.
- This intra-clan variability of firing structures can also be observed with a Banda clan, the Kavadia. Their households show four different technical situations: open firings (2), enclosed firings (2), the kiln (2) and enclosed firing and the kiln (1).
- This variability contrasts with the uniformity of the firing structures within the Godela clan which comprises the largest number of families among the Bandas. They all have adopted the kiln.

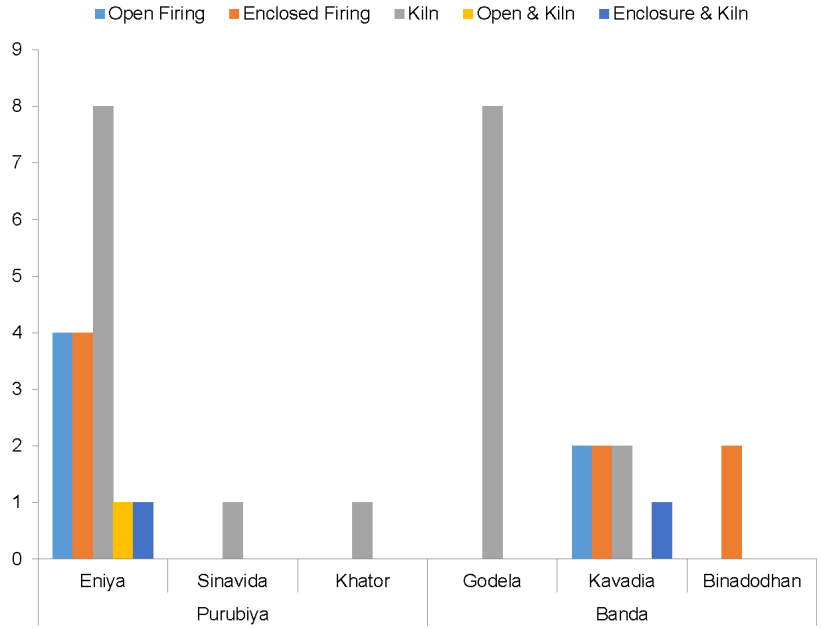

FIG. 2.3 DISTRIBUTION OF THE FIRING STRUCTURES PER *GOTRĀ* (CLAN)

3. Explaining the variability of the firing structures in Pachpadra

3.1. Material and methods

To understand the simultaneous intra-clan variability and uniformity, we examined the process of the kiln's diffusion. The kiln has become the predominant trait in the region's pottery production, now in the majority in Pachpadra, and is destined – on the basis of the evolution at regional level – to be selected in the end by all the potters. We were especially interested in understanding why the kiln diffused more widely among the Godela clan, as compared to the Eniya clan who uses different firing structures.

For this purpose, we conducted oral interviews. All the potters of Pachpadra (38 potters) were asked to reconstruct their technical history, meaning the different choices they made during their lifetime in terms of the type of production and firing techniques, including the dates of adoption of enclosed firings and/or the kiln. This allowed us to reconstruct the diffusion networks of these firing structures. Potters were also asked to make explicit whom influenced them in their choice of refusing or adopting the kiln or the enclosure, as well as the type of relationship – namely, kinship, friendship, or neighbour – relating them to the named source of influence. Parts of the interviews were also devoted to drawing complete family trees specifying kinship relationships between the

potters. Coding potters' narratives and coupling them with their family trees, it was possible to reconstruct both the advice and kinship ties relating the potters in Pachpadra.

The variability of firing structures could then be analysed in light of the adoption time of the kiln, the relationships between the diffusion, advice, and kinship networks, as well as the segmentation of the clans into lineages and the technical behaviour of the first adopters of the new firing structures.

3.2. Results

In a first stage of analysis, the adoption curves of the enclosed firing and the kiln (**Fig. 2.4**) were plotted. They illustrate how the three firing structures were progressively used in Pachpadra. The 'transition period' reached its peak in 2010-2011 when open firings, enclosed firings, and kilns were distributed evenly among the households of Pachpadra.

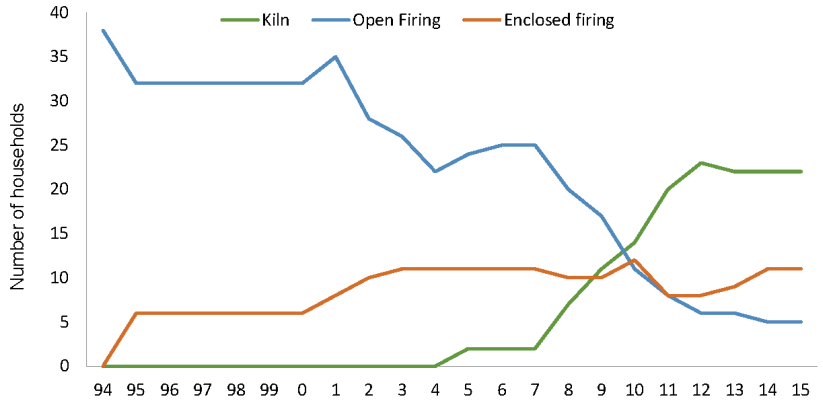

FIG. 2.4 EVOLUTIONARY CURVES OF THE OPEN FIRING, THE ENCLOSED FIRING AND THE KILN (FROM 1994 TO 2015)

The diffusion process of the kiln was then examined by comparing the adoption times of the kiln between the two sub-castes. **Figure 2.5** shows that they are comparable. From this point of view, the rhythm of the adoption of the kiln according to each sub-caste tells us nothing about what has caused the intra-clan variability.

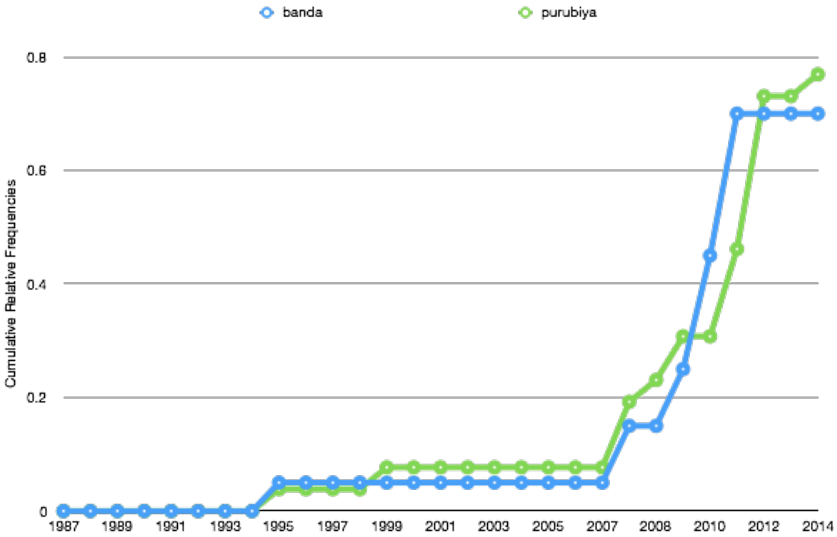

FIG. 2.5 ADOPTION TIMES OF THE KILN IN PACHPADRA ACCORDING TO SUB-CASTES (PURUBIYA, BANDA). THE X-AXIS REPRESENTS TIME, THE Y-AXIS REPRESENTS THE CUMULATIVE RELATIVE FREQUENCIES OF POTTERS THAT HAVE ADOPTED, IN THE RANGE 0 (NOBODY) TO 1 (EVERYBODY). EACH DOT REPRESENTS, FOR A SPECIFIC TIME PERIOD (X-AXIS), THE CUMULATIVE RELATIVE FREQUENCY OF POTTERS (Y-AXIS) THAT HAVE ADOPTED THE INNOVATION

Secondly, we examined the relationships between the kinship and diffusion network on the one hand, and between the advice network – the relationship network of the potters having adopted the kiln – and the kinship network on the other.

The results are as follows (**Table 2.2**):

- On the scale of Pachpadra, a statistically significant correlation exists between the kinship network and the diffusion network. This means that the adoption of the kiln mainly takes place under the influence of a potter with a family tie.
- On the scale of the sub-castes, one observes, on the one hand, that the correlation between the kinship and diffusion network is stronger with the Bandas than with the Purubiyas, on the other, that there is a significant correlation between the advice network and the kinship network with the Bandas (corr: 0.42, p-value 0.0), indicating that the Bandas having borrowed the kiln are close relatives. This second correlation distinguishes the Bandas from the Purubiyas. In other words, the Bandas tend to adopt the kiln if their parents adopt, which seems to be less the case for the Purubiyas as the source of influence of the Purubiyas is not necessarily parental.
- Lastly, at the scale of the clan one observes that the correlation between the diffusion network and the kinship network is stronger with the Godelas (Banda) than with the Eniyas (Purubiya) for which it is on the same level as in the sub-caste. The same conclusion follows than for the sub-castes: among the Godelas, the kinship ties played in favour of the diffusion of the kiln, contrarily to the Eniyas.

Sub-cast	Kinship network and diffusion network QAP	p-value	Advice and kinship network QAP	p-value
TOTAL	0.16	0.000	0.17	0.000
PURUBIYA	0.15	0.002	0.18	0.012
Eniya	0.16	0.002	-	
BANDA	0.24	0.000	0.42	0.000
Godela	0.59	0.000	-	

Tab. 2.2 Correlation coefficient (QAP) between the kinship and diffusion networks, and between the advice and kinship networks (QAP is a coefficient that measures the relations between two different matrices; p is the correlation's statistical value, significant when < 0.005)

In brief, our results show that the kiln has spread through kinship ties within the clan (Godela) which is made of a sole lineage. This is not the case with the Eniyas, a clan made of seven lineages. However, this difference in the diffusion of the kiln cannot be explained by the number of lineages. Indeed, within Gov's lineage (Eniya), the one including the most numerous households (7), kinship ties have done little for the spreading of the kiln. In the same way, one cannot invoke a difference in parental relationships between the two sub-castes: among the Kavadias, a Banda clan gathering seven households distributed between two lineages, the parental ties have not played in favour of the adoption of new firing techniques. What then do the Eniyas (Purubiya) and the Kavadias (Banda) have in common with one another but not with the Godelas (Banda)?

This puzzling question of the difference in firing structures between the Godelas, Eniyas, and Kavadias has been examined in light of the behaviour of the early adopters of the kiln and the enclosure.

As stated above, the two early adopters of the kiln in Pachpadra were Jag (Banda, Godela) and Gov (Purubiya, Eniya). However, both have a different technical story. Since building the kiln in 2005, Jag has stood by his choice. Jag is recognised as an expert and has built numerous kilns in Pachpadra for potters belonging to different sub-castes and clans. Gov is also recognised as an expert and was among the first to try the kiln. However, instead of standing by one firing structure, he kept trying different ones: he tried the enclosed firing between 2003 and 2005, then tried using a kiln between 2005 and 2009; moreover, since 2006, he has reverted to open firing which is the firing structure he currently uses.

This changing behaviour is also found with the most expert potter in the Kavadia clan (Banda), Puk. In Pachpadra, Puk was the first one to have tested the enclosed firing technique. In 2009, he tried several different sizes of kiln. He had many firing setbacks and failures; at present, he only uses the enclosed firing, keeping the kiln as a storage space.

In summary, when the initiator (Jag) successfully stands by his invention, the diffusion of the invention tends to spread widely among the kinship network through social learning. When the initiator does not stand by his invention (Gov, Puk) and tries out different techniques (marked by trials of firing structures resulting in reversions, *i.e.* returns to the initial firing structures), then a negative signal is sent, and the invention does not diffuse widely.

This difference in early adopters' behaviour explains, in particular, why the variability in firing structures is not correlated either with the sub-caste, the clan, or the number of lineages.

4. Discussion

Pachapdra is a town inhabited by potters witnessing a period of transition in firing techniques. Before 1995, only one type of firing was used, open firing. Since 2005, three types of firing are used whose distribution does not correspond to the sociological composition of the population. In the long run, and by reference to the regional situation, only one structure will be used, the kiln. In this respect, Pachpadra is a case in point for examining the mechanisms at work in the emergence of cultural trait variability at the intra-site level during a transitional period, before the definite selection of one trait.

In order to understand how variability emerged within a single location and for a limited period of time, an analysis of the variability of the firing structures was conducted.

This analysis highlights that, at the scale of Pachpadra, there is a statistical correlation between the kinship and diffusion networks, significant also at the sub-caste level with a strong correlation between the advice and kinship networks. However, this correlation concerns mainly one clan, the Bandas. Indeed, among the Eniyas and the Kavadias, kinship ties did not favour the adoption of the kiln. Differences in the number of lineages per clan cannot be taken as an explanation. Kinship ties are not acting as a facilitator even within the same lineage, whether among the Eniyas or the Kavadias.

Instead, our data suggest that the *early adopter's behaviour* had a major influence, positive or negative, to accelerate or slow down the diffusion of the new firing technique. Constant behaviour, consisting in standing by a technique, favoured the diffusion of the kiln among the Godela (Banda) with the consequence of progressively generating a homogeneous tradition within this clan. On the contrary, trial and error attitudes among the Eniyas (Purubiya) and the Kavadias (Banda), marked by reversion phenomena, slowed down the process of diffusion of the kiln with the result that technical variability increased.

These empirical observations can be explained in light of the conclusions of a recent study that relies on a unique combination of ethnographic data, social network analysis, and computational models and that has been conducted on a large scale in two different countries (India and Kenya) (Manzo *et alii* 2018). The general scope of the results obtained relies on the capacity of the highlighted mechanisms to engender the empirical curves of diffusion. According to the conclusions of this study, if those actors who are in the best structural position to spread the innovation do not consistently provide others with high-quality learning opportunities, then uncertainty and doubts about the to-be-adopted traits prevail, and network reachability and local redundancy are likely to act as diffusion obstacles rather than facilitators (Manzo *et alii* 2018). In Pachpadra, Gov and Puk's attitudes make that doubts about the kiln prevail among their parents, kinship ties acting then as diffusion obstacles rather than facilitators as shown by the high diversity of firing structures within Gov and Puk's lineages.

This mechanism entails a non-linear adoption of the new technical options and therefore a form of disorder during a certain time period accentuated by the successive appearances and disappearances of the various firing techniques on the household scale. This mechanism is opposed to that fostering gradual adoption, of a linear type, resulting in the progressive uniformity of the traits.

The non-linear adoption of the techniques has been observed in a context where various technical behaviours – acceptance versus exploration – were followed by the first expert adopters. In a recent study, it has been possible to show that the first adopters of new techniques are usually experts because they are the ones in a position to perceive the properties of the new task and therefore adopt them (Roux *et alii* 2018). In a situation where the population is exposed to different techniques, one can expect to have different reactions among the experts. Thus, in Pachpadra, on the one side, there is an innovator with a deep understanding of the properties of the kiln (Jag); the consequence is a stable behaviour and this behaviour, a positive source of influence. On the other, there are innovators with an exploratory behaviour (Gov and Puk); the consequence is a trial and error attitude and this attitude, a negative

source of influence. When these experts belong to different social segments, different rhythms of adoption of techniques are expected and therefore a high variability in technical systems for a certain time period.

The history connected to the introduction of new firing structures depends, of course, on particular circumstances and cannot be in the nature of a regularity. On the other hand, the mechanism that has generated the variability observed and the context in which it operates, can be considered general in its scope. The consequence is a variability which is not significant of 'ways of doing' specific to certain social groups.

Lastly, let us note that the variability studied here was observed at the *intra-site* scale. But a comparable variability can be envisaged at the *inter-site* scale given that comparable conditions are in place: the introduction of several technical options, the form of social heterogeneity between the settlements, and the variable innovator's strategies.

5. Conclusions

The question of the particular identity of transition periods in archaeology has been here answered in anthropological terms. These periods are characterised by the introduction of new traits inside communities in which both the ties between the individuals and the various inventors' strategies generate a variability in the adoption process with, as a consequence, a strong spatial and temporal variability in cultural traits that does not correspond to the population structure.

In other words, when several traits come into competition the coverage of the kinship networks and the initiator's strategies may have a direct effect on the selection processes and on the diffusion of the cultural traits. This leads to a variability in cultural traits for a certain time, the time of a transition, the time in which the traits are selected which *in the future* may characterise the population structure.

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3. Craft behaviours during a period of transformations

The introduction and adoption of the potter's wheel in Central Greece during Early Bronze Age

Maria Choleva[1]

1. Introduction

During the second half of 3rd millennium BC, the Helladic pottery production underwent one major technological change: the inclusion of the potter's wheel in manufacture[2]. The first examples of wheel-made pottery appeared on the Eastern Aegean islands and in coastal Central Greece during the later phase of Early Bronze Age (EBA) II (2450/2350-2200/2150 BC)[3] as part of a new pottery assemblage of Western Anatolian origin. At the transition to EBA III (2200/2150-2050/2000 BC)[4], a period of trouble and change for the Aegean communities, the new manufacturing technology was maintained and spread across various regions of the Greek mainland shaping new regional technological traditions. This major change in the history of Aegean forming techniques is integrated into the long socio-cultural transformations taking place during the late EBA. It also mirrors the complex mechanisms of technical transfers underlying the evolution of the Helladic technological systems in the context of a crisis in socio-economic structures.

This paper will focus on the modalities of appearance and on the transmission of the potter's wheel in central Greek settlements by drawing on two different case studies, Lefkandi on Euboea and Pefkakia in Magnesia. While both settlements experienced the innovation of the potter's wheel during late EBA II and present continuity in the presence of wheel-made pottery throughout EBA III, they follow two radically different trajectories in terms of integrating the new tool into the local technological systems. The aim of examining the craft practices involved in wheel-made pottery, is to reconstruct and compare the *chaînes opératoires* linked to the use of the potter's wheel within local production and to explore the pottery traditions shaped and transformed under the impact of the new technology in the course of late EBA. The identification of various craft behaviours through time will reveal different technological patterns regarding the adoption and transmission of the new way of producing pottery and will disclose differentiated socio-cultural mechanisms underlying the wheel's innovation. By adopting an anthropological view of techniques as expressions of social behaviours, this paper will bring into view the different reactions of the local communities to the profound socio-cultural changes as they are communicated through pottery production. This will be achieved by shedding light on the ways that potters establish and negotiate their social identities through craft practices within a socio-historical context of transformation and change.

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3 For absolute and relative dating, see Manning 1995: 141-153, 170-172, fig.2; 1997: 501-505, table 2; Kouka 2009: 137-140, table 4; for a discussion about the ceramic phases related to this period both in Aegean and Anatolia, see Maran 1998: 140-150, 153-159, pls 80-81; Broodbank 2000: 311, fig.1; *Şahoğlu* 2005: table 2; Wilson 2013: 410-418.

4 For absolute and relative dating, see n. 3.

2. Historical background: the appearance and dissemination of the potter's wheel in Central Greece

2.1. Late EBA II: connecting the Anatolian and the Aegean worlds

The later phase of EBA II signals the emergence of a global dynamic socio-economic phenomenon of early urbanisation and the establishment of long-distance networks of communication and exchange between the Aegean and Western Anatolia (Broodbank 2000; Rahmstorf 2006; Şahoğlu 2008; Kouka 2016; Ünlüsoy 2016). It is the period which is now characterised by terms such as the "Anatolian Trade network" (Şahoğlu 2005), "the Great Caravan Route" (Efe 2007), or "the time of change" (*Wendezeit*) (Maran 1998: 450-457). It represents an era of essential socio-economic transformations in the Aegean and Western Anatolian world that altered the socio-cultural and economic environment of the EBA communities. Those changes are manifested through major changes in the material culture on both sides of the Aegean Sea: (a) the occupation of new sites in the Greek mainland and the appearance of small short-lived fortified settlements on the Cyclades (Doumas 1988; Wiencke 1989; Broodbank 2000: 314-315); (b) the emergence of early urbanised settlements (Kouka 2002; Çalış-Sazci 2006; Parlama 2007; Kouka 2013; 2016; Bintliff 2016; Çevik & Sağır 2016) including monumental constructions, *i.e.* the fortification systems supported by horseshoe-shaped bastions (Broodbank 2000: 314-315; Wiencke 2000: 91-100; Şahoğlu 2004; Parlama 2009) or the new architectural form known as megaron (Kouka 2002; Şahoğlu 2004; 2005); (c) the appearance of new complex buildings, known as corridor houses, in the Greek mainland, considered as evidence of a more centralised organisation of the Helladic communities (*e.g.* Konsola 1986; Pullen 1986; Shaw 1987; Wiencke 1989; 2000: 185-197, 291-304; Peperaki 2004; Shaw 2007); (d) the use of administrative sealing and weight systems (Weingarten 1997; Rahmstorf 2006); and (e) the wide exploitation of new metal sources and the development of metal industries and trade (Pernicka *et alii* 2003; Rahmstorf 2006; Sherratt 2007).

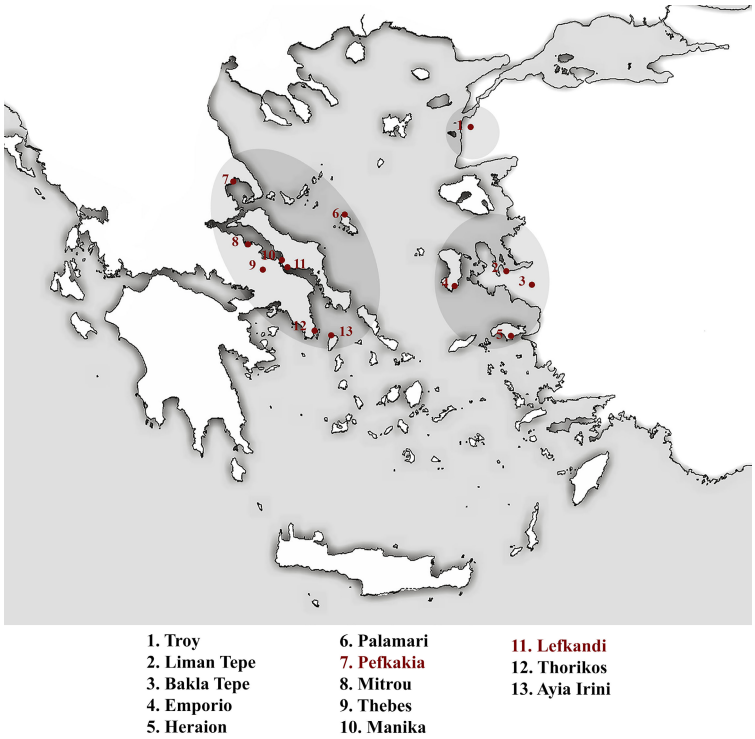

Fig. 3.1 Sites preserving EBA II wheel-made pottery (by the author)

In the context of this changing world, the intensification of contacts among Aegean and Western Anatolian communities has enabled the dissemination of common practices and knowledge leading to the emergence of a common pottery tradition. This development marked the flow of specific Western Anatolian ceramic features into the long-lived Early Helladic (EH) contexts of production. The new pottery was formed in Central and Western Anatolia in the course of the 3rd millennium BC (Türkteki 2013; Şahoğlu 2014) and was unevenly spread over the Aegean, reaching regions such as the Northern and Eastern Aegean islands, the Cyclades, and the east coast of Central Greece (Sotirakopoulou 1993:8-10, fig.3; 1997: 528-535, fig.1; Wilson 1999: 90-101; 2013; Broodbank 2000: 312, fig.103; Şahoğlu 2005: 352-354, fig.1). More concretely, the new pottery assemblage, known as Lefkandi I assemblage or Kastri group (henceforth Lefkandi I/Kastri group) includes a set of eating, drinking and pouring vessels implying new consumption habits (Rutter 1979; Sotirakopoulou 1993; Doumas & Angelopoulou 1997; Broodbank 2000: 309-312; Kalogerakou 2003; Day *et alii* 2009; Pullen 2013). It consists of dark burnished, red slipped and plain wares comprising different kinds of fine vessels: a series of shallow bowls, a variety of handled cups ('*depas*' cups, *i.e*. cylindrical two-handled goblets, bell-shaped cups, one-handled tankards), and spouted jugs (Rutter 1979: figs 1-2; 2012: fig.8.2, Şahoğlu 2005: figs 4-9; 2011: 139-140; 2014: figs 2-5). Whereas the new vessels are mainly produced by hand-building techniques, the Lefkandi I/Kastri group includes, for the first time, pottery made on the potter's wheel (Spencer 2007; Choleva 2015a; for the appearance of the wheel in Central and Western Anatolia, see Türkteki 2012: table 11; 2013). However, the wheel-made variants of the Western Anatolian vessels are not common and are currently documented in a very narrow geographical area in the Aegean, including some islands in the Eastern Aegean and some regions on the eastern coastline of Central Greece, such as Euboea, Attica, Boeotia, and Magnesia (Choleva 2015a: 151-154 with references, table 4.1) (**Fig. 3.1**).

2.2. EBA III: the era of regionalism

At the transition to EBA III, the Helladic communities experienced a period of vast changes and troubles, often manifested by abrupt and violent events (Mellink 1986; Forsèn 1992; Broodbank 2000: 324-326; Brogan 2013; Kouka 2013; Weiberg & Finné 2013). The main changes of the period can be synthesised by the following phenomena: (a) the collapse of the previous long-distance networks of trade and the breakdown of the established strategies of contacts between the Aegean and Western Anatolia (Şahoğlu 2005; Blum 2016); (b) the abandonment of settlements, especially in the Cyclades (Broodbank 2000: 320-349; Rambach 2008; Broodbank 2013; Brogan 2013); (c) the violent events in the North-Eastern Peloponnese as manifested through the destructions of monumental buildings in the Argolid and the disappearance of the administrative sealing system (Forsèn 1992: 254-257; Maran 1998: 450-457; Weiberg & Finné 2013; Weiberg & Lindblom 2014); (d) changes in settlement layouts in the Greek mainland manifested through the definite abandonment of both the megaron and the corridor house, and the concomitant gradual domination of a new architectural form known as the apsidal house (*e.g*. Banks 2013; Wiersma 2014; Weiberg & Lindblom 2014); and (e) the disappearance of the typical local EH II pottery traditions along with the decline of the Lefkandi I/Kastri group and their replacement by new shapes and wares of different origin linked with the configuration of new consumption behaviours (Rutter 1979; 1983; 1993; Maran 1987; Rutter 2008; Weiberg & Lindblom 2014). The new features in the material culture reflect the profound transformations of the previous socio-economic structures and imply new ways of organising socio-economic life along with new strategies of communication and exchange at the local and regional scale throughout the Aegean (Rutter 1988: 75-84; 1995: 648; Maran 1998: 175-193, 277-285; Broodbank 2000: 320-349). The reasons for this mutation from EBA II to EBA III have long been debated; the narratives include hostile invasions, migrations from the North and the East, movements of people, climatic changes, environmental degradation, deficiency of raw materials, socio-economic and political destabilisation throughout the Eastern Mediterranean (for an overview of the different scenarios, see Forsèn 1992; Weiberg & Finné 2013). While the definition of the causes of this profound crisis at the end of EBA II is still open to question, it is now acknowledged that the changes of this period reflect the outcome of a long process of transformation including the profound reorganisation of the EBA Helladic communities (Maran 1998: 460).

While late EBA II seems to be a period of extended interactions between the Aegean and Western Anatolian communities, characterised by a high degree of social complexity, centralised organisation and craft specialisation,

EBA III marks a shift towards different socio-economic strategies of subsistence which are instead based on the household economy. This change in subsistent strategies is especially evident on the Greek mainland (Rutter 1993: 26-29; Spencer 2007: 191-201; 2010; Weiberg & Finné 2013; Weiberg & Lindblom 2014) and favours the regionalism of pottery production (Rutter 1988: 83, 1995: 648). The regional character of the pottery is so salient that Joseph Maran (1998: 277-282) distinguished five regional groups: (1) North-Eastern Peloponnese, (2) Western Peloponnese, (3) Euboea-Magnesia-Skyros, (4) Boeotia, and (5) Cyclades. This phenomenon is mainly expressed in the field of stylistic predilections manifested through different wares, *i.e.* visually heterogeneous products distinguished by discrete stylistic choices (Rutter 1982; 1983; 1988; 1993: 26-29; 1995: 627-635; Maran 1998: 276; Nakou 2007; for an overview see Forsèn 1992: 210-22). However, this stylistic diversification, considered to be an expression of regional particularities and a sign of different production units coexisting within the same community (Rutter 1993: 26-29), occurs within a common range of new tableware shapes which appear at the beginning of EBA III and are unevenly distributed over the Greek mainland. The new pottery assemblage mainly consists of a series of fine vessels such as cups, tankards and bowls (Rutter 1979: figs 3-8; 1983: figs 1-4; Maran 1998: 280-282, 319-320, pl. 29:1-10) which are viewed as the outcome of a long hybridisation process, a fusion, merging different potting traditions through time (Rutter 1995: 648-649; 2012). One manifestation of this phenomenon is the techno-morphological evolution of the previous Lefkandi I/Kastri group which, at its crossing with the EH traditions in Central Greece, resulted in a new pottery assemblage diffused throughout the Greek mainland (Rutter 1979:10-13, 15; 1983: 349-353; 1995: 648-650; 2012: 77-78, figs 8.3-8.9).

Among the salient features of this hybridised pottery is the use of the potter's wheel which is now universally associated with the new pottery assemblage shaping innovations in technological practices at the local level. Through the new vessels, the tool is spread over the Greek mainland appearing for the first time in the North-Eastern Peloponnese (Rutter 1983; 1995: 464-466; Spencer 2007: 167-170; Choleva 2012). It continues to be used on the eastern coastline of Central Greece as confirmed in all the regions that were affiliated with the Lefkandi I/Kastri group during EBA II (Maran 1987; Choleva 2015a: 192-193 with references) (**Fig. 3.2**). In this area, its exploitation is strictly connected with new morpho-stylistic types, mainly the fine grey burnished two-handled cups and the buff to reddish hemispherical bowls, the latter being the hallmark of the new pottery tradition characterising regions such as Euboea and Magnesia (Maran 1987; 1998: 280-282).

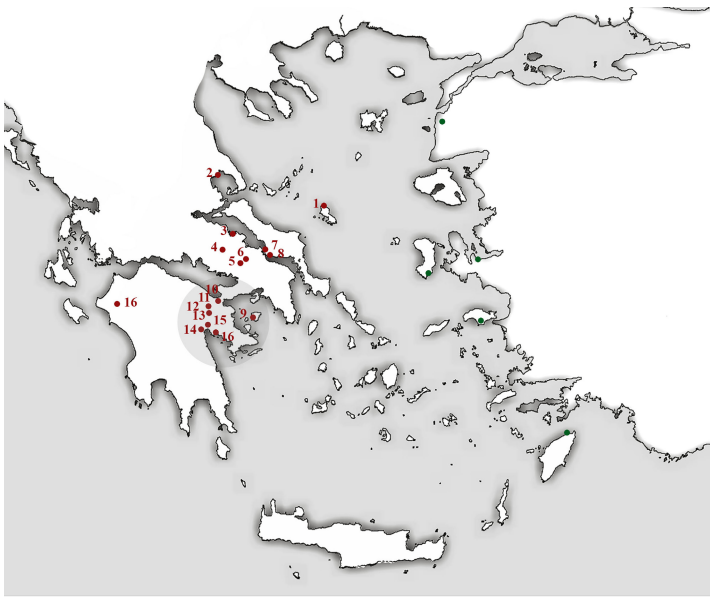

FIG. 3.2 SITES PRESERVING EBA III WHEEL-MADE POTTERY (BY THE AUTHOR)

3. Theoretical background: the potter's wheel as evidence of social practice

3.1. Reconsidering the use of the potter's wheel

The pioneering work of Valentine Roux on the appearance of the first wheel-made pottery in the Levant (late 5th-4th millennium BC) altered our outlook on the history of the potter's wheel. By revising the techno-economic determinism of the traditional interpretation which associated the appearance of the wheel with the invention of the wheel-throwing technique (throwing from a lump of clay) and attributed the use of this tool with a series of techno-functionalist properties such as efficiency, standardisation, and intensification in pottery production (for an overview see Roux & Courty 1998: 747-748), this study showed a more complex and dynamic process of technological innovation and a non-linear trajectory of adopting the potter's wheel (Roux 2003; 2008; 2010b). More precisely, the Levantine wheel-made pottery was the outcome of hybrid manufacturing techniques according to which the potter's wheel, and its associated Rotational Kinetic Energy (henceforth RKE), is exploited within the coiling technique. This in order to facilitate the different operations of the roughing-out and/or the pre-forming stages (Courty & Roux 1995; Roux 2003; 2009; Roux & Courty 1998; 2005; Roux & de Miroschedji 2009) (**Fig. 3.3**). The identification of this wheel-fashioning technique, as well as the various wheel-coiling methods, delineated a sinuous trajectory throughout time and space in the innovation of the potter's wheel and it thus encouraged scholars to reconsider the appearance of the potter's wheel according to specific archaeological contexts.

	Forming the coils	**Joining the coils**	**Thinning the rough-out**	**Shaping the rough-out**
Method 1	Without RKE	Without RKE	Without RKE	With RKE
Method 2	Without RKE	Without RKE	With RKE	With RKE
Method 3	Without RKE	With RKE	With RKE	With RKE
Method 4	With RKE	With RKE	With RKE	With RKE

Fig. 3.3 The four wheel-coiling methods (after Roux & Courty 1998: fig. 1, table 1)

In this framework, the results of different research efforts in the Aegean (for an overview, see Knappett 2016), aligning with those in the prehistoric Levant, have revealed that the wheel-fashioning technique was either the unique manufacturing process for producing wheel-made pottery in the Early and Middle Bronze Age Aegean (for MBA North-East Crete see Jeffra 2011; 2013; for EBA coastal Western Anatolia, Eastern Aegean and Greek mainland see Choleva 2012; 2015a, 2015b; for MBA Argolis, see Philippa-Touchais *et alii* 2011) or it represents a wheel-based craft practice that coexists with the wheel-throwing technique (for MBA Knossos, see Berg 2008; 2009; for MBA Phaistos, see Caloi 2011; for EBA Western Anatolia, see Türkteki 2014; for EBA-MBA Greek mainland see Spencer 2007). Despite their contradictory results, these studies underline the variability in the ways of inserting the tool into *chaînes opératoires*. This brings into focus the complexity and social dynamics of the processes of adopting this major technological innovation, marking a rupture in the continuum of the long-lived hand-building practices in the prehistoric Aegean (*cf.* Roux 2003).

3.2. The different ways of using the potter's wheel: skills, practice, identities

Each *chaîne opératoire*, *i.e.* the operational sequence though which raw materials are transformed into objects (Schlanger 2005), reflects a holistic craft behaviour that is built upon the acquisition of specialised motor and cognitive skills internalised through learning and practice (Roux 2010a; Roux & Brill 2002). The potter's wheel, as a novel mechanism with its own properties and physical modalities, triggers new qualities in the craft praxis and

implies a qualitative jump in the history of forming techniques, in terms of cognitive, sensory and motor abilities (Roux 2003; 2010b; 2011). Its mastery is difficult, requiring highly specialised and complex gestures, which vary depending on the operation of the manufacturing process in which RKE is involved. Apprenticeships demand long, permanent and intense *physical* contact between potters since a mastery of this tool cannot be obtained and transmitted through simple imitation or observation of the technical task (Roux & Corbetta 1990; Gandon *et alii* 2011).

The close interaction between people and the relational framework into which each transmission and practice of knowledge is inevitably incorporated (Lave 1996), transforms the craft behaviour into social practice (Lemonnier 1993; Creswell 2003; Schlanger 2009). From this perspective, the craft behaviours do not reflect a neutral set of technical operations. They are built upon a range of technological choices indicating ad hoc "local definitions" that each community confers to the craft actions (Gosselain & Livingstone Smith 2005: 42). As such, they express culturally and socially grounded practices (Dobres & Hoffmann 1994; Dietler & Herbich 1998; Gosselain 1998; 2008). In this light, each *chaîne opératoire* corresponds to fixed craft behaviour reflecting not only the particular ways of producing material culture but also the particular ways of conceptualising and perceiving the material world, indicative of a specific social and cultural context (Gosselain 2000; Roux 2010a). It is the material manifestation of the *mappa mundi* (Lemonnier 1993: 4, 9; Van der Leeuw 1993: 241-242), infused in the craft actions through the social processes involved in the learning and transmission of skills and knowledge (Sigaut 1991; Gosselain 2011a; Gosselain & Livingstone Smith 2005). These common and rooted ways of producing and conceptualising the material culture, or *habitus* enacting the craft praxis (Dietler & Hoffman 1994), shape the technological traditions that fix technical identities through time and space (Roux 2007: 165). These traditions, consolidated and transmitted through the socialisation and the participation processes taking place within a community of practice (Wenger 1998; Lave & Wenger 1991), correspond to social groups that weave their technical identity with the socio-cultural meanings in the making. It is on the ground of the craft practice that each community as a social entity constitutes, transmits and negotiates its socio-cultural identity (Minar & Crown 2001: 370-373; Gosselain 2000: 192-193; 2011b; Sigaut 1991: 40-41; 2011: 203-207). From this perspective, the different ways of using the potter's wheel within a *chaîne opératoire*, each one implying different degrees of specialised gestures and representing distinct sets of motor and cognitive skills indicating levels of RKE mastery (Roux & Courty 1998), suggest specific craft behaviours shaped and transmitted within particular social contexts of apprenticeship. These behaviours are founded on a coherent set of technological choices (selection of the raw material, forming and finishing techniques, firing processes) that shape discrete technological traditions, thus delineating, in turn, the borders of particular socio-cultural identities embedded in the tool's knowledge.

4. Technological innovation and transmission during a period of socio-cultural transformation: two different case studies from Central Greece

Through the identification of the *chaînes opératoires* underlying wheel-made pottery, the aim of the technological study[5] applied to the ceramic assemblages coming from Lefkandi (local phases 1-3) on Euboea and Pefkakia (local phases EBA 7 and MBA 1-3) in Magnesia is to elucidate the modalities of appearance and transmission of the new craft practice in coastal Central Greece during late EBA II and EBA III by focusing on the different reactions of the local communities to the innovation of the potter's wheel. The adopted methodology is based on: (a) an extended visual inspection on the local ceramic assemblages which enabled the identification of the pottery made on the potter's wheel; (b) the *chaîne opératoire* approach which encouraged the reconstruction of the different stages involved in the manufacturing process on the basis of the observation and analysis of the macro-features that are diagnostic of the different operations; and (c) the identification system established by Valentine Roux which enabled recognising different wheel-fashioning methods (Courty & Roux 1995; Roux & Courty 1998; for a detailed description of the methodology applied, see Choleva 2012: 351-358; Choleva 2015a:112-130). Provided that the different ways of using the potter's wheel correspond to different technical knowledge and that each technical identity grounded on this knowledge is founded on a coherent set of technological choices, the aim is

5 This study was a part of PhD research aiming to explore the origins and the modalities of appearance of the potter's wheel in different regions of the Aegean world during late EBA II and EBA III (Choleva 2015a).

to distinguish different technological traditions, indicative of specific social contexts of learning and hence of particular communities of practice.

4.1. The potter's wheel at Lefkandi: transferring and transmitting craft behaviours

4.1.1. EBA II: transferring the potter's wheel

Lefkandi is located on the western coast of Euboea and it was first inhabited during late EBA II (Lefkandi 1) (Popham & Sackett 1968: 5-6). It is a settlement very strongly affiliated with the Western Anatolian world in terms of material culture (Spencer 2007: 109-130). More precisely, from the very beginning, the Anatolian pottery dominates and represents over 40 % of the total pottery assemblage of phase 1 (Spencer 2007: 125-26, 166; for the recording pottery problems, see Spencer 2007: 112-116, note 91). The wheel-made pottery has at once a coherent and systematic presence in the settlement. On the one hand, the use of the potter's wheel is exclusively associated with the Lefkandi I/Kastri group and occurs in a variety of buff to reddish plain shallow bowls (Popham & Sackett 1968: 8; *cf.* Spencer 2007: 120-121, 166, fig.4.16). The most popular variants are (a) the so-called flaring bowls, a particular type with strong North-Eastern Aegean roots (Blegen *et alii* 1950: 225-226, pls 372-374) that, in its wheel-made version, has so far only been identified at Lefkandi, and (b) the concave or straight-sided bowls, which, in turn, are the hallmark of the wheel-made pottery that dominates in Central Greece during late EBA II (**Fig. 3.4**). On the other hand, the wheel-made pots exceed 46 % of the Lefkandi I/Kastri shallow bowls, whereas they represent ±17 %[6] of the total pottery production of the phase, a very high percentage when compared with the scarce quantities of wheel-made pots at other central Greek sites (Spencer 2010: 646; Choleva 2015a: 155-177, 394 with references).

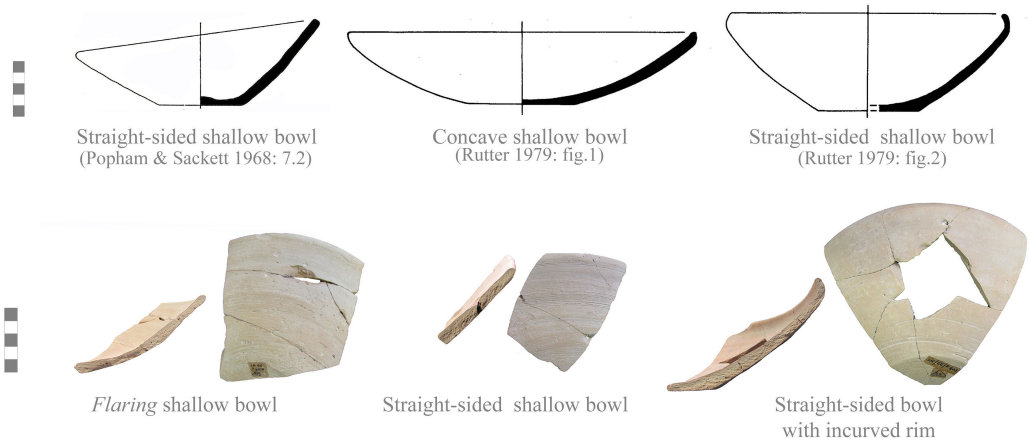

Fig. 3.4 The main wheel-made repertoire at EB 2 Lefkandi (photos by the author)

According to the results drawn from the technological study, the wheel-made pottery is produced through two distinct *chaînes opératoires*, implying two different methods of the wheel-coiling technique:

Chaîne opératoire Lef/CO.1 (**Fig. 3.5**): This *chaîne* is based on the wheel-coiling method known as Method 3 according to the classification system of Roux and Courty (1998: 748, fig. 1). RKE is used from the primary stages of the forming sequence. Once the coils are placed, RKE is exploited for joining the coils, thinning the walls and shaping the rough-outs. The pots made according to Method 3 are strongly transformed by RKE. Method 3 is the most difficult method of the wheel-coiling techniques because the potter has to deal with the crucial operation of pulling the walls up and it suggests the acquisition of highly specialised motor skills (Roux & Courty 1998: 750). Once the roughing-out is achieved, the surfaces are wiped by RKE. When leather hard, the pots are then upturned

6 The percentages are drawn from Spencer 2007 and the technological analysis of the unpublished material carried out by the author.

in order to treat, by turning (*i.e.* shaving by RKE), both the lower part and the base. Then, the surfaces are left as they are. Less often, they are smoothed or on rare occasions slipped, without using RKE (**Fig. 3.6**). The clays used are fine and well-levigated, sometimes including large inclusions, while the buff-reddish colours both of surfaces and fabrics suggest a high control of oxidised firing. This *chaîne opératoire* is used to produce flaring bowls, and concave/straight-sided bowls with simple or incurved rims.

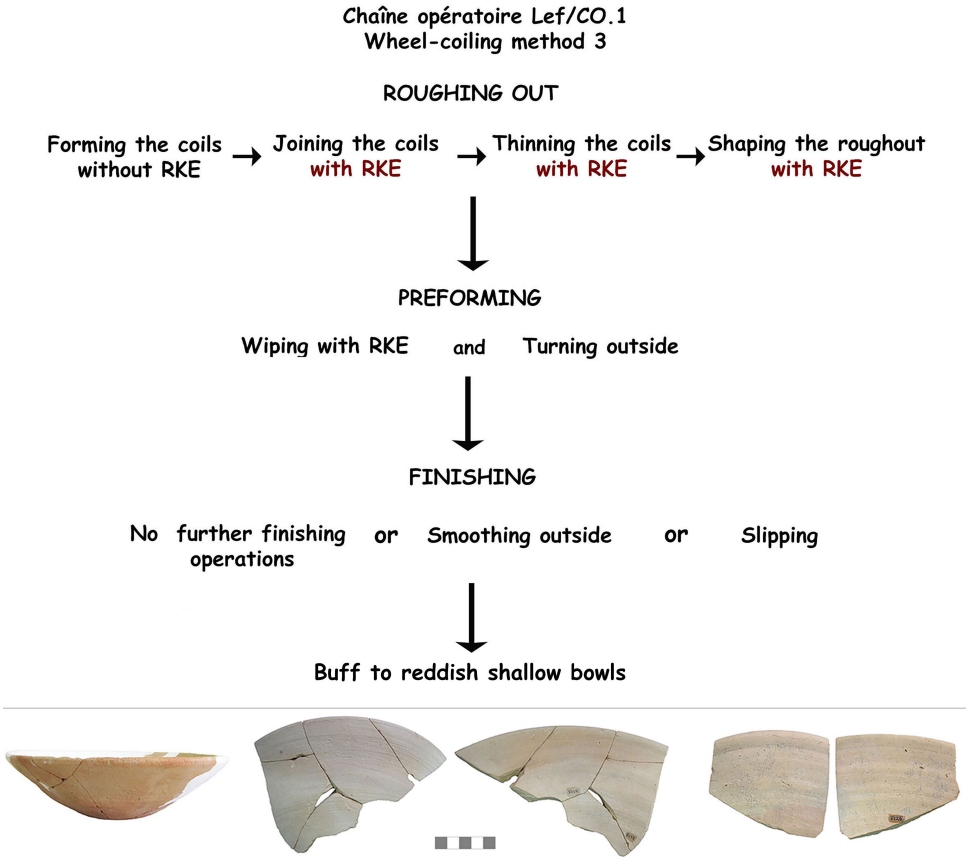

FIG. 3.5 THE MAIN OPERATIONS OF THE *CHAÎNE OPÉRATOIRE* LEF/CO.1 DURING LATE EBA II (PHOTOS BY THE AUTHOR)

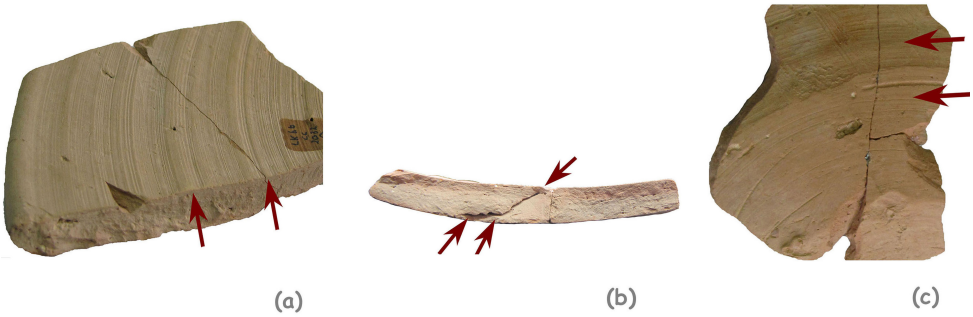

FIG. 3.6 DIAGNOSTIC MACRO-FEATURES OF THE *CHAÎNE OPÉRATOIRE* LEF/CO.1 (EBA II): A) RILLING AND GROOVES, INDICATIVE OF THE WHEEL-COILING METHOD 3 (INTERNAL FACE); (B) COIL JOINTS IN SECTION (HORIZONTAL AXIS); (C) WIPED UPPER SURFACE BY RKE (ABOVE), TURNED LOWER SURFACE (BELOW) (PHOTOS BY THE AUTHOR)

Chaîne opératoire Lef/CO.2 (**Fig. 3.7**): This *chaîne* is founded on the so-called wheel-coiling Method 2 (Roux & Courty 1998: 748, fig.1). According to this method, RKE is used during the later stages of the operational sequence and, contrary to the previous Method 3, it implies less specialised gestures. The coils are formed and joined by discontinuous pressures. RKE is incorporated into the operational sequence once the coils are joined and it is only used for thinning the coils and shaping the final rough-outs. The transformation of the walls by RKE is moderate implying the compression of the walls on the wheel whereas the surfaces of the pots are only slightly modified by RKE. For the preforming operations, the pots are wiped by RKE when humid. They are then smoothed outside when leather hard without RKE (**Fig. 3.8**). The surfaces are usually left as they are or, rarely, slipped. The clays are fine and well-levigated, and the highly controlled oxidised firing produces buff/pink/orange colours. This *chaîne opératoire* only includes concave/straight-sided bowls with simple or incurved rims.

Fig. 3.7 The main operations of the *chaîne opératoire* Lef/CO.2 during late EBA II (photos by the author)

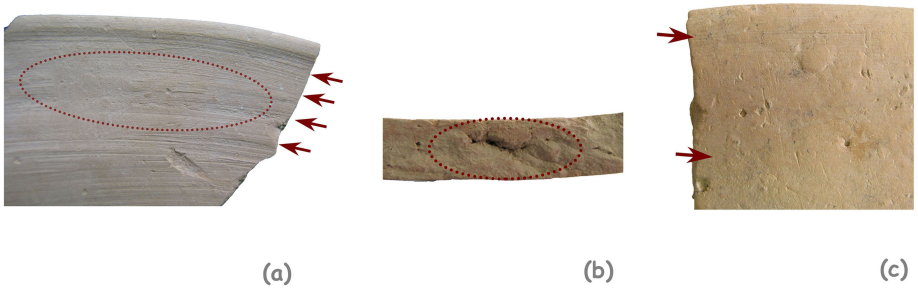

Fig. 3.8 Diagnostic macro-features of the *chaîne opératoire* Lef/CO.2 (late EBA II): a) irregular micro-relief and horizontal striations running around the internal face, indicative of the wheel-coiling Method 2; (b) coil joints in section (vertical axis); (c) striations due to the wiping by RKE (above), covered by the smoothing of the surface (below) (photos by the author)

The identified *chaînes opératoires* are devoted to the manufacture of stylistically and morphologically similar products (buff to reddish plain shallow bowls). As the fabric analyses undertaken by Lindsay Spencer (2007: 166, fig.4.12) have already shown, these are, in their majority, locally made. The local provenance of the clays as well as the high percentages of wheel-fashioned pots at Lefkandi 1 suggests the local use of the potter's wheel. In parallel, the coexistence of two distinct *chaînes opératoires* linked to the same pottery production but founded on a differentiated wheel's knowledge reflects two discrete craft behaviours which are distinguished on the basis of a distinct type of motor skills, implying different degrees of RKE mastery. However, the two craft behaviours do not have the same impact on the local technological system (**Fig. 3.9**). Although the *chaîne opératoire* based on the Method 2 (Lef/CO.2) is clearly identified within the wheel-fashioned production, its presence provides no evidence for a well-established and coherent practice. Its percentages are limited (16 % of the wheel-fashioned pottery) whereas the produced shape repertoire is non-systematic including only some straight-sided/concave shallow bowls. On the contrary, the *chaîne opératoire* linked to Method 3 (Lef/CO.1) implies a standardised technical identity which is expressed through (a) the dominance of this particular wheel-coiling method, (b) its association with a great variety of shallow bowls and hence its systematic use within the local wheel-fashioned production, and (c) the coherence of the technological choices involved (clays, forming and finishing techniques, firing, shapes). From this perspective, it suggests a fixed craft behaviour, indicative of potters who share a common technological tradition, whereas the marginal *chaîne* of Method 2 that belong to the same tradition, implies either a distinct but limited coexistent craft behaviour enrolled into the same context of production (*e.g.* learning?) or an idiosyncratic differentiation within the same technological tradition.

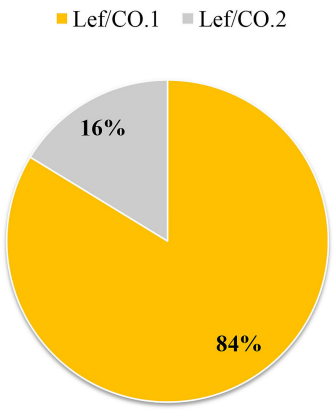

Fig. 3.9 Distribution of wheel-based *chaînes opératoires* during late EBA II at Lefkandi (by the author)

In any case, the appearance of the potter's wheel as a component of a specific technological tradition coincides with the dynamic flow of Western Anatolian ceramic features at Lefkandi. The Western Anatolian origin of this tradition is documented through two different ceramic features that reveal the transfer of the new craft practice from Western Anatolia. On the one hand, the potter's wheel is exclusively associated with the Lefkandi I/Kastri group and especially with the typical Western Anatolian buff to reddish plain shallow bowls. On the other hand, the technological study of different ceramic assemblages across the Aegean has showed that the wheel-coiling Method 3 is the most common way of using the potter's wheel within late EBA II pottery production in the Eastern Aegean islands (Heraion on Samos, Emporio on Lesvos, and Palamari on Skyros) and the littoral Western Anatolia (Troy) (Choleva 2015a; 2015b). It seems that a common and well-defined craft behaviour, based on a particular and highly specialised knowledge of the wheel (Method 3) and on a specific range of *chaînes opératoires* is shaped and diffused during the late EBA II in the eastern part of the Aegean world (Choleva 2015b: 204-273). It thus suggests the activity of specialised potters trained in the Western Anatolian technological tradition. In this framework, the dissemination of this tradition, via the multidirectional connection network developed during this period between the Aegean and the Western Anatolian communities, is probably responsible for the appearance of the potter's wheel at Lefkandi along with its early occupation.

4.1.2. EBA III: maintaining and appropriating the potter's wheel

During the transition to EBA III, Lefkandi participated in the socio-cultural transformations of this period and experienced essential changes in pottery production (Popham & Sackett 1968). The Lefkandi I/Kastri group begins to drastically decline and is replaced over the course of EBA III (Lefkandi phases 2 and 3) by the new morpho-stylistic types characterising the new regional tradition spreading over Euboea-Magnesia-Skyros (Maran 1987; 1998: 28-282). The new assemblage at Lefkandi represents a third of the total EBA III pottery production[7] and consists of a variety of buff to reddish (plain) and fine grey burnished (proto-Minyan) bowls and indicates major technological innovations in pyro-technology (control of reduced firing) and in finishing techniques (particular way of burnishing). However, despite these radical changes in production, the continuity in the field of the forming techniques is salient: the use of the potter's wheel is not only maintained but it drastically increases representing 24 % of the total pottery assemblage during Lefkandi 2 and reaching 40 % during Lefkandi 3 (Spencer 2007: 120, 169, 301, fig. 4.15) (**Fig. 3.10**).

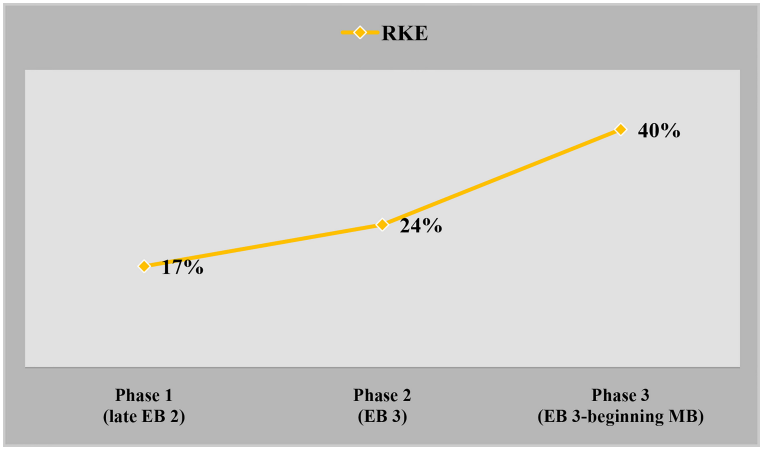

Fig. 3.10 Distribution of wheel-made pottery over the three EBA II-III phases at Lefkandi (by the author, based on Spencer 2007)

The potter's wheel is used, once again not *arbitrarily* but in a very precise way. It is exclusively associated with the production of the new shapes, especially the two-handled cups (kantharoi and Bass bowls, *i.e.* two-handled bowls with everted rim), a variety of small hemispherical bowls (with flattened or everted rims and S-profiles) and very rarely small closed vessels, all occurring in the fine grey and buff to reddish wares (*e.g.* Popham & Sackett 1968: figs 8-9) (**Fig. 3.11**). The new hemispherical bowls, especially the buff to reddish variants are seen as the evolution of the Lefkandi I/Kastri wheel-made shallow bowls and are typical of the regional pottery tradition of the coastal Central Greece (Maran 1987; 1998: 280-282, 319-320, pl. 29:1-10).

During Lefkandi 2 and 3, the potter's wheel is always exploited as part of the coiling technique whereas its knowledge is mainly maintained through the transmission and the standardisation of the wheel-coiling Method 3. While the previous *chaîne opératoire* of Method 2 (Lef/CO.2) is still documented in a very occasional way, associated with the sporadic production of some buff to reddish pots[8], the vast majority of wheel-fashioned pots are produced by the long-lived *chaîne opératoire* Lef/CO.1 and the innovative *chaîne* Lef/CO.3, both founded on the wheel-coiling Method 3.

7 The percentages are drawn from Spencer 2007 and the technological analysis of the unpublished material carried out by the author.
8 This *chaîne* will not be presented in details given its very scarce presence.

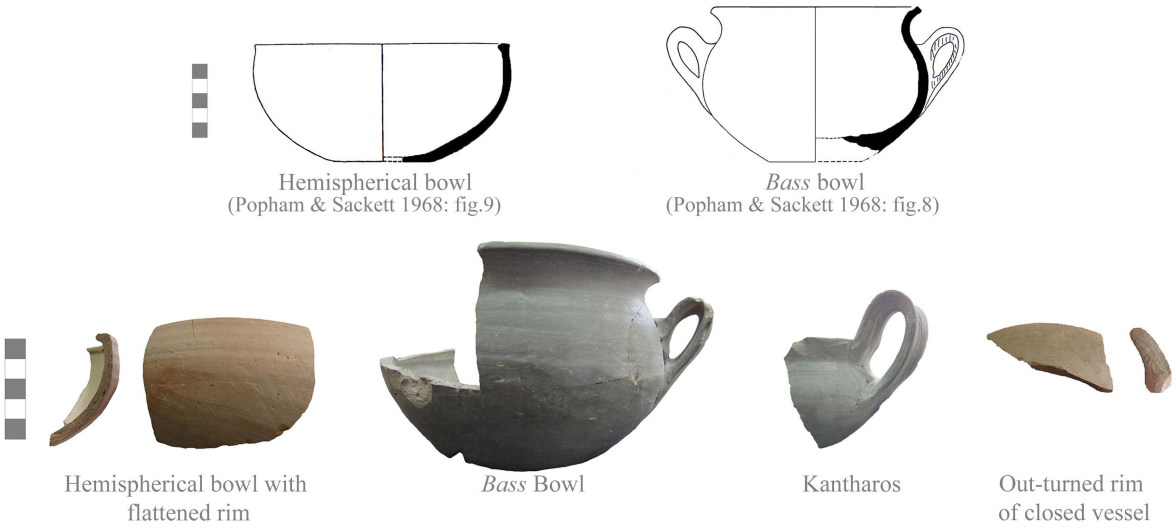

FIG. 3.11 THE MAIN WHEEL-MADE REPERTOIRE AT EBA III LEFKANDI (PHOTOS BY THE AUTHOR)

Chaîne opératoire Lef/CO.1 (**Fig. 3.12**): this *chaîne* is *directly* inherited from the previous period and is based on the technological choices developed over the course of EBA II (use of fine, well-levigated clays, roughing-out by the wheel-coiling Method 3, wiping and turning by RKE, oxidised firing). However, the majority of the pots are now smoothed when leather hard and, sometimes, burnished without RKE (**Fig. 3.13**). This way of doing pottery entails buff to reddish pottery, which now includes the new variety of hemispherical bowls and cups.

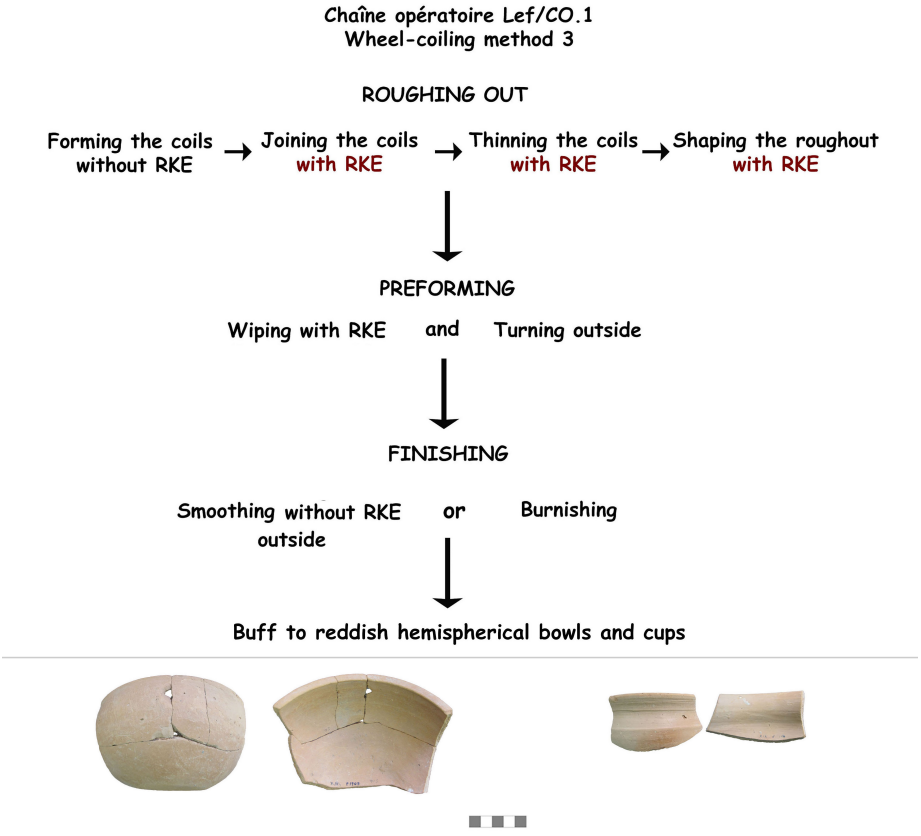

FIG. 3.12 THE MAIN OPERATIONS OF THE *CHAÎNE OPÉRATOIRE* LEF/CO.1 DURING EBA III (PHOTOS BY THE AUTHOR)

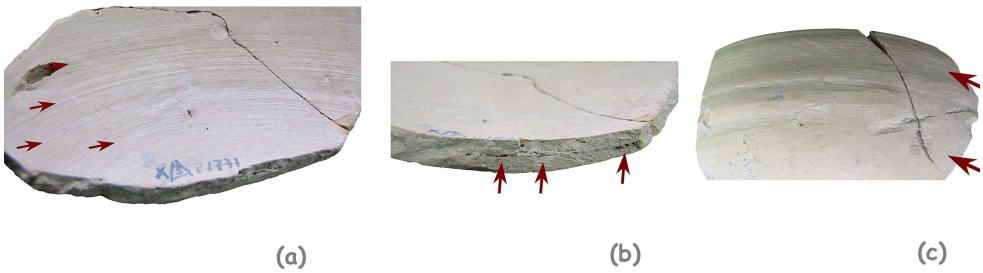

FIG. 3.13 DIAGNOSTIC MACRO-FEATURES OF THE *CHAÎNE OPÉRATOIRE* LEF/CO.1 (EBA III): A) RILLING AND GROOVES, INDICATIVE OF THE WHEEL-COILING METHOD 3 (INTERNAL FACE); (B) COIL JOINTS IN SECTION (HORIZONTAL AXIS); (C) WIPED UPPER SURFACE BY RKE (ABOVE), SMOOTHED LOWER SURFACE (BELOW) (PHOTOS BY THE AUTHOR)

Chaîne opératoire Lef/CO.3 (**Fig. 3.14**): this new *chaîne opératoire* is also based on the wheel-coiling Method 3 and follows common forming operations such as those of the preceding chaîne. Once the coils are formed, RKE is used for joining them, thinning the walls and shaping the rough-out. As for the products of Lef/CO.1, the ones of the present *chaîne* are strongly transformed by RKE. For the performing operations, the RKE is also used in order to facilitate the wiping of the surfaces when still humid. However, the main differences between the two *chaînes opératoires* lie in the preforming and firing techniques. In that case, the surfaces (especially the external ones) are systematically burnished when leather hard (**Fig. 3.15**). Moreover, the innovative reduced firing is here used and confers the typical grey uniform colour both to the surfaces and fabrics. The morpho-stylistic typology achieved consists of fine grey cups with or without handles and, less frequently, hemispherical bowls with flattened rim.

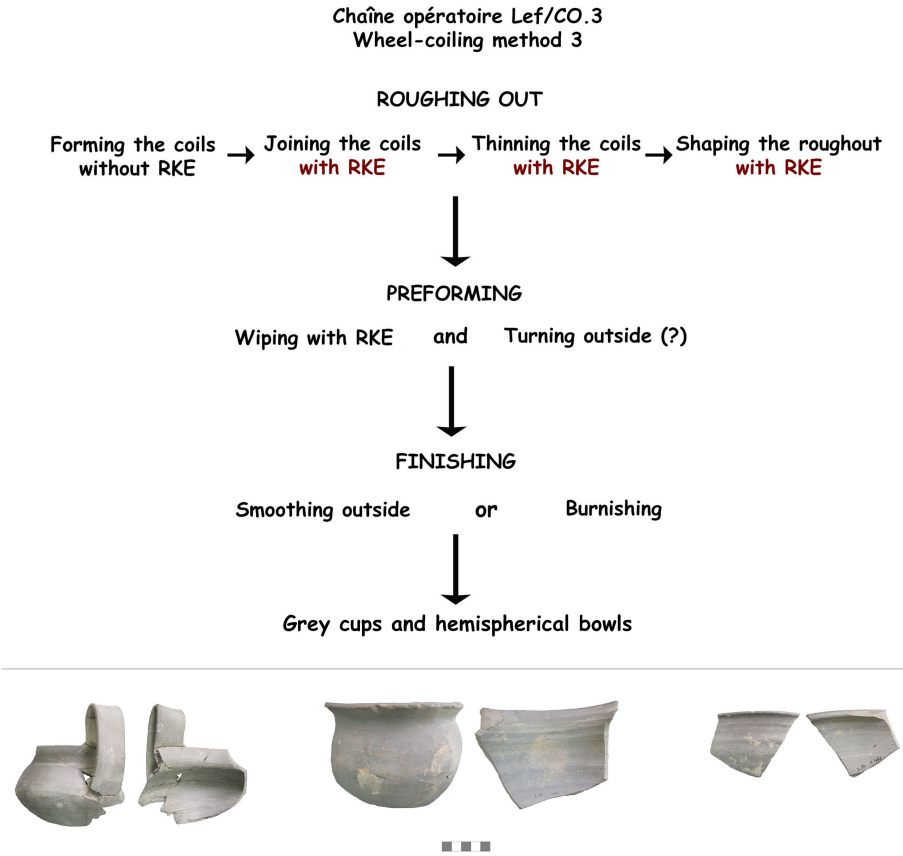

FIG. 3.14 THE MAIN OPERATIONS OF THE *CHAÎNE OPÉRATOIRE* LEF/CO.3 DURING EBA III (PHOTOS BY THE AUTHOR)

Fig. 3.15 Diagnostic macro-features of the *chaîne opératoire* Lef/CO.3 (EBA III): a) rilling and grooves, indicative of the wheel-coiling Method 3 (internal face); (b) coil joints in section (horizontal axis); (c) striations due to the wiping by RKE (above), covered by burnished surface (below) (photos by the author)

The dominant *chaîne* Lef/CO.1, along with the marginal *chaîne* Lef/CO2, both devoted to the production of the same pottery (buff to reddish bowls), imply the maintenance and perpetuation of the previous Western Anatolian technological tradition in the new context of production (**Fig. 3.16**). This tradition resisted the radical changes in pottery and was redefined by adapting to the new morphological predilections of the period. In these new vessels, one can recognise the craft behaviours developed during the previous period and identify a well-established community of practice, which produces, maintains and transmits its traditional ways of doing pottery over time. At the same time, the *chaîne opératoire* Lef/CO.3, including the new grey pots, represents the malleability of the local technological milieu against the new intentions in pottery consumption behaviours. This *chaîne* is the outcome of a fusion of the traditional knowledge of the wheel (*i.e.* wheel-coiling Method 3) and the new technological innovations (*i.e.* particular burnishing of the surfaces and use of reduced firing atmospheres), resulting in the emergence of a new craft behaviour.

The two dominant *chaînes opératoires* founded on the wheel-coiling Method 3 (Lef/CO1, Lef/CO.3) are differentiated only in terms of finishing and especially firing techniques which ensure the production of visually different final products (buff to reddish vs grey cups and bowls). They thus reveal two discrete craft behaviours with different aims in production (**Fig. 3.16**). However, these craft behaviours are based on a common knowledge of the wheel and therefore suggest the activities of potters sharing the same *technical identity*. This identity is established on the basis of a precise way of using the wheel, which implies a common set of motor and cognitive skills enabling a high mastery of the tool within manufacture. This discloses a well-established context of learning and practice within the similar technological system inherited from the previous period and founded on the transmission and perpetuation of an embedded and resistant craft practice of Western Anatolian origin.

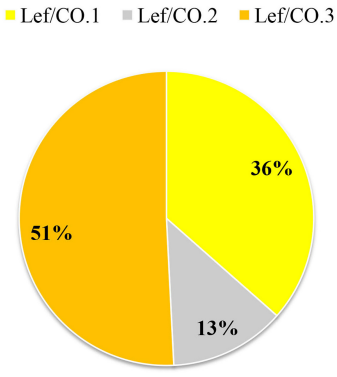

Fig. 3.16 Distribution of wheel-based *chaînes opératoires* during EBA III at Lefkandi (by the author)

4.2. The potter's wheel at Pefkakia: transforming traditional craft behaviours

4.2.1. Late EBA II: rejecting the potter's wheel

Pefkakia-Magoula, a littoral site near Volos in Thessaly, is a settlement with a long history during the whole EBA (Maran 1992; Christmann 1996). During the late EBA II, *i.e.* local phase EBA 7 (for the chronological synchronisms of the local phases, see Christmann 1996: 323-325; Maran 1992: 369-374, fig. 25), Pefkakia experiences profound changes in the material culture without apparent signs of destruction or violent events (Maran 1992: 6-7, plan VA; Christmann 1996: 20-21, plan XII; see also Wiersma 2014: 43-51). Over the course of the local phase EBA 7, a new architectural type, the megaron, appears along with profound changes in pottery production signalling the connection of Pefkakia with the Anatolian world (Christmann 1996: 14-20, plan X, XIA). The Anatolian pottery appears during late EBA II and at once has a dynamic presence at the settlement: its percentage exceeds 18 % of the total pottery assemblage (Maran 1998: 49-50; Christmann 1993: 45; 1994: 196-197, 201-202)[9]. As at Lefkandi 1, the potter's wheel exclusively occurs in the Lefkandi I/Kastri group and is associated with the production of buff to reddish plain concave/straight-sided shallow bowls and red slipped or burnished Depas cups. However, contrary to Lefkandi, the new assemblage is mainly produced by hand-building techniques. The use of the wheel is marginal reaching 5 % of the Lefkandi I/Kastri group whereas it represents only 1 % of the total production of the phase EBA 7 (Christmann 1996: pls 71.18-19,86.9-10, 88.7, 89.10, 94.18. 98.4) (**Fig. 3.17**).

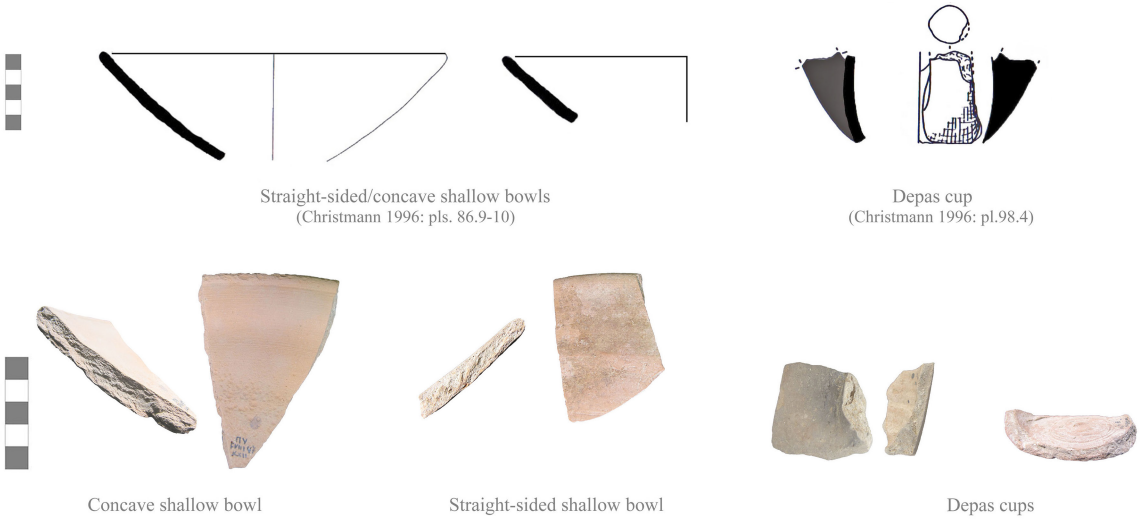

Fig. 3.17 The main wheel-typology at late EBA II Pefkakia (photos by the author)

Notwithstanding the occasional character of the first wheel-made pots at Pefkakia, the technological analysis revealed a pronounced uniformity regarding the underlying manufacturing process. The assemblage of the wheel-made pottery is the outcome of a single *chaîne opératoire* associated with the wheel-fashioning technique.

Chaîne opératoire Pef/CO.1 (**Fig. 3.18**): This *chaîne* is founded on the wheel-coiling Method 3, a method already known from the *chaîne* Lef/CO.1 at Lefkandi 1. RKE is introduced into the forming sequence once the coils have been formed by discontinuous pressures. It facilitates the joining and thinning of the coils and the shaping of the rough-out. After the roughing-out, the surfaces are wiped by RKE when humid. Then the lower parts of the vessels are preformed when leather hard by turning. Finally, the surfaces are left as they are (mainly in the case of shallow bowls) or they are slipped and/or burnished (especially in the case of Depas cups) (**Fig. 3.19**). The clays

9 The percentages are drawn from the micro-files published by Maran 1992 and Christmann 1996 and from the technological analysis carried out by the author.

used are fine and well-levigated whereas the surfaces and fabrics are of buff-reddish colours due to oxidised firing conditions.

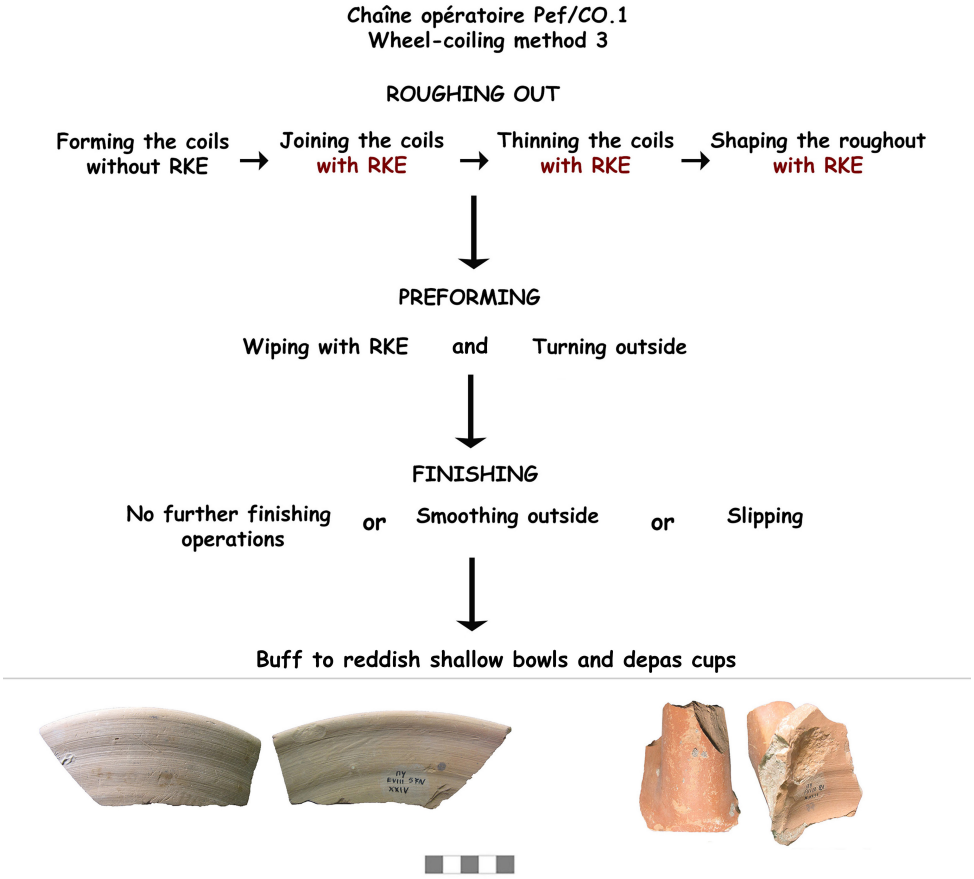

FIG. 3.18 THE MAIN OPERATIONS OF THE *CHAÎNE OPÉRATOIRE* PEF/CO.1 DURING EBA II AT PEFKAKIA (PHOTOS BY THE AUTHOR)

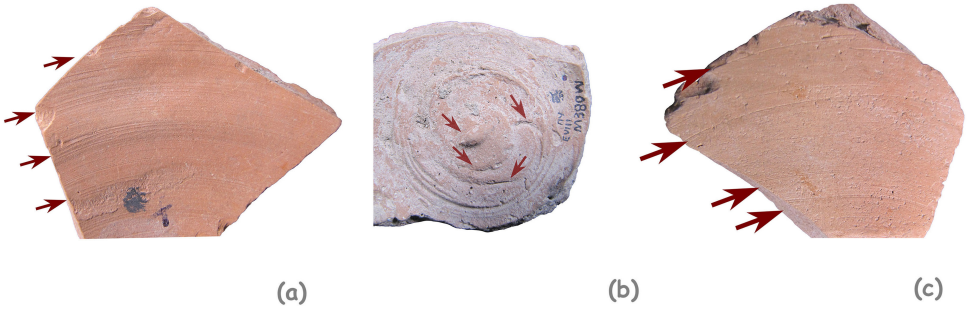

FIG. 3.19 DIAGNOSTIC MACRO-FEATURES OF THE *CHAÎNE OPÉRATOIRE* PEF/CO.1 AT PEFKAKIA: A) RILLING AND GROOVES, INDICATIVE OF THE WHEEL-COILING METHOD 3 (INTERNAL FACE); (B) COIL JOINTS ON THE INSIDE OF A DEPAS BASE; (C) WIPED UPPER SURFACE BY RKE (ABOVE), TURNED LOWER SURFACE (BELOW) (PHOTOS BY THE AUTHOR)

This *chaîne opératoire* represents a coherent craft behaviour based on the wheel-coiling Method 3. It is obviously founded on a compact set of technological choices comprising the Western Anatolian technological tradition as already identified at Lefkandi 1 within the *chaîne opératoire* Lef/CO.1. Once again, the wheel-fashioned production implies the appearance of an established technical identity rooted on Anatolian craft behaviours and connected to the Lefkandi I/Kastri vessels and never to local shapes and wares. However, contrary to Lefkandi, the non-systematic presence of the limited wheel-fashioned production as well as the foreign technological choices for the local milieu, which still preserves the traditional practices, implies the non-local character of the wheel-technology at Pefkakia. Although the arrival of the Lefkandi I/Kastri group signals the adoption of stylistic and typological features of Western Anatolian origin and hence implies explicit changes in the local technological system (new shape morphology, new surface treatments), the craft practices related to the forming techniques have not been affected by the wheel-technology. The potter's wheel (a) had no impact on the local craft practices which were widely founded on the use of hand-building techniques for the production both of Western Anatolian and local Helladic shapes, and (b) did not prompt the establishment of a new network of learning and practice within the local technological milieu which resisted the new craft practice but incorporated the more malleable techniques of the manufacturing processes, *i.e.* shapes, finishing techniques (for the malleability of the craft behaviours, see Gosselain 2000: 191-192; 2011a: 215-217). Moreover, the striking similarities in terms of macro-features between the products of the *chaîne* Pef/CO.1 and the *chaîne* Lef/CO.1 of Lefkandi 1 suggest the close association of the craft behaviour underlying the wheel-made pottery at Pefkakia with the well-established technological tradition developed at the same time at Lefkandi, thus disclosing the activities of potters who were trained within this tradition and whose products circulate in a sporadic way at Pefkakia (**Fig. 3.20**).

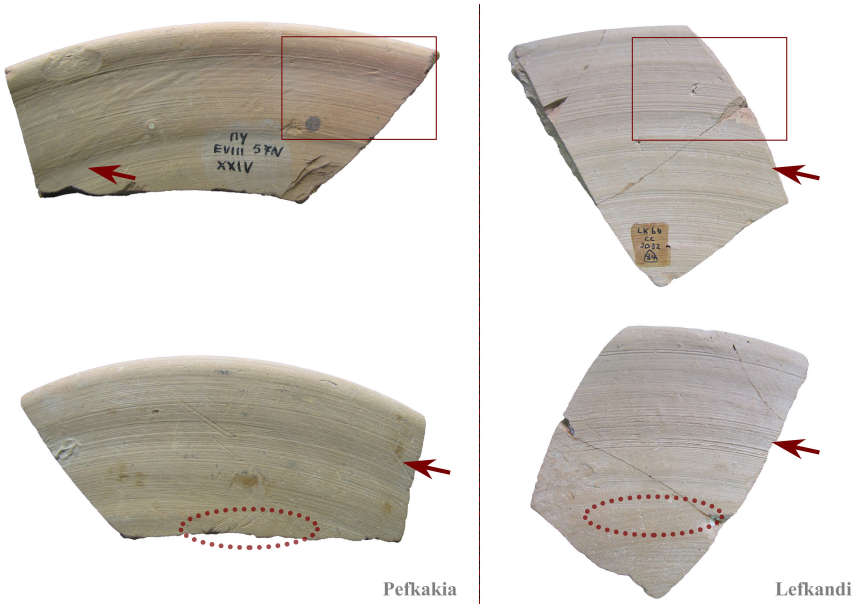

Fig. 3.20 Similar diagnostic macro-features of two wheel-fashioned shallow bowls from Pefkakia and Lefkandi (photos by the author)

4.2.2. EBA III: adopting the potter's wheel

At the transition to EBA III (transitional phase from the local EBA to MBA) and during EBA III (local phases MBA 1-3), Pefkakia is influenced by the wider socio-cultural mutations and experiences profound changes in pottery production (Maran 1992: 206-208, 369-374, fig.25; 1998: 50-53; Christmann 1994: 203-204; 1996: 323-325). As at Lefkandi, the Lefkandi I/Kastri group is replaced by the new tableware set which is typical of the regional pottery tradition characterising the coast of Central Greece during this period. The new

assemblage, including a variety of buff to reddish and grey burnished fine pots, represents over ±20 %[10] of the total EBA III (local phases MBA 1-3) production. Along with the changes in shape morphologies and finishing and firing techniques, the appearance of the new pottery signals a radical technological shift in the forming practice: the use of the potter's wheel is spectacularly increased reaching 20 % during EBA III, especially in the course of the local phases MBA 1-2 (**Fig. 3.21**). The increase of the wheel-made pots was so radical that Joseph Maran (1992: 75-80) established a unique class on the basis of the use of the potter's wheel, *i.e.* "the light red to yellow wheel-made ware" (*Hellrote bis gelbe Drehscheibe Ware)*.

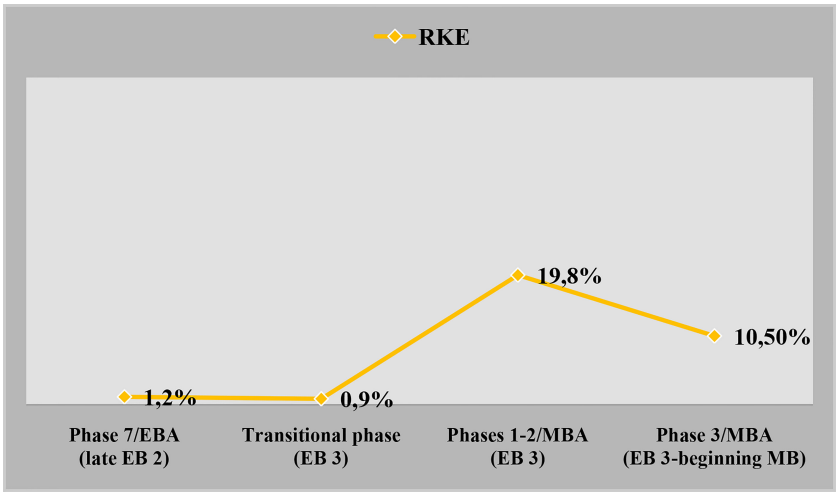

Fig. 3.21 Distribution of wheel-made pottery over the four EBA II-III phases of Pefkakia (by the author)

The new wheel-made assemblage includes a great variety of the characteristic central Greek hemispherical bowls (with simple, flattened, thickened, inturned, everted, and S-profile rims), a series of handled cups (vertical or horizontal) such as Bass bowls and kantharoi, and, very occasionally, small closed vessels with out-turned rims. It is mainly belonging to the buff to reddish and, less often, to the fine grey wares (Maran 1987; 1992: 75-78, 79, 81-93,116, pls XII.1, 10:1-22) (**Fig. 3.22**).

The technological study of the wheel-made pottery of the period has revealed a radical change in the craft behaviours based on the potter's wheel: instead of the wheel-coiling Method 3 which was so far identified within the sporadic EBA II wheel-fashioned pots (local phase EBA 7), the RKE is now used according to the wheel-coiling Method 2. This new craft behaviour is expressed through two different *chaînes opératoires*:

- *Chaîne opératoire Pef/CO.2* (**Fig. 3.23**): Once the forming of the coils and their junction are achieved by discontinuous pressures, RKE is exploited for facilitating the thinning of the walls and shaping the rough-out. The use of the potter's wheel within the later roughing-out operations (*i.e.* Method 2) does not strongly affect the configurations of the walls, built previously by discontinuous pressures. RKE moderately modifies the topographies of the pots by slightly eliminating the signs of a coil-built rough-out. After the roughing-out, the surfaces are wiped by RKE. The external surfaces are then smoothed without RKE when the pot is inverted. Sometimes the pots are finally slipped outside (**Fig. 3.24**). The clays used, considered local, are fine but moderately levigated containing, contrary to the wheel-fashioned pots of the previous period, coarser inclusions (Maran 1992: 75). The surfaces and fabrics are of buff to reddish colours suggesting controlled oxidised firing atmospheres. This *chaîne* mainly consists of a great variety of hemispherical bowls and, less often, of one- or two-handled cups.

10 The percentages are based on the recording material published in micro-film by Maran 1992 and the technological analysis carried out by the author.

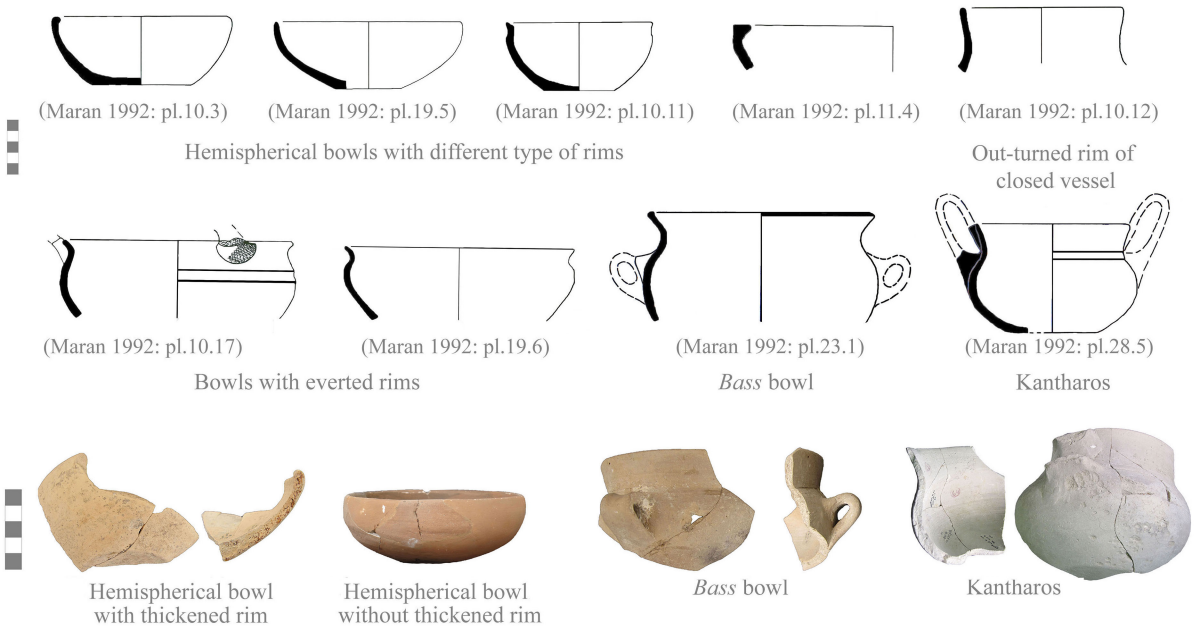

FIG. 3.22 THE MAIN WHEEL-MADE REPERTOIRE AT EBA III PEFKAKIA (PHOTOS BY THE AUTHOR)

FIG. 3.23 THE MAIN OPERATIONS OF THE *CHAÎNE OPÉRATOIRE* PEF/CO.2 DURING EBA III (PHOTOS BY THE AUTHOR)

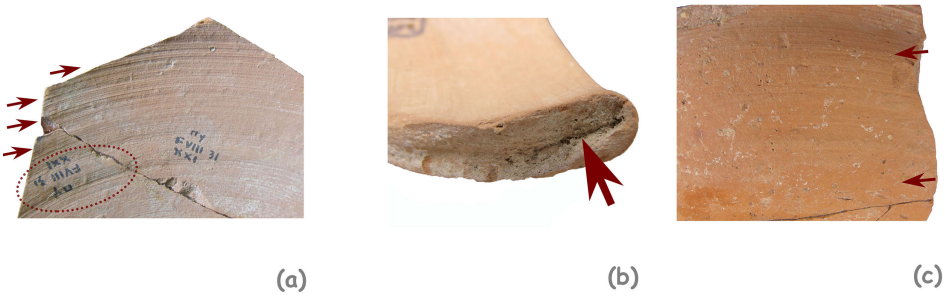

FIG. 3.24 DIAGNOSTIC MACRO-FEATURES OF THE *CHAÎNE OPÉRATOIRE* PEF/CO.2 (A) IRREGULAR MICRO-RELIEF AND HORIZONTAL STRIATIONS RUNNING AROUND THE INTERNAL FACE; (B) COIL JOINT IN SECTION (VERTICAL AXIS); (C) STRIATIONS DUE TO THE WIPING BY RKE (ABOVE), COVERED BY SMOOTHED SURFACE (BELOW) (PHOTOS BY THE AUTHOR)

- *Chaîne opératoire Pef/CO.3* (**Fig. 3.25**): The pots of this *chaîne* share similar manufacturing features as those identified in the previous *chaîne*: use of wheel-coiling Method 2, wiping the surface by RKE, smoothing without RKE. However, they present some new technical practices: the surfaces, when leather hard, are usually burnished outside with a smooth tool, the clays are fine and well-levigated and the colour of both surfaces and fabrics is grey indicating a high control of reduced firing conditions (**Fig. 3.26**). The pots made according to this *chaîne* are mainly grey two-handled cups and less often hemispherical bowls, with flattened rim.

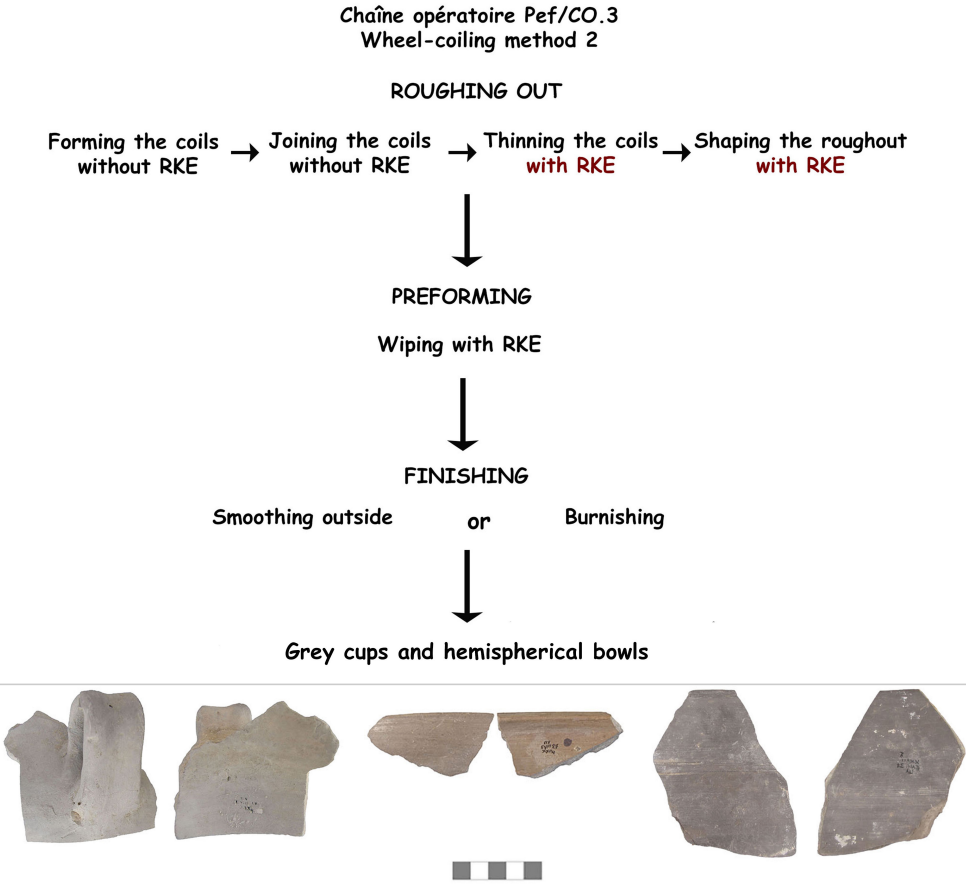

FIG. 3.25 THE MAIN OPERATIONS OF THE *CHAÎNE OPÉRATOIRE* PEF/CO.3 DURING EBA III (PHOTOS BY THE AUTHOR)

Fig. 3.26 Diagnostic macro-features of the *chaîne opératoire* Pef/CO.3: (a) irregular micro-relief and horizontal striations running around the internal face; (b) coil joint in section (vertical axis); (c) striations due to the wiping by RKE (above), covered by burnished surface (below) (photos by the author)

The wheel-fashioned production at Pefkakia is thus the outcome of two distinct craft behaviours, founded, however, on a common way of using the potter's wheel in terms of cognitive and motor skills (**Fig. 3.27**). This knowledge is combined with some specific practices in forming and finishing operations, which occur in both *chaînes opératoires*. Those similar craft actions delineate a common ground of apprenticeship and suggest a stable technical identity, which seems to be fixed through the mastery of the wheel-coiling Method 2. Based on this common context of practice, a series of different technological choices engender a variety of craft behaviours which imply different intentions in pottery production.

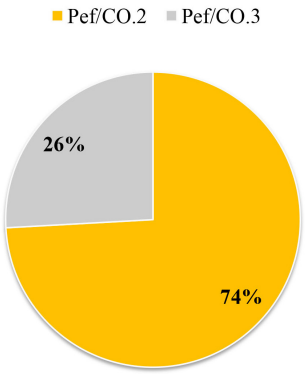

Fig. 3.27 Distribution of wheel-based *chaînes opératoires* during EBA III Pefkakia (by the author)

The dominant *chaîne opératoire* Pef/CO.2 implies the impact of the previous EBA II Western Anatolian technological tradition on the local technological milieu. The characteristic craft practices of this tradition now occur within the EB III buff to reddish hemispherical pots. At Pefkakia, this tradition is perpetuated through the innovative wheel-coiling Method 2, a way of using the wheel which has already been identified within the wheel-fashioned pottery at EBA II and III at Lefkandi (Lef/CO.2) and which could be considered a ramification originating from this same tradition. In turn, the *chaîne* Pef/CO.3, which is responsible for the limited production of the innovative grey cups and bowls, represents the crossing of this new wheel-fashioning technique with the new technological innovations of the period (reduced firing, burnishing). In the case of Pefkakia, one can recognise the establishment of a completely new technological system founded on a particular mastery of the potter's wheel which appears at the transition to EBA III and enables the development of different craft behaviours.

5. Conclusions: two different reactions to the appearance and transmission of the potter's wheel

The appearance and the transmission of the potter's wheel in the Aegean during the late EBA II and EBA III mirror a complex and dynamic phenomenon of discontinuous change within the local technological milieus (about the discontinuous technological changes, see Creswell 1996: 251-253, 254-262; Roux 2003; 2008; 2010b; Roux & Courty 2013). The discontinuous character of this technological innovation is not only suggested by the rupture that this new tool prompts within the history of forming techniques in terms of (a) cognitive and motor skills and (b) the qualitatively different physical modalities involved in the craft praxis (Roux 2008; 2010b). It is also implied by the rupture with the local craft practices, habits and knowledge, and translated by the embeddedness of this new tool in a foreign socio-cultural context within which its function is defined.

The new technology does not appear as a neutral instrument of production, disseminating arbitrarily within the local technological systems, but it emerges as a culturally defined practice of a particular community. It appears and is transmitted as an integrated part of a very specific potting tradition, fixing a constant technical identity that is rooted in the socio-cultural ground upon which it is produced and reproduced. The connection between particular ways of using the wheel and the very narrow morpho-stylistic typology of the Lefkandi I/Kastri group reveals the development and the dissemination of a coherent Western Anatolian technological tradition during late EBA II. Its transmission and perpetuation during EBA III – through a new pottery assemblage inspired by the same Anatolian traditions and habits – reflects the maintenance of precise socio-cultural identities through time and space. The use of the potter's wheel always appears outside of the Helladic traditions and hence is never combined with local practices. This rigid choice is refracted by these identities, which prevented the potter's wheel from being widely disseminated and appropriated by local communities.

The arrival of the new technology in Central Greece during the late EBA II is incorporated into the interface of the Aegean communities with the Western Anatolian traditions and delimits the multidirectional network of contacts enabling the circulation of people, technologies, objects and ideas throughout Aegean. The case of Lefkandi sheds light on a phenomenon of potter mobility which emerges as the mechanism of the technological innovation linked to the potter's wheel and the emergence of the Western Anatolian technological tradition at Lefkandi. From the very beginning, the specialised potters using the wheel comprised a distinct community of practice that produced and reproduced a fixed technical identity, originating from a single context of learning and practice. But this technical identity is not neutral; socio-cultural meanings seem to be embedded within the craft behaviours linked to the potter's wheel, meanings that connect the new tool with particular morpho-stylistic choices and restrict its use to the exclusive manufacture of vessels of Anatolian origin and never of vessels of Helladic traditions. Through this practice, one has to recognise a strong social and cultural identity, indicative of potters who were trained in the Western Anatolian technological tradition. These figures negotiated their place in the new Helladic socio-cultural milieu by maintaining their Western Anatolian craft behaviours, thus preserving the ways that they conceive and produce their material culture. One could infer that once Lefkandi became occupied by the late EBA II, a community of potters maintaining a particular technical identity, at that time foreign to Helladic craft behaviours, transferred and practiced the potter's wheel as the traditional way of producing pottery. These were obviously formed within an exogenous socio-cultural framework and rooted within Western Anatolian craft habits. On the contrary, at Pefkakia the appearance of wheel-fashioned pots does not reflect the appropriation of the potter's wheel by the local communities, which instead rejected the new technological innovation and maintained their traditional *habitus* in forming practices while adopting the morpho-stylistic features of the new Western Anatolian pottery. The potter's wheel seems to be an invisible practice embedded in the final objects whose presence is accidental, circulating sporadically in Pefkakia. From this perspective, the appearance of wheel-fashioned pottery should not be considered a sign of technological change in the local technological system but as the outcome of the dissemination process of objects which represent, in the local context, the Western Anatolian technological tradition developed at the same time in Lefkandi, thus providing evidence of interaction and exchange phenomena, likely imports, at the inter-community level.

During the tumultuous transition to EBA III, the local communities provide different and variable responses to the crisis of the period as manifest in productions through regionalism in pottery traditions, a phenomenon suggesting resilience against the corrosion of the socio-economic tissue (Weiberg & Finné 2013; Weiberg & Lindblom 2014).

At Lefkandi, the wheel's knowledge is maintained and transmitted through a resistant technical identity albeit with the explicit changes in the local technological system. This implies a long learning history at the site, built upon the common experience of practice that should act as an agent for the cohesion of the specific community of potters. The potters who produce the new wheel-fashioned pottery do not abandon their traditional craft practices, but modify their behaviour by adapting to the new typology and by adopting the new techniques in surface treatments and firing. The technical identity rooted in the particular cognitive and motor skills of the wheel is preserved and emerges as the more resistant technical feature in the craft praxis. This transforms the use of the potter's wheel into a dynamic tool of production with a very precise function and, at the same time, into a culturally-mediated choice. The technical identity, inherited from the previous period and adapted to a new technological system, is thus indicative of a community of practice which constructs and reproduces its *habitus* on the ground of a long-lived technological tradition. This tradition is fixed and reproduced through a rooted network of apprenticeship, indicating resilience against the major socio-cultural transformations expressed through the new intentions in pottery production. Along with the legacy of this tradition, a spectrum of definitions is also transmitted. The use of this tool within the new EBA III regional group is shaped by a very precise set of morpho-stylistic choices, originating from the impact of the previous Anatolian practices. A well-established and resistant socio-cultural context of learning, practice and interaction among the members of a particular community seems to account for the transmission, generation by generation, of the socially grounded practices linked to the potter's wheel, from EBA II to EBA III. In this light, the resilience of craft habits as markers of social identities becomes the mechanism underlying the maintenance of the specialised wheel's knowledge. The mechanism operates without necessitating its generalised adoption by the majority of potters at Lefkandi or causing its disappearance along with the decline of the Lefkandi I/Kastri group. The transmission of the potter's wheel actually reveals the power of technological traditions that are embedded within the "most rooted and enduring aspects of social identity" (Gosselain 2000: 93). In this light, the potter's wheel must be seen as an expression of social practice for a particular group of potters who do not associate their craft behaviours with any neutral arbitrary pottery activity. They link the wheel with a very precise production, culturally and socially defined by particular consumption behaviours. This pottery becomes the means for preserving long-lived cultural meanings and for negotiating social identities within a historical framework of changes, redefinitions and profound transformations.

On the contrary, at Pefkakia the local technological system is corroded along with the wider socio-cultural transformations at the end of EBA II. The potter's wheel now becomes a dynamic tool within pottery production that ensures the emergence of new craft behaviours, thus enabling the production of the same pottery assemblage as at Lefkandi. These behaviours are indicative of a new community of potters sharing a particular wheel's knowledge that acts as a marker of discrete specialised craft behaviour within the local technological system largely dominated by the use of hand-building techniques. The members of this community are tightly affiliated with the production and reproduction of a specific regional technological tradition. Similar to Lefkandi, the EBA III wheel-fashioned pottery at Pefkakia presents a shared technological pattern. The potter's wheel is tightly linked to the production of a narrow morpho-stylistic typology. Despite the differences regarding the wheel-coiling method used at each site, the wheel-fashioned pottery at Pefkakia follows the same trajectory as Lefkandi: a technical identity is shaped on the basis of the wheel which is used only for producing the same specific range of buff to reddish and grey pottery. This rigid choice suggests, once again, that the new practice reflects a socially and culturally grounded choice which captures the potter's wheel within particular production intentions. The distinct technical identity underlying the wheel-fashioned pottery at Pefkakia uncovers the particular way in which the local potters have appropriated the new tool as a part of a rooted tradition. It equally sheds light on the probable socio-cultural processes associated with the emergence of the new craft behaviour at Pefkakia. For the time being, it is difficult to investigate the mechanisms underlying this appropriation process. This kind of study would be necessary to know if the appearance of the potter's wheel at Pefkakia during EBA III reflects a process of adoption – whereby the local potters abandoned their traditional practices in favour of the wheel-coiling technique – or whether it indicates that a new group of potters arrived at Pefkakia along with a particular technological tradition at the very beginning of EBA III where the life in the settlement seems to be reorganised. Whatever the answer, it seems that this tradition was closely related to that developed during the same period at Lefkandi and that the sudden change within the local technological milieu at Pefkakia took place within the context of the wider socio-cultural transformations which were observed on the interregional scale throughout Central Greece. The local

communities seem to be participating in a network of communication and interaction, which had been established since EBA II and enhanced during EBA III by the consolidation of a regional pottery group, strongly influenced by the previous western Anatolian traditions. This active network connecting Pefkakia and Lefkandi enacts intensive inter-community relations and contacts, which probably account for the integration of the potter's wheel into the technological system of Pefkakia. If this is true, then one can assume that the appearance of the potter's wheel at Pefkakia suggests a new (or a transformed) community of practice which through the potter's wheel produces and reproduces a technical identity originating from a rooted technological tradition in Central Greece. This implies a distinct milieu of apprenticeship, indicative of potters who established their social practice within the new production context and consolidate their socio-cultural identity through the practice of the potter's wheel.

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4. The times they are A-changin'

Pottery production and technological change at Mochlos in the earlier Prepalatial period

Thomas M. Brogan
Luke Kaiser
Eleni Nodarou

1. Introduction

Seager's excavations in 1908 revealed a large Prepalatial cemetery on the island of Mochlos on the Northeastern coast of Crete (Seager 1912) (**Fig. 4.1**). While most scholars agree that burials began on the island in Early Minoan IIA and continued through the end of the Prepalatial period (*i.e.* Early Minoan III-Middle Minoan IA phases [hereafter EM III-MM IA]), there has been considerable disagreement over the dating of individual artifacts to either an EM II or EM III/MM IA horizon. This in turn has hampered attempts to interpret the finds which include significant numbers of imported metal, stone, and ceramic material within broader discussions of emerging inequality and social complexity on Crete and in the wider EBA Aegean (Seager 1912; Soles 1992; Soles & Davaras 1992; Watrous 2001; 2005; Whitelaw 2004; 2011; Cherry 2010; Brogan 2013; Legarra Herrero 2014: 97-117, 265-273). The recent excavations by Soles and Davaras have taken direct aim at this problem and uncovered new evidence for the earliest phase of occupation at the site from EM I-EM IIA. Material collected during the 2012 excavation season confirmed Seager's suggestion that habitation began on the island in EM I, and this evidence provides a significant sample for understanding the earliest developments at the site in the EBA (Seager 1912: 92-95; Brogan & Kaiser forthcoming).

In 2012 a deep trench (D2 97/9825) was opened on the east side of the Prepalatial cemetery, exposing a continuous stratigraphic sequence from EM I to EM IIB, which is unique for both the site and the region (Brogan & Kaiser forthcoming)[1]. The deposit, which is 2.5 m deep, contained four distinct layers that can be associated with changes in pottery, architecture, and the use of the space. Phase Ia-b represents a fill of EM I to EM IIA date. Habitation continued in Phases II and III, with rebuilding in Phase II that can be dated to EM IIA, and with a clear floor surface associated with Phase III (late EM IIA). Phase IV represents a substantial change in the use of the area connected with the eastward expansion of the cemetery in EM IIB. During this period, a house tomb with Vasiliki Ware pottery was built over the earlier dwellings.

This pottery sequence from Mochlos is marked by continuities but also significant changes in fabric recipes, manufacturing techniques, and decoration, as well as in exchange networks within and outside of Crete. No less important, these changes in pottery production and consumption can be associated with other significant changes in the local settlement and cemetery. In this paper we concentrate on the pottery from Phases Ia-b, II, and III. After reviewing the local context for each phase, we then turn our attention to the wider picture, integrating Mochlos into the emerging narrative for early Prepalatial Crete. We examine whether any of these changes in pottery production and exchange can be attributed to the social, political, and economic changes (potentially a crisis?) witnessed in EM I-EM IIA Mochlos.

1 The authors are grateful to J.S. Soles and C. Davaras for their permission to study the pottery as part of the Mochlos Excavation Project and for the support which the project has received from the Lasithi Ephoreia under the direction of Chrysa Sofianou. We also would like to thank K. Hall and M. Tzari for conservation, L. Bonga and D. Faulmann for the drawings, and Ch. Papanikolopoulos for the photography. Dr. M. Eaby supervised the excavation. This particular trench represents a small portion of a much larger deposit of Early Minoan pottery studied as part of Kaiser's master and doctoral research.

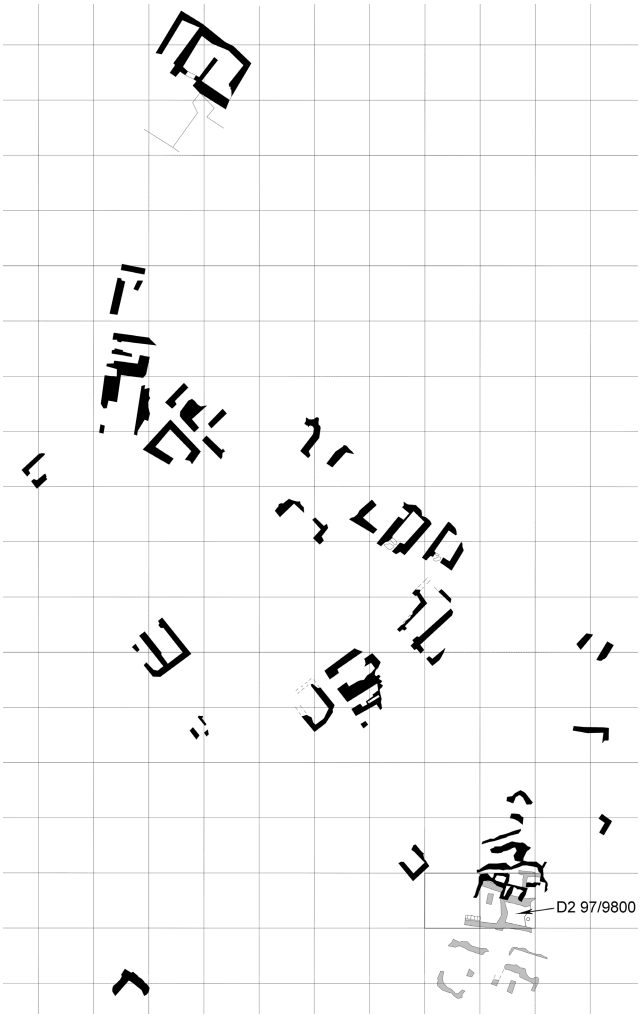

Fig. 4.1 Plan of the Prepalatial cemetery at Mochlos after 2012 (D. Faulmann)

2. The Early Prepalatial ceramic sequence at Mochlos

2.1. Phase Ia

The lower deposit in Trench D2 97/9825 (**Fig. 4.2**) represents Phase Ia and was distinguished as a pocket of soil that lay beneath the earliest architecture in the area. The ceramic assemblage is rather small and consists of two main fabrics and a third one which is relatively rare. More specifically:

Fabric 1 (**Fig. 4.3**) is characterised by a red-firing non-calcareous clay and metamorphic rock fragments, all compatible with the local geology. Most of the vessels belong to a category of Plain Red/Brown Coarse Ware (PR/BCW) with the shapes including thin, flat cooking dishes pierced near the rim (**Fig. 4.4**)[2], jars with semicircular handles (**Fig. 4.5**), and lids (Seager 1912: 82, nos 36-37).

2 Although one might be tempted to identify these pierced dishes as cheese pots commonly found on Final Neolithic sites in Eastern and Western Crete, the EM I Mochlos dishes are different. The authors would like to thank Y. Papadatos who noted that they appear to be finer in terms of both fabric and surface treatment and that they exhibit smaller rim profiles. They are discussed in more detail in Brogan & Kaiser, forthcoming.

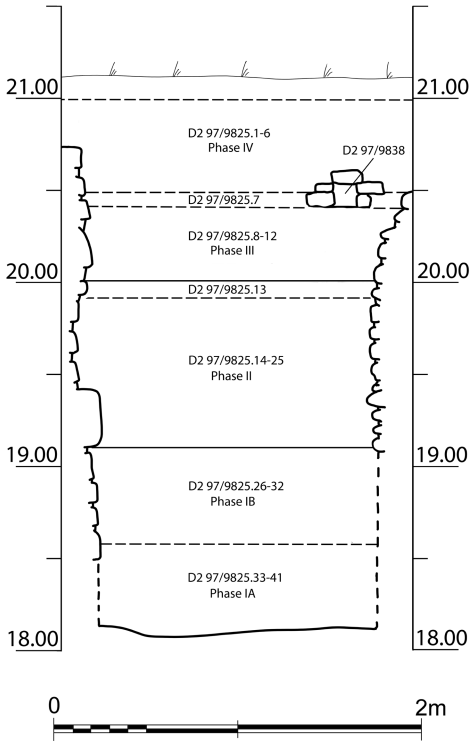

FIG. 4.2 SECTION THROUGH TRENCH 97/9825 MARKING THE PREPALATIAL PHASES (M. EABY & D. FAULMANN)

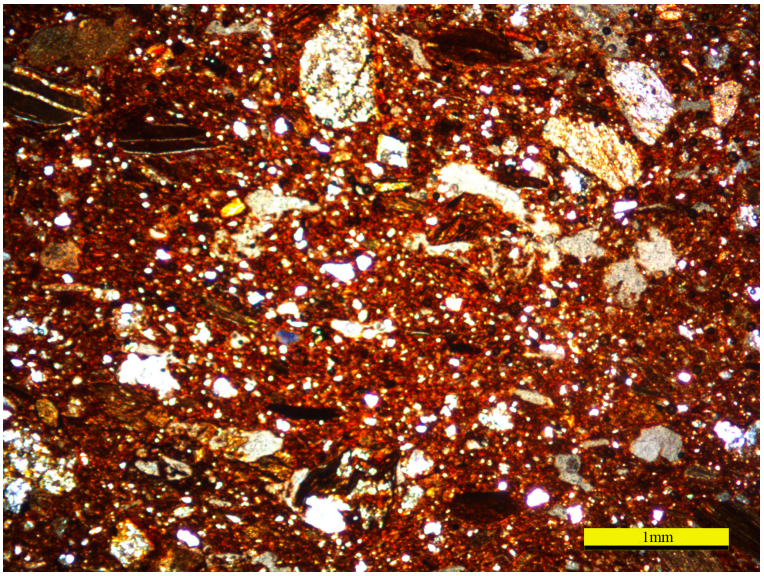

FIG. 4.3 PHASE 1A. FABRIC 1. LOCAL METAMORPHIC FABRIC (XPL, X25) (E. NODAROU)

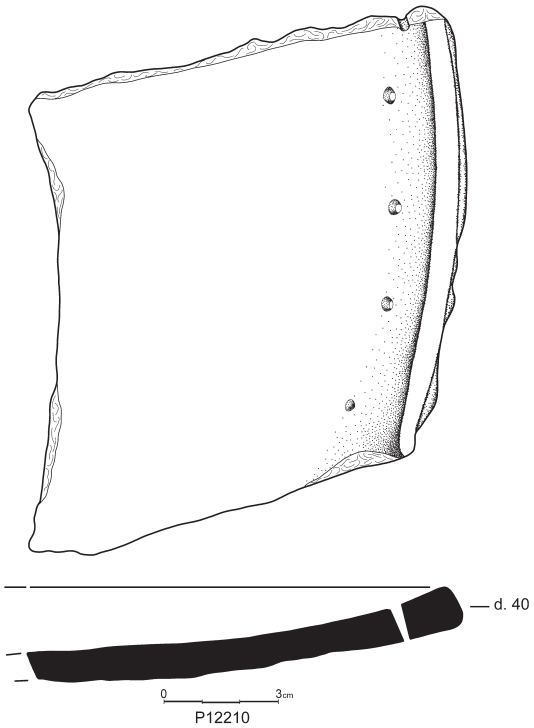

Fig. 4.4 EM I Cooking dish with a pierced rim (P12210) (L. Bonga)

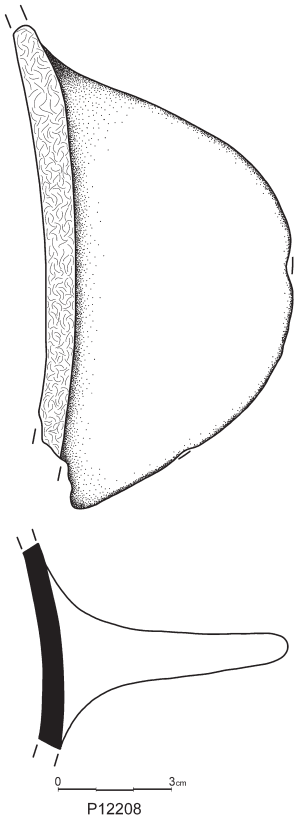

Fig. 4.5 Jar (P12208) (L. Bonga)

Fabric 2 (**Fig. 4.6**) is rather unusual. It is highly micaceous and that gives the vessels the shiny appearance that is not commonly seen in Cretan pottery – it is more at home in the Cyclades and the East Aegean[3]. Petrographic analysis showed that it is rather homogeneous and contains metamorphic rock fragments and an increased amount of biotite mica. Unlike Fabric 1 that occurs in a single ware, the micaceous fabric is encountered in a variety of wares and shapes, the most common being the Plain Red/Brown Coarse Ware (PR/BCW) with cooking dishes with flat bases and pierced rims, jars with rough exteriors belonging to Wiped and Washed Wares (WWW), and the Dark Burnished Ware (DBW) including jars with strap or round horizontal handles (**Fig. 4.7**). The origin of this fabric is uncertain. It is not compatible with any known fabric from Mochlos (dating in the Prepalatial or any other period analysed so far). It could be imported but at present there is no reported parallel from the Cyclades or the East Aegean[4]. It seems more likely that it represents a local production that exploited the small micaceous deposits found within the metamorphic series in the area of Mochlos-Chamaizi. A local origin is further substantiated by the frequency of this fabric in the assemblage and the diversity of wares and shapes that it was used for.

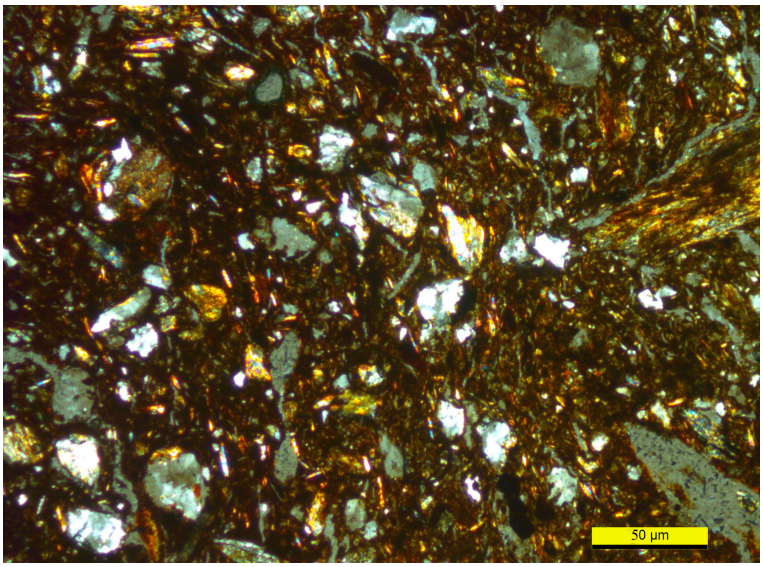

Fig. 4.6 Phase 1A. Fabric 2. (Local?) metamorphic fabric with biotite mica (XPL, x50) (E. Nodarou)

Fig. 4.7 Jar jandle (P12203) (Ch. Papanikolopoulos)

Fabric 3 is much less common. It has a very fine matrix and contains a variety of rock fragments (sandstone, basalt, serpentinite) consistent with the ophiolite series and the flysch mélange outcropping in South-Central Crete and the South Coast (Poursat & Knappett 2005; Nodarou & Rathossi 2008). It comprises a burnished chalice in Light Gray Ware (LGW) and two jugs in Dark-on-Light Ware (DOLW), *i.e.* fine luxurious tableware vessels probably imported to Mochlos for conspicuous consumption within the local community, which are also evidenced at Knossos (Wilson & Day 1994; 2000). The characteristic painted decoration helps to date the deposit to EM IB

3 Pers. comm. Y. Papadatos, K. Nowicki & J. Hilditch 2015.
4 Pers. comm. J. Hilditch 2015.

(Wilson & Day 1994: 77-86; Molloy *et alii* 2014: 328-329; Haggis 1996: 670-671 for EM IB chalices at Kalo Chorio).

2.2. Phase Ib

Phase 1b is a more substantial fill associated with the earliest architecture. In comparison to the previous phase, a change is observed in the relative quantity of the fabrics.

Although the two main fabrics of Phase Ia continue, the micaceous fabric (Fabric 2) becomes dominant and is encountered in a variety of recipes, wares, and shapes. The majority of the vessels belong to the Red Burnished Ware (RBW) characterised by a red firing fabric with a dark core. The main shapes include bowls, several jar types, and two types of flat cooking dishes: the first resemble those from Phase Ia; the second have tall vertical tab handles pierced by a single larger hole (**Fig. 4.8**).

This fabric also includes an array of jars that belong to a Plain Red/Brown Ware without any burnishing. A Kampos-group bottle (**Fig. 4.9**) helps to date this group of vases in EM IB/EM IIA (Davaras & Betancourt 2012: 67-73, 104-105, for the Kampos-group bottles at Haghia Photia). A third group of vessels using this red micaceous fabric belong to the Dark Burnished Ware (DBW). The shapes include a chalice with a bulging stem, a goblet (**Fig. 4.10**), two pyxides, and bowls.

Fig. 4.8 Cooking dish with pierced rim (P11177) (Ch. Papanikolopoulos)

Fig. 4.9 Kampos-group bottle (P12221) (Ch. Papanikolopoulos)

Fig. 4.10 Goblet (P 12238) (Ch. Papanikolopoulos)

The red metamorphic non-micaceous fabric (Fabric 1), which is broadly local, also continues in Phase Ib but it becomes less frequent. It is encountered in many wares the most common being the Plain Red/Brown Ware encompassing cooking dishes with pierced rims.

A third, very rare fabric encountered for the first time in the Prepalatial assemblage of Mochlos is the calcite-tempered fabric (**Fig. 4.11**). The few vases produced in this fabric comprise a jar with a horizontal lug handle (**Fig. 4.12**) and a tray, and belong to the Plain Red/Brown Ware. Calcite-tempered fabrics are commonly found on Final Neolithic (FN) and EM I sites on the north coast of Crete but the distribution is not uniform. They make up less than 1 % of the EM IB assemblage at Mochlos, Priniatikos Pyrgos (Molloy *et alii* 2014), and Kalo Chorio (Haggis 1996). They are more frequent at sites like Halepa in the Gournia region to the north of the Ierapetra Isthmus (Watrous & Schultz 2012a: 22), while in other sites it is the dominant fabric. At Poros it constitutes 33 % of the assemblage (Dimopoulou-Rethemiotaki *et alii* 2007; Wilson *et alii* 2008) and 50 % at Mesorachi[5]. Finally, in cemeteries like at Haghia Photia (Davaras & Betancourt 2012) and Gournes (Nodarou forthcoming), the calcite-tempered pottery comprises more than 95 % of the total assemblage, and the shapes have strong Cycladic affinities, particularly with the pottery of the so-called Kampos group.

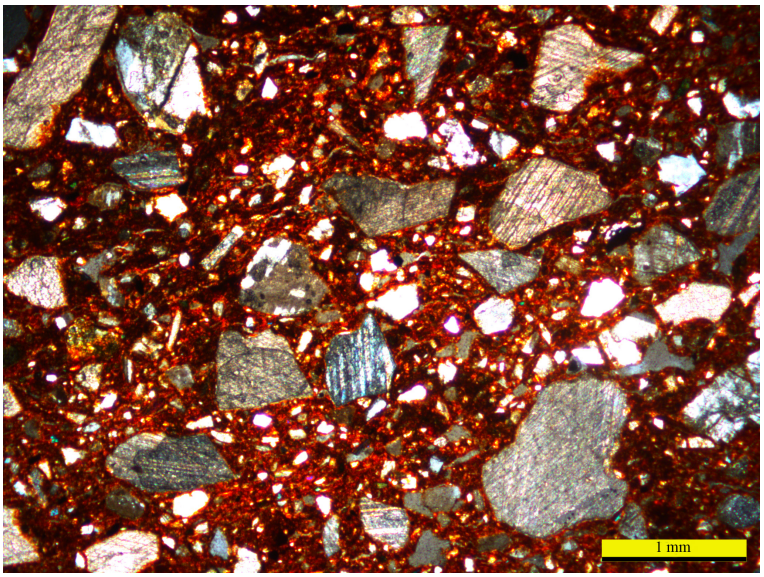

Fig. 4.11 Calcite-tempered fabric (XPL, x25) (E. Nodarou)

5 Pers. comm. Ch. Sofianou 2015.

Fig. 4.12 Jar with a lug handle (P12220) (Ch. Papanikolopoulos)

Imports from other Cretan sites include Dark-on-Light jars and Light Gray Ware chalices made with fabrics consistent with the South Coast. Two last objects are off-island imports. The first is a cup made with a micaceous fabric and painted in red; the second is a fine painted sauceboat, probably from the West Cyclades (Broodbank 2000: 306-307, fig. 101). This leads us to suggest an EM IB/early EM IIA date for this phase.

2.3. Phase II

The next levels in Trench D2 97/9825 (Phases II-III) are associated with architectural changes dated to EM IIA. Although there is no sign of violent destruction (fire, collapse, *etc*.) the pottery from Phase II reveals significant changes in both local pottery production and imports.

The pottery of the period is manufactured in a series of fabrics:

1. The local red-firing fabric which is connected with the Phyllite-Quartzite series using a non-calcareous raw material.
2. A rather rare metamorphic fabric containing silver (muscovite) mica which is very different from the biotite-rich micaceous fabric of Phase I and whose source (most likely foreign) is still unknown (**Fig. 4.13**).

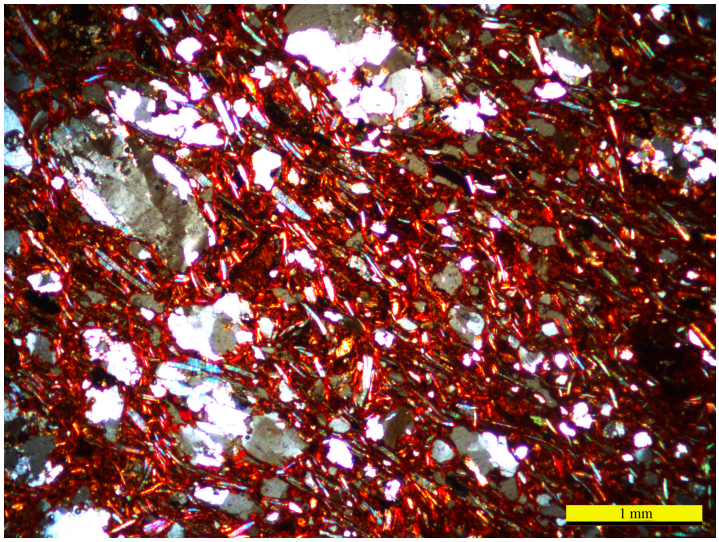

Fig. 4.13 Micaceous fabric (imported) (XPL, x25) (E. Nodarou)

The pottery recipes in this phase become more standardised and the assemblage is dominated by the burnished wares: Red Brown Burnished (RBW) and Black Burnished (BBW) comprising vessels intended for serving, food and drink consumption, transport or small-scale storage. The repertoire of shapes includes various types of jars (**Fig. 4.14**) and bowls (**Fig. 4.15**), the latter distinguished by the high degree of burnishing and the presence of distinctive horizontal lug handles at the rims, some molded with slightly projecting knobs and others that are surprisingly long and thin.

Fig. 4.14 Jar (P12251) (Ch. Papanikolopoulos)

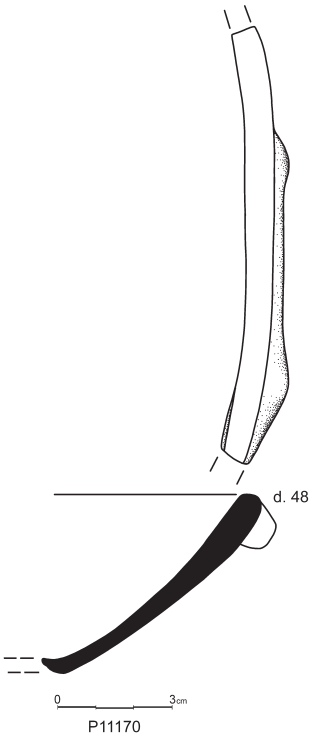

Fig. 4.15 Bowl (P12270) (L. Bonga)

3. A major change in Phase II is the first appearance of vessels in granitic-dioritic fabric which can be sourced in the region of Gournia and Priniatikos Pyrgos on the south side of the Bay of Mirabello (**Fig. 4.16**). This fabric is encountered primarily in Plain Red/Brown Wares (coarse to semi-coarse) and the shapes include fenestrated stands that may have served as supports for cooking vessels, cooking dishes (**Fig. 4.17**), collared jars, and hole-mouthed jars. Their arrival marks an important shift in the consumption choices of the people of Mochlos, as pottery from the Mirabello would continue to be imported with varying intensity until the end of MM IIB, *i.e.* roughly for the next 1000 years. The new cooking dishes which replaced the earlier pierced dishes, have a characteristic angular profile. They are very well fired and their numbers increase with the appearance of the first tripod cooking pots in the same fabric in the next level which is again dated to EM IIA. Together the dishes, stands and in the next phase the cooking pots represent a major change in local cooking habits that are introduced in this period.

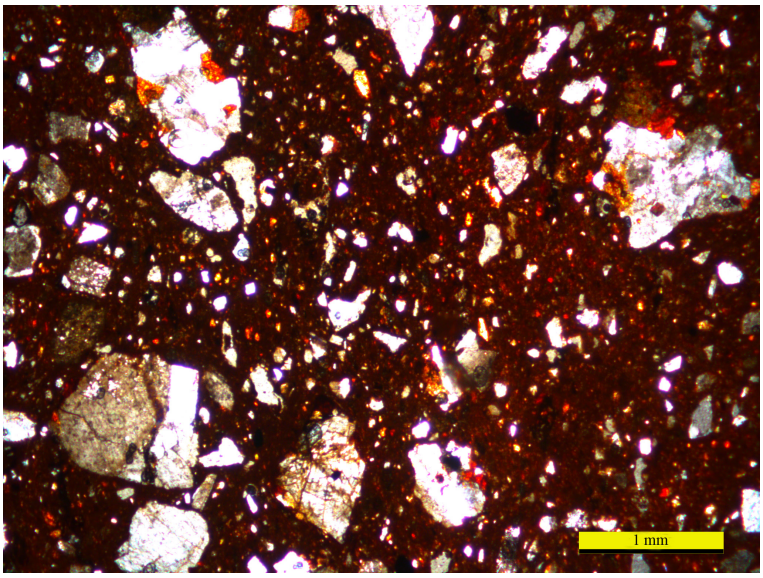

Fig. 4.16 Fabric with granitic-dioritic inclusions (XPL, x25) (E. Nodarou)

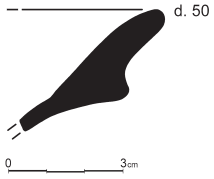

Fig. 4.17 Cooking dish (P11165) (Ch. Papanikolopoulos)

The granitic-dioritic fabric is also used (on a smaller scale) for Dark-on-Light Wares, namely for jugs (**Fig. 4.18**), a trend that becomes more widespread in East Crete in the later Prepalatial period (Whitelaw 2015).

4. Finally, there is a small group of transport jars (**Fig. 4.19**) produced possibly in South Coast and a jug with EM IIA parallels from Knossos (Wilson 2007: 62, fig. 2.8:2-3) (**Fig. 4.20**).

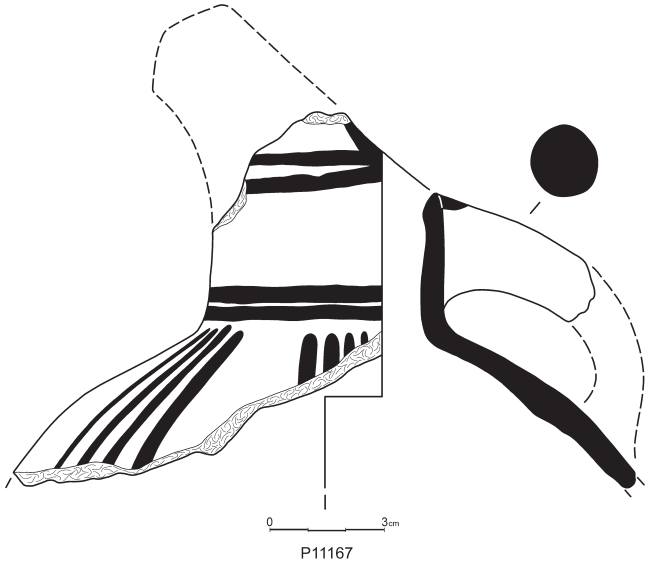

Fig. 4.18 Jug (P11167) (L. Bonga)

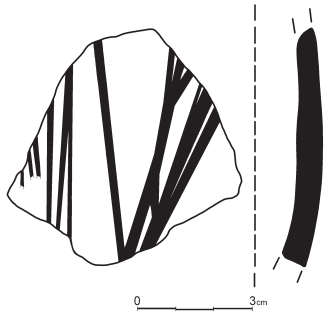

Fig. 4.19 Jar (P12284) (L. Bonga)

Fig. 4.20 Jug (P12261) (Ch. Papanikolopoulos)

2.4. Phase III

No new houses or tombs can be assigned specifically to Phase III, which appears to represent a transition to EM IIB and the introduction of Vasiliki Ware in Phase IV. The material from Phase III is more restricted in range. A precise date of late EM IIA is suggested, primarily because it is sealed beneath a tomb with large amounts of EM IIB Vasiliki Ware. In terms of fabrics, wares, and shapes there is evidence for continuity with Phase II but also for some changes in the repertoire of shapes as well as in the quantity of the imports.

1. The local metamorphic fabric is still used for the Red Brown and the Black Burnished Wares (bowls and cups) (**Fig. 4.21**) but there is a change in their appearance which no longer exhibits the highly lustrous surfaces of Phase II.
2. The granitic-dioritic fabric also continues for vessels in the Plain Red/Brown Coarse Ware with a marked increase in the number of cooking dishes (**Fig. 4.22**) and the appearance of two new shapes: the basin and the tripod cooking pot with flat legs (**Fig. 4.23**). To this group we can also add a pair of monochrome jugs (**Fig. 4.24**).
3. Imports from the South Coast region decrease significantly in number.

Fig. 4.21 Cup (P12309) (Ch. Papanikolopoulos)

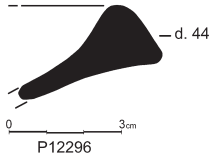

Fig. 4.22 Cooking dish (P12296) (L. Bonga)

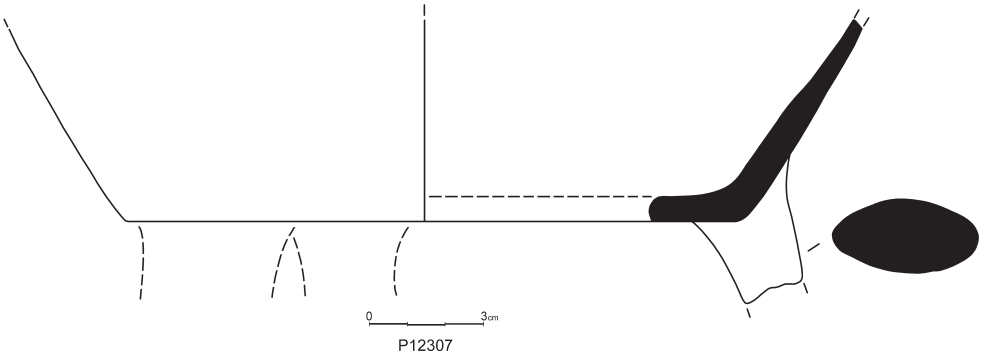

Fig. 4.23 Tripod cooking pot (P12307) (L. Bonga)

Fig. 4.24 Jug (P9949) (Ch. Papanikolopoulos)

3. Technology in crisis? Changing patterns of pottery consumption at Mochlos during the earlier Prepalatial period

Recent excavations at Mochlos have identified a stratigraphic sequence with three phases belonging to the earlier Prepalatial period. Phase I (Ia-b) is dated broadly to EM IB/early EM IIA, whereas Phase II is more securely dated to early EM IIA and Phase III to later EM IIA. The earliest levels (**Phase Ia-b**) show pottery assemblages which are homogeneous in terms of fabrics, shapes and wares. The majority of the pottery belongs to the Plain Red/Brown Coarse Ware and the main shapes include cooking dishes pierced near the rim, jars, and a few lids (**Figs 4.3-4.5, 4.8-4.10**). The fabrics employed are the local metamorphic one and a micaceous one which may or may not be local. The appearance of the calcite-tempered fabric in Phase Ib (**Fig. 4.11**) is noteworthy because it marks a sharp difference between Mochlos and other parts of the island of Crete where the practice of tempering with calcite is present from the FN and already widespread in EM IA. The apparent scarcity of the calcite-tempered fabric at Mochlos and the total absence of grog-tempered pottery which is rather frequent in other sites such as Petras (Papadatos & Tomkins 2013; Nodarou 2012), suggest that Mochlos followed a different pattern than the rest of East Crete and probably the rest of the island. The presence of painted wares in fabrics originating from the South Coast region and/or the Mesara indicates a regular flow of fine decorated vessels to Mochlos throughout these early phases of the Prepalatial. Off-island imports are limited to a small number of shapes from the Cyclades (*e.g.* a Kampos group bottle and a painted sauceboat) which probably arrived with substantial amounts of other imports from the Cyclades islands such as metals and obsidian[6].

Phases II and III mark an important transition at Mochlos in early EM IIA that is characterised by changes in pottery fabrics and shapes that more closely resemble patterns seen at other Cretan sites. The pierced cooking dish in the local metamorphic fabric (**Figs 4.3, 4.8**) is abandoned in favor of new cooking vessels like the cooking dishes with angular profile (**Fig. 4.15**) and the fenestrated stands in Phase II, and the cooking dishes (**Fig. 4.21**) and the tripod cooking pots (**Fig. 4.22**) in Phase III. These cooking shapes are produced exclusively in granitic-dioritic fabric and imported from the sites along the southern side of the Mirabello Bay, like Gournia and Priniatikos Pyrgos. Studies have shown that cooking pots are among the most conservative ceramic shapes, so drastic changes in the tradition of manufacture (raw materials, fabric recipes, and shapes) could reflect significant changes in everyday cooking and eating habits (Villing & Spataro 2015: 11-19). The type of tempering materials in cooking pots is known to affect the thermal conductivity of the vessels, while the firing temperature of vessels affects their strength and resistance to repetitive exposure to fire (Müller *et alii* 2009; Hein *et alii* 2009). Put in another way, changes in the choice of the tempering materials and the shape of the cooking vases may reflect changes in the way consumers intended to use the pottery and cook their food (*i.e.* for slow simmering of stews or casseroles, or for fast boiling, or else for frying foodstuffs).

This change in the shape of the cooking pots coincided with a generalised shift in the exchange of pottery in the Mirabello and Ierapetra region with a marked increase in the consumption of pottery from Gournia and Priniatikos Pyrgos across the East Crete (Whitelaw 2015 for the nature and intensity of this trade in the area of Myrtos, on the south coast, west of Ierapetra, and the wider Isthmus of Ierapetra in EM IIA and EM IIB). The same pattern can now be observed at Mochlos where granitic-dioritic pottery from producers based at Gournia and Priniatikos Pyrgos made its first appearance in EM IIA and increased in numbers through MM IIB (Watrous & Schultz 2012b; Brogan 2013 for EM III-MM IA; Watrous & Schultz 2012c for MM IB-II).

Returning to the theme of pottery technology in times of crisis, we ask if any of these changes in pottery production and exchange can be attributed to the social, political, and economic changes (potentially a crisis?) witnessed in EM I-II Mochlos. The problem should be considered in two chronological parts: EM I and EM IIA.

The evidence from Mochlos suggests that a significant portion of the *earliest settlement* was probably located in Area D2. The stratigraphic sequence offers a rare opportunity to examine an EM IB-IIA gateway community

6 It is still too early to make definitive statements about the exact number and nature of ceramic imports in Phase I and II at Mochlos because less than 10 % of the pottery excavated in Area D2 has been studied. This project will be undertaken by Kaiser as part of his doctoral dissertation.

from a domestic perspective as was the case for the earlier FN/EM IA settlement at Petras Kephala and the contemporary EM IB settlement at Poros Katsambas, respectively in East and North-Central Crete (Papadatos & Tomkins 2013; Dimopoulou-Rethemiotaki *et alii* 2007; Wilson *et alii* 2008).

Pottery produced locally in this phase shows a preference for vessels in a fabric recipe (the one with biotite mica) not commonly found at contemporary sites in East Crete. These differences are significant and reveal both the variability and complexity in EM I pottery production and consumption. The sudden disappearance of these habits in the *subsequent phase* (Phase II) reveals how susceptible these traditions were to broader changes during the EM I/IIA transition on the island. The most significant involves the adoption of new shapes for cooking vessels (dishes and tripod cooking pots), with new, heat resistant fabrics, produced by potters working in the region of Gournia and Priniatikos Pyrgos.

The inclusion of Mochlos in this broader network of pottery exchange from the Mirabello in later EM IIA forms part of a wider trend seen on Crete, which probably reflects strengthened ties between sites in the region, in a pattern that would continue for the rest of the Bronze Age. Operating below these likely political and economic shifts were more subtle but no less significant cultural changes related to cooking traditions, like stewing and frying which highlight the deeper, social significance of this realignment. Reviewing this process at sites along the south coast of the Isthmus of Ierapetra during the Prepalatial period, Whitelaw (2015) observed similar changes in pottery consumption at sites like Myrtos Phournou Korifi and Myrtos Pyrgos with a significant increase in the numbers of Mirabello imports in EM IIB through the exchange of bulk containers or jars, perhaps thanks to the increased use of equids. Among the important factors for this increasing regional interaction is simple demography, or what anthropologists define as a stable breeding population of 500-1000 individuals (Whitelaw 2015: 42-43). Given the small size of Prepalatial settlements identified on surveys in this south-eastern part of Crete, Whitelaw suggests that demography would have required groups of up to 40 sites to interact with one another for marriages.

In this light, the new evidence from Mochlos allows us to consider one last question: did these pots arrive with new people or instead reflect the appearance of new political and economic networks like those recently outlined for the region? In his study of the EM IIA ceramic exchanges across the Isthmus of Ierapetra, Whitelaw cautioned that "ceramics may be the enduring materials through which we can document such exchanges, but they may have been a sideline, rather than the principal driver of such developments. Because the distribution of pottery does not document the medium-distance social interactions which also had to have taken place in EM IIA to integrate these extended social and demographic networks, their extant and the means by which they were maintained remain largely invisible" (Whitelaw 2015: 45).

In this paper we suggest that the new evidence from early Prepalatial Mochlos may in fact allow us to trace some of these medium distance social interactions while offering a case study for how they were maintained. Since cooking habits like textile production are often associated with women's roles in the household, it may be worth considering the possibility that the appearance of new cooking shapes in early EM IIA Mochlos coincided with the arrival of women bringing new kits for food preparation (Cutler 2016: 75)[7]. One obvious mechanism for this transfer would have been marriages between families at Mochlos with families from Gournia and/or Priniatikos Pyrgos. This dynamic might help to explain the appearance of small numbers of imported cookwares in Phase II which increase in Phase III (later EM IIA) as this process developed and strengthened between these sites. There is also ample evidence that these exchanges intensified in the region during the later Prepalatial period (Watrous & Schultz 2012b; Brogan 2013; Whitelaw 2015). Of course, a more aggressive model could also interpret the larger amount of Mirabello imports in Phase III as a sign of the arrival of much larger numbers of newcomers, but we would need to take a much more detailed statistical approach to the material before reaching any such conclusions. For now we believe strongly that the different changes observed within the pottery assemblages throughout Phases I, II and III offers a new perspective for studying this very dynamic period of Cretan Prehistory.

7 Cutler (2016: 75) said: "Since weaving in the Bronze Age Aegean was closely associated with women (Cutler 2011; 2012), the nonlocal loom weights are indicative of *female* mobility during the Bronze Age. Possible mechanisms for female mobility, both within the Aegean and beyond, include inter-marriage, migration as part of a family unit, raiding, slavery and the exchange of textile workers between elites (discussed further in Cutler 2011; 2012; for the possibility that women may have travelled as the result of inter-marriage, see also Gorogianni *et alii* 2015)."

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5. Recognising conflict and crisis in prehistoric societies

The contribution of pottery

Ina Berg

> ‘‘Social and environmental changes and external contacts […] are evident in the archaeological records of ancient societies, especially in the form of changes in pottery, which *immediately* reflects changes that affect the members of a society […] it is hard to find a material product in any period that provides more *immediate* and *exact* information about the state of a society than does pottery’’ (Grieder 1975: 850, cited by Adams 1979: 727 with his emphases added).

1. Disaster, period of trouble, crisis, conflict

‘Periods of trouble’, the title of this workshop, evokes a wide range of scenarios – from a major ecological disaster and environmental hazard (*e.g.* storms, earthquakes, volcanic eruptions, avalanches, droughts, mudslides) to large-scale warfare, from historically structured processes (*e.g.* migrations, urbanisation, colonialism, intermittent conflicts with neighbours, evolving trade networks) to minor disagreements within communities that may reference traditions, political parties, ethnicity, identity, or kinship affiliations.

Disasters, hazards, crises, periods of conflict and trouble have been theorised by anthropologists and sociologists for decades but remain relatively underexplored by archaeologists (Oliver-Smith 1999; Simons 1999; Tierney 2007). While each of the above terms evokes slightly different meanings, they nevertheless cluster together tightly enough to be subsumed under the broad heading of disaster research. Oliver-Smith (1996: 305) defines disaster as “a process/event involving a combination of a potentially destructive agent(s) from the natural and/or technological environment and a population in a socially or technologically produced condition of environmental vulnerability”. Disasters can be rapid events that occur in a flash (*e.g.* tsunamis) or slowly developing processes that may take weeks, months or even years to bubble to the surface (*e.g.* toxic spills) (Oliver-Smith 1999). They may be driven by external forces entirely outside a society’s field of influence or may be the result of internal developments. Finally, disasters may originate in any area of society – be it the economy, religion, military, or culture – and then spread and subsequently develop into a much more fundamental crisis. Whatever the crisis, it interrupts or destroys a community’s social or physical matrix and signals the society’s failure to “adapt successfully to certain features of its natural and socially constructed environment in a sustainable fashion” (Oliver-Smith 1996: 303). Thus, a disaster is only a disaster if it is perceived as such by the community. In addition, disasters are not ecological events *per se*, but ultimately originate in social conditions as it is a society’s ability or inability to cope with stresses that avoids or invites disasters. It is commonly agreed that disasters disrupt normal life and can test a society’s resilience and act as an engine for socio-political, cultural, religious, and economic change. From a researcher’s point of view, disasters can be quite desirable as they are, rather problematically, considered “natural laboratories” of the human condition under which societal norms are attacked and the “basic social, cultural and material necessities” are laid bare (Oliver-Smith 1996: 304; Tierney 2007: 510).

While periods of trouble can be extremely challenging for communities, sociologists have stressed the positive behaviours that are laid bare by disasters, such as “enhanced community morale, declines in crime and antisocial behaviour, reduction in status differences, [and] suspension of pre-disaster conflicts in the interest of community safety” (Tierney 2007: 505). However, these positive behaviours in the immediate aftermath of a disaster can quickly turn into contested actions in the recovery phase. Individuals seeking long-term change may welcome the destabilising force of a disaster – what is a disaster to one person might be an opportunity to another. This is because disasters are generally perceived to “accelerate changes that were underway before the disaster” (Oliver-Smith 1996: 313). Prudent players, for example, can take advantage of an uncertain situation and turn it to their

advantage. At the same time, disasters particularly test those structures in society that benefited from the *status quo*, as the weaknesses of these structures are laid bare and often magnify conflict in the recovery phase as different factions battle for power.

Thinking initially of natural disasters, the best-known example in the prehistoric Aegean world is probably the eruption of the Theran volcano in mature Late Minoan IA (1627-1600 BC; see Friedrich *et alii* 2006). The Theran eruption was not directly responsible for the demise of the Minoan civilisation – neither the earthquake nor the ash fall or tsunami were severe enough to destroy all of the Minoan cities, though they undoubtedly caused major disruption. Instead, it was the delayed social trauma of this natural disaster that, over time, destabilised the power base and religio-political standing of established elites and ultimately led to their demise and the emergence of regional chiefs (Driessen & Macdonald 1997). While natural disasters are often perceived in terms of material or human loss, the moral, behavioural, and spiritual consequences are equally severe. A helpful contemporary example is the eruption of Mount St. Helens (WA, USA) in 1980 (Driessen & Macdonald 1997). Despite scientific knowledge of what a volcanic eruption is and access to TV and radio for information, people living in the vicinity of the volcano experienced an increase in psychological stress: increases of 18 % in death rate, 21 % in emergency room visits, 200 % in stress-aggravated illnesses, 235 % in mental illness, 45 % in domestic violence and 37 % in aggression. One can only imagine how much greater these stresses would have been for prehistoric communities. These communities presumably explained the resulting tsunami, ash fall, earthquake and volcanic winter by reference to cosmological beliefs.

While the Theran eruption has left many observable traces behind, other natural disasters may go undetected archaeologically. Cohen (1977) suggested several proxy criteria by which times of real crisis could be detected, including the spread of settlement into new ecological zones, concentration on previously ignored micro-niches, change in utilisation of animal resources (especially a move to smaller and younger animals), and man-made environmental degradation. For crises of man-made origin, archaeologists will have to look elsewhere. Obvious markers are skeletal pathologies, weapon hoards, deposition of weapons in graves, and a distinct warrior iconography. Crises that do not have environmental or militaristic aspects at their heart – and may often result from internal restructuring rather than external intrusion – are much harder to detect and may require a subtler analysis of different aspects of material culture. Such crises may find themselves reflected in styles of clothing, architectural designs, food consumption or processing practices, ritual activities, or village layout. However, we cannot forecast in which aspects this stress might show itself; any aspect of material culture can potentially change in response to a crisis and illuminate the underlying social relationships (Hodder 1979).

2. Crisis as an event

As we have seen above, crises can be short-term events or longer-term processes. Archaeology, by the very nature of its evidence and methodology, is concerned with the *longue durée*. The analysis of events, *i.e.* singular moments in time that demonstrably transform social structures, is normally considered to be the sole prerogative of historians. Thus, if a specific event triggered a crisis, its occurrence is likely to go entirely unnoticed in the archaeological record. What may remain accessible, however, are succeeding major changes to the social structures made manifest in transformations to archaeologically visible material or landscape patterning. As it is all too clear, (pre)history happens first and is only understood later with the benefit of hindsight.

However, scholars in support of 'event archaeology' have recently put forward an argument that archaeology, too, is a discipline suited to investigating events (Beck *et alii* 2007 with comments and reply). Based on work by Giddens (1979; 1984), Sahlins (1981) and, particularly, Sewell Jr. (2005), the authors propose that archaeology, by focusing on spatial rather than temporal dimensions, is well equipped to identify and understand events. The built environment, ranging in scope from a hearth to buildings to entire city landscapes, permits us to recognise events when existing structures and patterns are interrupted and transformed. The authors caution, however, that not all changes to the built environment exemplify underlying social transformation. Eventful change is characterised by "coterminous changes in multiple kinds of material resources" (Beck *et alii* 2007: 836). Archaeology, when studied alongside textual material, can add vital new dimensions to our understandings of events. The added advantages of a focus on events is a move away from discussing change in a standard generalising manner, such as the emergence of social hierarchies, urbanisation, state formation, *etc*., where agency does not reside in human

actors, but in concepts. Whilst useful theoretical devices, the authors compare archaeology's reliance on such general concepts to the proverbial black box which ultimately masks true understanding.

While the authors' case studies are successful in bringing archaeology to bear upon events by examining the spatial dimensions of cultural discontinuity, *e.g*. the introduction of Christianity to Iceland or barrow constructions in Denmark, several archaeological commentators remained unconvinced of the explanatory potential of 'event archaeology'. At the most fundamental methodological level, Joyce (2007) questions whether social transformations find their expression in culture change. Instead, she draws attention to incidences where continuity in practices could mark equally transformative ruptures in a society's make-up. Similarly insightful is her comment on why we want to study events as categories in the first place, when, for the most part, we do not recognise life-changing events as we live through them. It is only with the benefit of hindsight that events become historic markers, indicating they belong to an etic rather than an emic category. Focusing on the inconsistencies between case studies and theoretical ideal, Whittle *et alii* (2007) highlight the discrepancy between the authors' concept of an event being a moment in time and their chosen case studies which actually speak about processes that took place over longer time scales and hence suffer from the inevitable conflated timescale experienced by all archaeologists. In the end, the article is a useful reminder of the power of archaeology to reveal spatial patterning. However, even if we are at times able to illuminate aspects of a specific event, the chronological resolution that archaeologists are capable of achieving makes this a rare occurrence.

3. A ceramicist's guide to crisis

Assuming that any aspect of society can potentially act as a flashpoint for a crisis, this section explores how such signs might manifest themselves in the pottery *chaîne opératoire* and offers ethnographic and archaeological examples for each stage.

3.1. Collection of raw materials

Clay, temper, slips, paints, glazes and pigments are important resources with varying availability in the immediate vicinity of a potter's workshop. Based on an analysis of 110 ethnographic case studies, Arnold (1985: 32-57) found that most clays were collected within a 7 km radius (range: <1 km to 50 km), while tempering materials were often procured in the immediate vicinity (range: <1 km to 24 km). Slips and paints – which were not needed in bulk – frequently travelled over greater distances, 800 km being the farthest recorded. The 7 km radius within which 85 % of potters source their raw materials, Arnold argues, correlates with their home territory that they are most familiar with through tending fields, herding animals, gathering plants and visiting relatives or friends (see also Rice 1987: 115-118).

In the archaeological record, we may be able to trace a crisis through changes in raw materials. A good example of such a process can be found in the Taos District of Rio Grande Valley in the state of New Mexico between the 12th and 14th c. AD (Fowles *et alii* 2007). During the Late Developmental period (1050-1190 AD) pottery production was dispersed among the hamlets in the valley. The heterogeneous nature of fabrics analysed shows that the potters travelled great distances to collect their raw materials – sometimes as much as 30 km – apparently choosing the best clay for each vessel type. Fowles and colleagues (2007: 130) interpret the relatively uniform range of variability across the valley as indicative of a socially permeable space where potters could choose from a wide variety of clay and temper resources without encountering social or political boundaries. As time went by, migration increased population almost ten-fold and people began to aggregate into larger villages between 1190 and 1260 AD (Early Coalition Period), and between 1260 and 1320 AD (Late Coalition Period) into one large aggregated village, T'aitöna. Two other large nucleated villages existed, one 16 km to the south and the other 18 km to the north of T'aitöna. Conflict seems to have accompanied these migrations and subsequent population nucleation as evidenced by defensive architectural features at T'aitöna. The authors argue that this growing tension between the villages led to the desertion of previously inhabited areas and the creation of an empty unsettled buffer zone around the village. Compositional fabric analyses allow us to detect this inter-village tension in concrete terms as the choice of fabrics in the Late Coalition period becomes restricted to a single – less desirable – source

located near T'aitöna. Clays from the buffer zone are no longer in use and signal that this stretch of land had become highly contested and thus inaccessible to potters. The same pattern can be observed for prime agricultural land situated within the buffer zone which was also deserted at this time (**Table 5.1**).

Period	Settlement pattern	Clay fabrics	Mobility of potters
Late Developmental period, 1050-1190 AD	Widely distributed hamlets	Potters use dispersed and geologically heterogenous clays and temper sources; most suitable clays chosen for each vessel type; heterogenous fabrics	Wide-ranging mobility; up to 30 km travelled
Late Coalition period, 1260-1320 AD	Large aggregated village with unsettled buffer zone	Potters relied on local clay and temper sources; clay choice dependent upon access to source; homogenous fabrics	Restricted mobility; within 1 km

Tab. 5.1 Taos District, Rio Grande Valley, New Mexico. Changes in pottery and settlement patterns (based on Fowles *et alii* 2007)

3.2. Clay preparation

Potters may be able to use clay without additional processing, but often some degree of manipulation is required to make it more usable either by removing inclusions, adding temper or both. This may involve the removal of small or large inclusions through cutting the clay and picking out stones, leaves, roots, and branches by hand, grinding or sieving, and levigating with water. Temper, such as quartz sand, shells, straw, or grog, may also be added to modify the properties of the clay and may have undergone some processing beforehand. Temper is often very distinct as it may be sourced from a different geological context than the base clay or because it is an intrusive organic compound (Rice 1987: 117-119).

Being a culturally embedded process, clay preparation is a helpful archaeological marker of crisis. Raw materials and processing techniques provide clues about desired physical, mechanical, thermal, or visual properties and hence potential social changes. Aspects that would be particularly visible are changes to the source region, temper type, size, frequency, proportions, or morphology. A conflict-related change in temper has been recognised for Early Bronze (EB) Age pottery from the settlement of Kastri on the island of Kythera, Greece (Broodbank & Kiriatzi 2007). Inhabited from the Final Neolithic (FN) to the Late Minoan (LM) IB period, Kastri, the main settlement on the island, housed a substantial and long-established community. A re-assessment by Broodbank and Kiriatzi (2007) of the excavated pottery from the lowest levels (α, β, γ) shows dramatic transformations in clay, temper, shape repertoire and decoration between deposits α and β/γ. Deposit α is dated to FN-EB II. It incorporates distinct imported and indigenous pottery traditions that made use of clay sources from north and central Kythera. Some of these traditions had strong stylistic affinities with Peloponnesian pottery. As regards temper, Kytheran potters preferred grog during this early phase. Grog temper is already well known from the Peloponnese where it was a common addition to potting clay during the Neolithic. Pottery from deposits β and γ (EB II-MB IA) is markedly different in repertoire, appearance, and manufacture to that found in deposit α. It belongs to a distinctly Cretan potting tradition that used sand as temper, a practice well-known from Crete since Early Minoan (EM) II.

Cretan imports are common in these deposits, while Helladic imports are virtually absent. While the two traditions were clearly demarcated, the analysis demonstrates a chronological overlap between deposits α and β/γ, hinting at a degree of cohabitation/coexistence of two different communities at Kastri. In addition, surface survey data show a partial spatial overlap between the two traditions across the island. It appears that the island's original indigenous population was gradually absorbed into or transplanted by an expanding immigrant Cretan community. Given the chronological and spatial overlap of the two traditions, the authors argue for a relatively peaceful process rather than a violent replacement, though hybrid vessels as a potential archaeological marker of this process are rare (Broodbank & Kiriatzi 2007). Regardless of whether this was a peaceful or conflict-rich transition, the Cretans brought with them traditions of distinct tempering materials that visually reflect the origin of this community.

3.3. Forming

Vessels can be made using many primary forming techniques or combinations of techniques and several techniques can be utilised on the same pot. Forming techniques are generally conceptualised along a spectrum ranging from fully hand-made to fully wheel-made products, with a wide range of hybrid techniques, such as wheel-coiling, occupying the middle ground. Best known primary forming techniques are pinching, drawing, coiling, moulding, and wheel-throwing (Rice 1987: 124-135). Forming techniques are normally acquired through some form of apprenticeship. Apprentices learn specialised gestures and motor habits through repeated practice and are thus embedded in wider knowledge networks. Because learning how to form vessels requires direct involvement by the teacher – for example by demonstrating or by correcting mistakes – and because learnt gestures develop into involuntary motor habits, forming techniques often represent the most individual and rooted aspects of social identity, including kinship, learning networks, gender, and social class (Gosselain 1998; 2000; Gelbert 1999). As a consequence, changes to forming techniques can reflect major crises in an individual's or a community's life.

The first appearance of the wheel-coiling technique in the Southern Levant during the second half of the 5th millennium BC and its disappearance 300 years later indicates just such a social crisis (Roux 2003; 2010). During these 300 years, wheel-coiling was used exclusively for the manufacture of V-shaped bowls, a ceremonial vessel used in domestic, funerary, and sanctuary contexts. Wheel-coiling is fundamentally different from established hand-made techniques and requires an entirely new set of conceptual skills (*e.g.* rotative kinetic energy) and motor habits (*e.g.* two-handed stabilisation of the arms). Its emergence has been linked to a demand by emerging elites for a monopoly on a distinct ceremonial vessel. Thus, the existence of this package is inextricably linked to the fortunes of the elite (Roux 2003; 2010). In Early Bronze I (4th millennium BC) the existing social structures collapsed, and three-quarters of all settlements disappeared together with the wheel-coiling technique. Wheel-coiling only re-emerged in EB II-III when it remained limited to an estimated 3 % of the entire ceramic production. The revival of this forming technique coincides with the construction of fortified cities with monumental architecture, hinting again at an elite context for its production and consumption. When the fortified cities collapsed in EB IV (end of the 3rd millennium) wheel-coiling also vanished again. It is only in the 2nd millennium that wheel-coiling re-appeared, was readily adopted and developed into the most dominant technique by the Middle Bronze II (Roux 2003; 2010). Roux (2003) argues that the difference between the aborted development of the wheel-coiling technique on the one hand and its widespread use on the other lies within the craft production context. In the EBA, the skill to execute this technique was limited to a small number of attached craft specialists; transmission of the technique was exclusively within this circle of practitioners who specialised in the production of a limited repertoire of shapes for the elites. Roux (2010) calls this a closed system of innovation. With its fortunes tied to the fortunes of individual elites, wheel-coiling went out of use when the elites collapsed. In this instance, the disappearance and reappearance of a forming technique is a direct reflection of developments in the political sphere and may indeed act as a poignant marker of times of change. Contrasting with this are open systems of innovation, such as the adoption of wheel-coiling in the MBA, where the skill spreads beyond the initial group of inventors and is adopted by a wider community of craftspeople. Its success and spread are no longer dependent on a specific socio-political group but are governed by broader social, cultural or political traditions at play within a society. Here, pottery's potential to act as an indicator of troubled times is less apparent as transitions would be more gradual and diffuse.

3.4. Surface treatments

Many of the characteristics of clay pots are easily visible to other potters, customers, relatives, and neighbours. The most visible are surface treatments, decoration, and motif design. As a consequence, these features are more easily transmittable, fluctuate through time, and reflect the more superficial, situational, and temporary facets of identity; they often are highly responsive to changing social, economic, or symbolic pressures (Gosselain 2000). Because of their visibility and responsiveness to change, surface treatment and decoration can quickly display coded messages in crisis situations. Often, however, it is not so much a change in surface treatment that indicates times of trouble but rather firm adherence to mutually exclusive design motifs/decorative types that signal greater group definition either side of a social or political boundary, revealing conflict between these communities (Hodder 1982). The message communicated by surface treatments or design motives may be unconscious – what Sackett (1985) would call 'passive' style – or conscious, *i.e.* 'active' style. While a conceptual dichotomy between active and passive style is attractive for its simplicity, it overgeneralises the function of style. Instead, most makers and consumers would be aware to some degree of the socio-political message encoded in a given style, something that Giddens (1979) refers to as the concept of 'practical consciousness'.

'Practical consciousness' is undoubtedly present among the women potters in Conambo, Ecuador. This evocative case study on the responsiveness of pottery decoration to political change investigates the domestic production of painted beer (*chicha*) drinking bowls in Conambo (Bowser 2000). All adult women, whether married, unmarried or widowed, make *chicha* bowls. The designs painted on the bowls are unique to each female potter. Although used in domestic rather than public consumption events, the *chicha* bowls are highly visible. This is because decisions affecting the entire community of Conambo are reached through consensus-building, requiring regular visits to each other's households. As part of a visit, male and female visitors will always be offered *chicha*. *Chicha* bowls are therefore afforded a constant presence during all visits – from negotiations and discussions around personal matters to problem-solving or conflict resolution between families and even high-level community politics.

The village is divided into two political factions, the Achuar and the Quichua. Affiliation with a political group is independent of a person's ethnic background and can shift throughout a person's lifetime. Comparing the women's political affiliation with the designs painted on 40 *chicha* bowls (variables include symmetry, framing lines, colour, and design elements), Bowser (2000) was able to show a significant correlation between the two. Unexpectedly, this correlation was considerably stronger than a link between style and ethnicity (*i.e.* early enculturation patterns) in this community. Equally important were her findings that women were aware of the meaning of their design styles and, when questioned, were able to assign them accurately to political affiliation with an average accuracy of 70 %. Examples of 'ambiguous' designs were shown to belong to women who had established strong cross-coalitional political alliances and for whom it was particularly important to appear neutral and impartial. Painted designs on this Ecuadorian domestic pottery type thus strongly reflect political alliances that can change throughout a person's life, and these political messages are understood accurately by both insiders and outsiders (Bowser 2000). In this example, decoration is a good potential indicator of times of crises at the level of the individual as it tracks the women's satisfaction, neutrality or rejection of a political view visually.

3.5. Firing

Firing is essential to expel water from the clay body and harden it for subsequent use. Factors that influence firing are the clay's composition and the time, temperature, and atmosphere of the firing. Archaeologists generally distinguish between kiln fires and open-air fires whereby the latter are considered to be more variable and less controlled (Rice 1987: 80-110). As an activity that often involves a wider group, be it colleagues or family members, it is publicly semi-visible and thus open to manipulation. The firing is able to communicate crises moments, with change being reflected in the firing structure used, temperatures achieved, fuel used, or the organisation of the firing process.

Firing times and temperatures mark a long-standing conflict between the lower and upper barrio potters at Las Animas in the Northern Andes. Dedicated to ceramic production (especially copying archaeological artefacts) since the 1960s, the village is divided by a riverbed into two areas: that of the potters and that of the merchants. The potters' region is further subdivided into a lower and an upper sector, each employing distinct manufacturing and

firing techniques. Upper town potters are men who use the free-form method (*i.e.* figurines and pots are built up slowly using small pieces of clay) and artefacts are sold in up-scale tourist markets; their income is higher. Lower town potters are predominantly female, use the prop method (*i.e.* figurines and pots are formed with the help of a mould) and "sell in street markets and lower-priced tourist shops"; they are economically worse off (Hosler 1996: 63). Although these gender and wealth differences pre-date pottery production, they quickly found a highly visible expression in this technical domain.

While there are some similarities in the firing, there are also marked differences. All potters exploit the same clay deposits *ca*. 50 km outside of Las Animas. These deposits provide black and yellow clays which they mix in equal proportions. River sand is added as temper and large organic objects and pebbles are removed by hand or the clay is sieved. Depending on the size of the artifacts, potters choose either the traditional raised free-standing indoor cooking hearth or a pit for firing. All potters fire at temperatures over 600° C for at least 10 minutes. However, upper town potters use a mix of slow- and fast-burning woods resulting in longer firing durations and higher temperatures than their lower town counterparts who only use fast-burning woods. Intriguingly, pottery production is so strongly interwoven with a person's birthplace in the village that lower town female potters who marry upper town male potters continue to use their traditional prop method manufacturing sequence and do not switch to the free-form style. Hosler (1996) thus argues that the stringent technological division in firing and manufacturing techniques mirrors and reinforces long-standing conflict in the village's social, status and gender matrix.

4. Discussion

From the ethnographic and archaeological case studies discussed above, we can surmise that crisis or conflict can potentially manifest itself in any stage of the *chaîne opératoire*: clay collection, clay preparation, forming, decorating, or firing. While my argument was intentionally broken down into individual aspects of the *chaîne opératoire* to highlight how conflict might be reflected in each stage, it is a characteristic of all the above conflict situations that several stages of the *chaîne opératoire* would normally be affected simultaneously. If change is limited to one feature only, it does not (yet) constitute a true crisis which, according to its definition, requires the involvement of several societal subsystems (Oliver-Smith 1999). Setting aside extreme natural disasters and major wars, social inequality, status differences, gender discrimination, and differential access to land resources seem to be major drivers for inter-/intra-societal conflict in the above examples. The resulting archaeological pattern is equally diverse and can be classified into three distinct categories: 1) clearly delineated *chaîne opératoire* boundaries between two relatively evenly matched but contesting social units, 2) the complete demise of one type of pottery in favour of a new one as one social unit succumbs to another, or 3) hybrid scenarios where there is a degree of ongoing negotiation and arrangement. The degree of distinctiveness or hybridity is governed by the attitudes of the parties involved. DeLanda (2016) has drawn attention to two issues in this respect: territorialisation and codification. Territorialisation refers to both the physical boundary between social groups and the degree of homogeneity within each group. The more strongly opposed the groups ('them' vs 'us'), the stronger the territorialisation effect and the more clearly marked the geographic, material, and behavioural boundaries. In contrast, hybridity emerges where these societies are more permeable, mobile and more accepting of differences. The degree of codification indicates to which extent practices, manners, and objects are required to perform to an accepted communal standard – the greater the standardisation, the stronger the coding. Societies with great material and behavioural variability are thus more open while those with strong coding are highly controlled and rigid.

While the above case studies have demonstrated that changes in pottery may indeed reflect times of trouble, the question now is whether it is possible to reverse the argument. Can we assume that all crises result in recognisable changes in the *chaîne opératoire*? Can we postulate a consistent and predictive relationship between the two? Adams (1979) was the first to tackle this issue head-on in relation to Nubian ceramics. Having studied the Nubian ceramic sequence from 200 to 1550 AD, he identified a number of major and minor changes in ware categories in relation to key variables, such as method of manufacture, fabric and temper, surface treatment, vessel form, paint colours, and decorative methods (Adams 1979: figs 2-4). Considering the overall pattern, Adams believes gradual change to have been an ever-present feature of Nubian pottery production. Radical or revolutionary change that involved several variables simultaneously, however, occurred only at two points in the ceramic development and

should, if ceramics acted as a marker of change, correspond to major socio-political transformations in Nubian society. The first is dated to *ca*. 350 AD when wheel-made pottery changed radically in all of the variables except shape repertoire. The second falls around 850 AD and shows dramatic modifications in all variables except shape and surface finish. The first instance may possibly be linked to the collapse of the Kushite Empire which then led to the disappearance of Meroitic pottery. The second ceramic revolution, however, took place at a time when the Kingdom of Makouria was stable and prospered, a time period that is generally considered to have been without external or internal sources of conflict. In contrast, "the introduction of Christianity in the 6th century, although it was immediately reflected in architectural, artistic, and literary canons, had no measurable impact on Nubian pottery until 250 years later" (Adams 1979: 732). In the end, Adams concludes that the relationship between changes in Nubian pottery and major historical processes in the region was indirect, complex, and imperfect, and is therefore ultimately unpredictable. Pottery may change quickly or slowly, one or many variables may be affected, and ware groups may be impacted differently. While often culturally sensitive the relationship between crises and pottery production must be demonstrated first, not presumed *a priori*.

Adams is not alone in his views and many of the paper's commentators (*e.g*. Abel 1979; Arnold 1979; Chittick 1979; Davis 1979; de Maret 1979; Fattovich 1979; Franken 1979; Kolb 1979; Simmons 1979; Syms 1979) agree with his initial assessment that pottery and socio-political history do not directly mirror each other, or argue that they may do so in imprecise and as yet poorly understood ways (see also Tschopic 1950). Applying these insights to the topic of this workshop indicates that pottery specialists cannot assume *a priori* that changes in the *chaîne opératoire* reflect crises, conflict, or tensions within a community. Nor does the reverse apply: times of trouble do not express themselves in a straight-forward manner in the ceramic sphere. Instead, archaeologists must be attentive to the symbolic, social, economic, political, and technological contexts and must meticulously explore the minutia of each case – whilst always being alert to circular reasoning and untested assumptions. At times we may be able to determine social relationships, at other times we may come up empty-handed.

Ethnographic case studies are in strong support of such a nuanced and situational approach. As Gosselain (2008: 174-175) has argued in relation to his large-scale analysis of African potting traditions, "cultural phenomena are never reducible to simple, bounded entities". Instead, we need to be aware that our categories are by their very nature only artificial constructs trying to instil order into a complex, ever-developing process of cultural practices and dynamics whereby potters continuously mix, borrow, invent, manipulate and re-evaluate their craft within the context of their communities.

Whilst acknowledging the 'messiness' of the archaeological record, one cannot help but wonder whether some patterns and relationships can be discerned more easily or are more meaningful than others. Gosselain's concept of social visibility might offer some methodological inroads. In his seminal paper, Gosselain (2000) suggests that different aspects of the ceramic *chaîne opératoire* have different degrees of social visibility. Based on his Cameroonian case study, he distinguishes between three socio-technical categories:

- Techniques that leave visible evidence on the finished product (*e.g.* tempering or mixing clays, secondary forming techniques, decoration, certain firing techniques, and most post-firing treatments). Easily visible features allow other potters, customers, relatives, and neighbours to be aware of an individual's techniques. As a consequence, these features are easily transmittable, fluctuate through time and reflect the more superficial, situational, and temporary facets of identity; they often are a response to changing social, economic, or symbolic pressures.
- Techniques that leave no visible traces on the finished product but are observed by fellow workers, especially when the work is done on a collective basis (*e.g.* clay selection, extraction, processing, and firing). Consequently, modifications are likely to reflect adjustments to local or regional identities.
- Techniques that do not leave visible traces on the finished product (*e.g.* primary forming techniques which are generally obliterated by secondary forming treatments). They are most resistant to change as they are based on specialised gestures and motor habits acquired through repeated practice. Thus, primary forming techniques reflect the most individual and rooted aspects of social identity, including kinship, learning networks, gender, and social class (Gosselain 1998; 2000).

Revisiting the conflict case studies summarised above, one cannot help but observe a degree of overlap between them and Gosselain's proposal. In the Las Animas community of the Northern Andes, for example, forming and

firing are tightly linked with the most deep-rooted aspects of a person's identity, namely gender and social class. In contrast, affiliation with political factions in Conambo, Ecuador, an altogether more fluid dynamic, is visible in the quick reactions to changes displayed in the decoration. Whether the relationship between different levels of social visibility and different types of identities could be considered a predictive one, is doubtful given Gosselain's subsequent research which showed much greater heterogeneity in practices than previously imagined – practices which do not coincide with any social or political boundaries (Gosselain 2008; 2011). Forming techniques more frequently – though not always – display a correlation between technique and linguistic, political, or social groupings. Gosselain (2000: 208) believes that this is due to forming techniques encapsulating "the core of people's identity, that part which probably most firmly rooted and hence most difficult to mask or erase".

Although Gosselain's ethnographic case studies show considerable diversity in how different identities manifest themselves, degrees of social visibility in the *chaîne opératoire* may nevertheless retain their conceptual value if we reformulate Gosselain's proposal slightly. Instead of assuming that pottery reveals a straight-forward set of predetermined identities according to the social visibility of each manufacturing stage (*e.g.* ethnicity = forming technique; political factions = decoration), they rather reveal what a community considers to be more or less important structuring agents. Facets of identity considered to be most central and significant to an individual or community are encapsulated in the choice of forming technique. In contrast, those facets of identity embedded in more visible stages of the *chaîne opératoire* (*e.g.* decoration, firing) are of lesser relevance for the community's self-consciousness at any given point in time. The reformulated model would thus suggest that forming techniques reflect whichever aspects a community considers to be the most deep-rooted and central to their core identity. This may be ethnicity or linguistic groupings (as identified by Gosselain's 2000 case study), or it could be gender, social status, or economic power. The advantage of this reformulation is that it takes into account Gosselain's findings from his later case studies (2008; 2011) which demonstrate that there is much greater variability than suggested by his original case study published in 2000. By asking the question of what aspect a community or individual considers most crucial and central to their identity, we are acknowledging the great diversity of possible cultural scenarios. Further work is required to test this hypothesis more broadly.

5. Case study: Phylakopi on Melos

Bearing the various methodological issues in mind, let us now explore the relationship between ceramic production at Bronze Age Phylakopi on Melos (Greece) and times of crisis in this island community.

The settlement of Phylakopi, located on the north-eastern coast of the island of Melos, saw several phases of excavation between the 19th and 20th c. AD which revealed a Bronze Age town of *ca.* 80 m x 200 m (Atkinson *et alii* 1904; Dawkins & Droop 1910-1911; Renfrew 2007). The town had already reached a considerable size by the end of the Early Bronze Age (Phylakopi I). The Middle Bronze Age town (Phylakopi II) was at least of equal size, even though the stratigraphy is not fully clear due to the overlying later remains. Currently, no public or specialised buildings that could be indicative of a central authority are known from this phase. After a destruction at the end of the Middle Cycladic period (MC), the site was levelled and re-built. The Late Bronze Age town (Phylakopi III) extends over *ca.* 2 ha. The presence of an impressive Late Cycladic (LC) I fortification wall and of a new imposing Mansion, a large special-purpose building, speaks to some kind of central organisation. Pottery remains suggest that the Mansion went out of use sometime in LC II. The discovery nearby of two fragments from one Linear A tablet – a system of writing used in Crete at this time – might indicate the use of some administrative system at Phylakopi, with the Mansion as the likely organisational centre (Renfrew & Wagstaff 1982: 39). The turn from Phylakopi III to IV is marked by the construction of a Megaron (dated to LC III, corresponding with Late Helladic IIIA) and the building of a sanctuary. The town of Phylakopi was finally abandoned in the 11th c. BC.

The stratigraphic and architectural information available from Phylakopi shows two major disruptions in the settlement's life. The first can be dated to the end of the MBA when Phylakopi II was levelled in its entirety and rebuilt as Phylakopi III in the LC I period with an (extended) fortification wall and the Mansion. The second hiatus occurred when the Megaron was built in the LC III period. This latter event is beyond the scope of this article.

Different causes have been proposed for the major destructions at the end of the MC period. Atkinson *et alii* (1904) assumed that they were due to earthquake damage. However, Renfrew is less specific and simply alludes to them as 'destructions' (Renfrew 2007). The existence of a major levelling episode could equally be interpreted

as a necessity following the earthquake destruction or as an independent major rebuilding project by the local community. In either case, it could signal a time of crisis – either the result of a natural disaster or as the result of social and political re-negotiations among inhabitants. The construction of the Mansion, a central building with possible evidence of administrative function in the form of a Linear A tablet, on top of the levelling layer would at first glance favour the second alternative and may indicate the emergence of a new ruling elite. However, we have also seen in our discussion about disasters that these events often can act as a catalyst for the emergence of new power players who may have been lying in wait and biding their time for an opportunity to arise. An earthquake could have afforded the necessary trigger by undermining existing power structures, questioning existing cosmologies and highlighting the benefits of a newly emerging elite. Regardless of the cause, the action of levelling the entire town must represent a time of heightened stress for all inhabitants.

A unique and complete assemblage of pottery covering the Middle and Late Cycladic period is available to test our hypothesis. While mostly fragmentary in preservation, I was able to study *ca*. 90,000 sherds and *ca.* 400 complete vessels from Renfrew's 1974-1977 Phylakopi excavations (Renfrew 2007). The goal of the excavations was primarily to clarify the stratigraphy and dating of specific buildings or structures in different parts of the sites. As a consequence, the trenches were unconnected. However, thanks to seriation studies undertaken by Davis and Cherry (1984; 2007) and myself (Berg 2000) we have a very good understanding of the pottery's development through time across all trenches (Berg 2007a).

5.1. Middle Cycladic (Tables 5.2-5.3)

The statistical analysis shows that there was no discernible development of the local pottery in the MC deposits. This led the excavators to argue that these deposits represented a mixed levelling fill on which the later Late Cycladic I town was built. The assemblage is characterised by plentiful amounts of local burnished and slipped wares. Cycladic White Ware is also present in some quantity while handleless cups (*i.e.* conical, bell-shaped, and straight-sided cups and saucers) – hallmarks of Minoan Crete at this time – are rare. These features, together with the presence of curvilinear and some naturalistic decoration date the pottery to the later MC period, roughly contemporary with the Middle Minoan (MM) III phase on Crete (Barber 2007). Only hand-made forming techniques existed, representing the traditional way of potting at Phylakopi. Wheel-throwing was limited to a small number of handleless cups, imitating not only a Minoan shape, but also their Minoan mode of production. Imports reached the site from Crete (MM II to MM IIIB/LM IA), Kea, and the Greek mainland (Grey Minyan and painted Middle Helladic Wares). Only imports from Crete are relatively numerous in numbers.

Variable	late MC	early LC I	middle LC I	late LC I/LC II
Burnished	6.6%	3.4%	2.1%	1.1%
Slipped	8.3%	5.8%	1.5%	1.3%
Painted	18.7%	16.7%	16.4%	17.3%
Plain	62.6%	65.6%	65.9%	54%
Handmade (only local fabric)	98.6%	89.5%	90.9%	87.1%
Wheelmade (only local fabric)	1.4%	10.5%	9.1%	12.9%
conical cup	0.3%	5.4%	12.1%	23.3%
Cycladic White	1.9%	0.8%	1.5%	0.5%
Keian	0.02%	0.4%	0.08%	0.3%
MM	1.0%	0.08%	0.06%	0.03%
LM	0.03%	0.9%	0.1%	0.2%
Grey Minyan	0.4%	0.1%19-	0.03%	0.03%
Mycenaean	0.06%	0.5%	0.1%	1.6%

TAB. 5.2 DEVELOPMENT OF CERAMIC VARIABLES THROUGH TIME (BY THE AUTHOR)

5.2. Early Late Cycladic I (Tables 5.2-5.3)

The early LC I layers lie stratigraphically directly above the MC levelling fill and are contemporary with early LM IA on Crete. This phase sees a dramatic increase in wheel-thrown handleless (mainly of conical type) cups to around 5 % of the entire assemblage, and with it, we see the first application of the wheel-throwing technique to local cup types. However, most local shapes continue to be made by hand in the traditional way. Burnished and slipped wares have decreased in popularity. Imports firmly dated to LM IA are now present from Crete in some quantities. Popular LM IA motifs (grass, spiral, and tortoiseshell ripple) also become fashionable for use on locally produced Minoanising vessels. Imports from Mainland Greece, Kea, and other not determined locations remain small in numbers. Grey Minyan imports ceased with the end of the Middle Bronze Age.

5.3. Middle Late Cycladic I (Tables 5.2-5.3)

These deposits cover the middle phase of LC I, characterised by a lack of LM IB imports and the almost complete disappearance of MC burnished and slipped wares. Cycladic White Ware remains popular. The success of the handleless cups continues, now adding up to 12 %, most of which are of the conical type and wheel-thrown. Wheel-throwing extends to some local cup types, but traditional hand-made techniques remain dominant also in this phase. Imports from the Greek mainland, Crete (LM IA), Kea and other sources are present in small numbers. Decorative motifs of LM IA origin continue to be popular.

5.4. Late Late Cycladic I - Late Cycladic II (Tables 5.2-5.3)

The final phase of LC I and LC II are characterised by LM IB imports from Crete. As Barber (1981: 7) remarked, there are no obvious differences between LC I and LC II; it is only the presence of LM IB/LH IIA imports which suggests that this phase stretches into the LC II period. The handleless cup percentage gradually increases to about 23 %, almost all of which are of the conical type and wheel-thrown. Minoanising shapes, including medium- and large-sized vessels, are increasingly made with the help of the wheel. This forming technique has also spread more widely among the local production: up to 13 % of the local wares are made using the wheel although the majority remain hand-made. Imports from Crete, Kea and elsewhere, as well as local Cycladic White Ware are present in small amounts only. Imports from mainland Greece are increasing in number and have become by far the most popular import in this period. Established motifs of Minoan origin, however, continue to be present.

6. Assessing the link between crisis and pottery at Phylakopi

Based on the seriation study, we can observe many changes through time within this MC to LC II pottery assemblage from Phylakopi. However, most of these changes are of a gradual rather than abrupt nature: burnished and slipped wares waned slowly through time, Cycladic White Ware gradually became less important and Minoanising shapes and motifs increased progressively. Abrupt changes are rare and do not necessarily coincide with the boundaries of recorded phases. The first marked change is the cessation of Grey Minyan imports with the end of the Middle Bronze Age. The second abrupt change is the introduction of locally produced Minoan-style handleless conical cups alongside the adoption of the potter's wheel during the late Middle Bronze Age. However, this change occurred within the late MC period rather than at the junction between the Middle and Late Bronze Age. During the LC I-II periods, the trends set in motion during the late MC period continue without any significant hiatus. Likewise, a statistical analysis of the handleless conical cup production at Phylakopi shows that they lacked standardisation throughout the Late Bronze Age, indicating that there was no conscious or unconscious attempt to make conical cups adhere to a rigid idealised shape (*i.e.* lack of codification) or producer/workshop specialisation that could have led to a more standardised product. This is in stark contrast to conical cups at Haghia Irini on Kea which became more standardised over time, possibly suggesting increasing competition between potting workshops (Berg 2004) and stricter codification. It has to be concluded, therefore, that the early LC I levelling event did not in itself cause or reflect a social or cultural crisis in the community that expressed itself in the pottery.

	late MC	early/middle LC I	late LC I/LC II
Cycladic bowl	hand	hand	hand
Melian bowl	hand	hand	hand
other bowls	hand	hand	hand
panelled cup	hand	hand and wheel	hand
hemispherical cup	hand	hand and wheel	hand and wheel
tumbler	hand	hand	---
semiglobular cup	hand	hand	wheel
rounded cup	hand	wheel	wheel
conical cup	wheel	wheel	wheel
bell cup	wheel	wheel	wheel
straight-sided cup	wheel	wheel	wheel
saucer	wheel	wheel	wheel
jugs	hand	hand	hand
jars	hand	hand	hand
bridge-spouted/ hole-mouthed jars	hand	hand	hand
amphora	hand	hand	hand and wheel
buckets/cooking pots/ **tripod cooking pots**	hand	hand	hand
basins	hand	hand	hand
pithoid jar/pithos	hand	hand	hand
tub	hand	hand	hand
lamp	hand	hand	hand and wheel
rhyton	---	hand and wheel	wheel

Tab. 5.3 Development of dominant forming technique at Phylakopi (all local fabrics; Minoanising shapes in bold; hand = hand-made; wheel = wheel-made; hand and wheel = equal proportions of hand-made and wheel-made) (by the author)

This is not to say that there was no conflict in the community. However, the conflict that did exist was encapsulated in more subtle details of shape morphology and design than the broad stratigraphic patterns discussed above. A careful study of the local pottery production shows a clear separation into a 'traditional production' and a 'Minoanising production' (**Fig. 5.1**). The traditional production utilises hand-made techniques to produce Cycladic shapes with Cycladic surface treatments and motifs. In contrast, the Minoanising production imitates Minoan shapes using the potter's wheel and decorates them with Minoan-style designs. Minoanising shapes include several types of cups, lamps, amphorae, and rhyta. Large Minoanising shapes, such as hole-mouthed jars, bridge-spouted jars, and cooking pots, are normally hand-built, although a few wheel-made jars exist. Hybrid vessels, namely vessels that combined Minoanising and local features in non-deterministic ways are present but are small in number.

Further analysis demonstrates that the traditional *vs* Minoanising divide permeated all aspects of the pottery production, including fabric, forming technique, and decoration (Berg 2007b): the 'conical cup' fabric was exclusively used for small, open Minoanising shapes which were wheel-thrown. Cycladic White Ware was primarily used for local shapes which were hand-made. The local fabric was used for both, but Minoanising shapes were regularly wheel-made while those following the local tradition predominantly used hand-building techniques. Decoration also follows this trend. Minoanising motifs are more commonly found on Minoanising shapes and traditional motifs on local shapes. When the local fabric was used for Minoanising shapes a pale slip was often added to mirror the pale Cretan clay. Potter's marks only occur on local shapes and never on Minoanising ones.

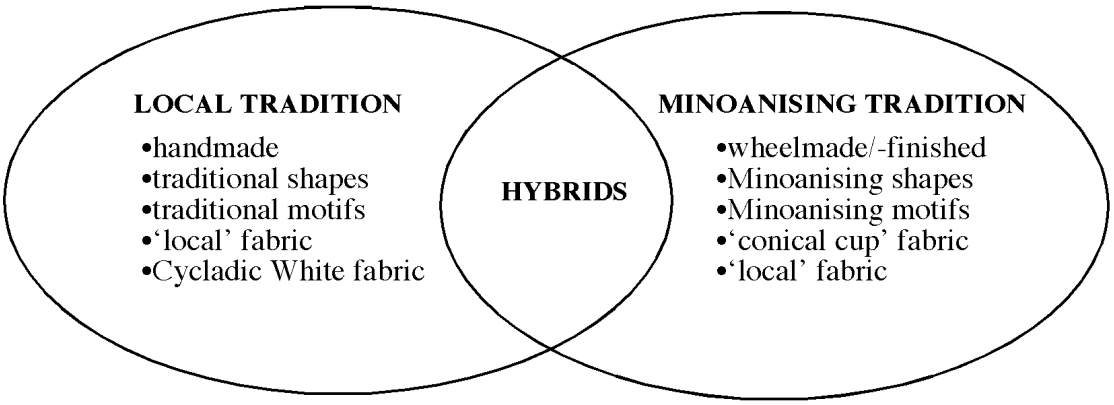

Fig. 5.1 Conceptualising the pottery production at Phylakopi (by the author)

How to explain the division of the pottery production at Phylakopi? On one hand, we have the rapid adoption of easily discernible features, such as fabric colour, Minoan shapes and motifs. Being highly visible, the adoption of these features signals more superficial desires and may have been a response to customer demand, reflecting what Wiener (1984) has called the 'Versailles effect', namely the adoption of a cultural trend seen as superior or more fashionable. On the other hand, the hesitant application of a new forming technique beyond Minoanising shapes and the resulting technological division in the pottery production at Phylakopi into a traditional hand-made and Minoanising wheel-made mode (with hybrid vessels signalling a degree of overlap) are indications of a deep-rooted division among potters – and quite possibly also reflect the attitude of the wider Phylakopi community. These new pottery types and forming techniques question aspects of identity, such as kinship, identity, or gender, and highlight how contested and controversial the introduction of Minoan shapes and technologies may have been. The fact that they were adopted and subsequently spread in popularity, indicates the community's desire to align themselves with wider technological innovations, fashion trends, and consumption habits (Berg 2007b).

However, debates within Melian society are likely to have gone well beyond technical dimensions related to pottery manufacture: most of the Minoanising vessels, such as handleless cups, jugs, and jars, can be categorised as serving vessels. Their social significance lies in their presence during private and public drinking activities. One of the possible beverages that may have been consumed during these activities was wine. In relation to Crete, Hamilakis (1996; 1999) has discussed the importance of wine in socially-visible consumption activities due to its intoxicating properties. Characterised by an unsystematic management in the Early Minoan period, wine exploitation becomes more systematic in the palatial periods. The spatial distribution of wine installations and archaeobotanical evidence particularly focuses on sites of palatial character (*e.g.* palaces, villas) and elite houses in high-ranking sites. Unlike cereals and pulses, for example, vine is labour-intensive to produce and is a riskier crop to grow. Far from being a subsistence crop, the fact that wine is considered an elite item in the Linear B tablets makes it likely that it held a similarly high social position in Minoan society and was related to feasting and drinking ceremonies and intra-elite gift exchange (Hamilakis 1996). It is likely, therefore, that the adoption of handleless cups at Phylakopi is much more than an attempt to 'buy into' a new ceramic serving-set design. It illustrates the imitation of foreign culinary practices and elite social strategies with the aim of negotiating social relations and consolidating and legitimating power between local factions. As such, wine acted as "a barometer of the constant and endemic instabilities" (Hamilakis 1999: 50).

However, given the existence of hybrid vessels that combine Minoanising and local features in non-deterministic ways, we know that codification and territorialisation were not as rigid as they might have been (DeLanda 2016). While the traditional and Minoanising groups were clearly differentiated in their practices and materials, the existence of hybrid vessels alerts us to a certain degree of openness, diversity, and tolerance among producers and consumers. On one hand, cultural norms were enforced strictly, but on the other, potters also had some room for diversity and individual expression.

In contrast, the ceramic record at Haghia Irini on Kea, a Cycladic island a little further north, shows no hint of a

conceptual division. There, the adoption of Minoan shapes and the wheel-throwing technology were much more inclusive, impacting on local shapes to a much greater degree. The new technology was incorporated into the potter's repertoire without resulting in any kind of division, indicating less conflict about the social trajectory of the community (Berg 2007b). Phrased in terms of the concepts of codification and territorialisation (DeLanda 2016) introduced above, the lack of codification (rigidly adhered to repertoire categories) and territorialisation ('them *vs* us' dichotomies) indicates that the inhabitants of Haghia Irini were generally open to new challenges and accepting of diversity (DeLanda 2016).

If we accept that technology is socially constituted, then the patterns we have observed in the pottery manufacture at Phylakopi can be regarded as an expression of wider socio-cultural attitudes. During the Middle Bronze Age, Melians had a strong local identity which manifested itself in an accepted system of manufacture: vessels were made using hand-forming techniques, local shapes were valued highly, decorative patterns were traditional and clay choices remained stable over a long time. Outside influences, such as Grey Minyan Ware from the Greek mainland, were visible, but considerably less popular than at Haghia Irini, for example. Thus, both codification and territorialisation were very pronounced during this phase.

The influx of Minoan objects, technologies, and practices from the Middle Bronze Age onwards gradually began to undermine this rigid self-definition, leading to a society characterised by deep tensions between those wedded to traditional ways and those open to new (Minoan) influences. The existence of hybrid vessels shows that there may have been individuals occupying the middle-ground. The levelling of the Middle Bronze Age town, the erection of the Mansion and the possible use of Minoan-style administration in the Late Cycladic period appears to indicate that the local elites had firmly aligned themselves with the new 'brand'. In contrast, the continuing division in the pottery production suggests a more hesitant attitude by the general population. Such hesitation is not visible at Haghia Irini which readily incorporated Minoan features into many aspects of its material culture (and perhaps even belief systems) and where the pottery production has shown no equivalent separation (Berg 2007a).

7. Conclusions

Culture change is an ever-present issue in archaeology. However, its relevance to times of trouble, disasters, crises, and the like, has largely gone unexplored. Pottery, like any other item of material culture, has the ability to encapsulate and communicate messages about cultural norms, political alliances, and religious beliefs. As the above case studies have demonstrated, such transformations may reflect times of crisis when traditions are contested, old ways of life challenged, and new alliances created. However, contrary to Grieder's quote at the beginning of this article, no predictive relationship between ceramic change and societal conflicts or tensions can be established. Times of crisis may – or may not – express themselves in the ceramic *chaîne opératoire*. While ceramics certainly have the potential to be very sensitive to change, cultural change may, of course, manifest itself in any aspects of material culture, practices or technologies – ceramic or otherwise. Likewise, conflict and societal responses to it may not necessarily be synchronous. A crisis may be sudden with cultural change only occurring as a delayed response or, in contrast, a conflict situation may have been bubbling underneath the surface for some time, but only erupts forcefully at a later stage. Thus, each crisis scenario will need to be investigated on its own terms, utilising a contextual approach.

Alongside a careful analysis of the historical context, I have found particularly helpful the concepts of territorialisation and codification which highlight the degree of rigidity and control that exist within a given society and provide insights into heightened levels of disagreements within a community or between factions. The visibility of individual stages of the *chaîne opératoire* might provide additional information and may highlight which issues are at the very core of a society's self-perception. As such, these approaches and concepts might also be of use to archaeologists working with other material classes.

As regards my own case study, the major period of upheaval in Phylakopi can be dated to the end of the MC period when the town was entirely rebuilt. Two scenarios can be proposed for this rebuilding episode: an earthquake and a political power struggle. If the destruction of the town was the result of an earthquake, then the event would have occurred suddenly and unexpectedly. Change in the pottery production could only have manifested itself subsequently. If the destruction layer and the subsequent rebuilding of the town with a central building symbolise a political power struggle, one might expect expressions of this struggle to be present already in the MC period.

The picture of the Melian pottery production is clear: it points to a gradual development with trends uninterruptedly continuing from the MC period into LC II. The rebuilding of the town did not alter the trajectory of ceramic change. The rise of Minoan pottery had already been set in motion in the Middle Cycladic period with Cretan imports and the local production of Minoanising handleless cups but gathered greater speed in LC I as Minoan imports decreased and local production of an ever-wider range of Minoanising shapes filled the gap. It is only in a subtler analysis of the pottery manufacture – with particular emphasis on forming techniques – that we can see the underlying tensions between different societal groups at Phylakopi (present already from the Middle Bronze Age). On the one hand, we have those who treasured tradition and preferred to continue the accustomed ways of life. On the other hand, there are the elites and those who want to associate themselves with a new lifestyle that was culturally perceived to be superior. Thus, one could make an argument that Melian pottery is sensitive to the social tensions that existed at Phylakopi between those in the community who wanted to align themselves with Minoan culture and those who preferred their traditional ways. However, the expressions are extremely subtle, and we would have to postulate a time-lag between cause and effect. While possible, such a modus operandi underlines the difficulties in aligning archaeological processes with historic events and raises more methodological questions than it answers.

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6. Change and continuity in the pottery tradition at Kontopigado, Alimos, during the late 13th and the early 12th c. BC

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1. Introduction[1]

Rescue excavations during the last 20 years in the Alimos municipality, and in particular at the site locally known as Kontopigado, located 5 km southeast of the Acropolis in Athens, brought to light important new evidence regarding the occupation history of this region from the 14th to early 12th c. BC (**Fig. 6.1**). A curious large installation with channels which probably belongs to an industrial workshop area (see below) constitutes one of the most spectacular finds of Mycenaean Attica (**Fig. 6.2**) (Kaza-Papageorgiou *et alii* 2011). Although the function of the channels is not yet determined, the labour involved in their construction suggests a careful planning and organisation which probably exceeded the potential of a small settlement. Due to this and due to their location, it has been suggested that the channels were part of an industrial workshop area connected to a centralised administration, probably established in the Acropolis. Some of the craft activities assumed to have taken place in this area are related to the manufacture of pottery. Indeed, a relatively large number of overfired wasters were found within wells and pits close to the channels dating to the late 13th and early 12th c. BC. However, no potter's kilns have been found yet (Kaza-Papageorgiou *et alii* 2011: 205). A settlement contemporary with the installation was located and partially excavated 300 m to the north of the channels (Kaza-Papageorgiou 1993; Kaza-Papageorgiou & Kardamaki 2012: 145, plan 1). Due to their proximity, the workshop and the settlement were probably associated with one another. The settlement was relatively short-lived and was abandoned at some time during LH IIIC Early 1 (*ca*. 1180 BC) (Kaza-Papageorgiou & Kardamaki 2012: 162-163, fig. 10:16, 21; 166; Kaza-Papageorgiou & Kardamaki 2017: 61-69), whereas the earliest homogeneous deposit found at the site dates to LH IIIA1 (**Table 6.1**) (Kaza-Papageorgiou & Kardamaki forthcoming). Based on the available evidence there are at least two destruction events, in LH IIIB2 and LH IIIC Early 1 respectively, that may have 'interrupted' the life in Kontopigado before its final abandonment. It also cannot be excluded that the area of the channels may have already been out of use during the final phase of the settlement. The fill excavated from the interior of the channels contained very fragmented, small and worn sherds dating from LH IIIA2 to LH IIIC Early 1. These probably accumulated here after the site had already been abandoned. The excavation of Kontopigado adds important new knowledge concerning the distribution of settlement and workshop areas in the wider region of Athens during the late Mycenaean period. Moreover, the study of the pottery from Kontopigado revealed the practices and processes involved in the production of ceramics, showing very wide distribution in Attica and Salamis (Gilstrap *et alii* 2016).

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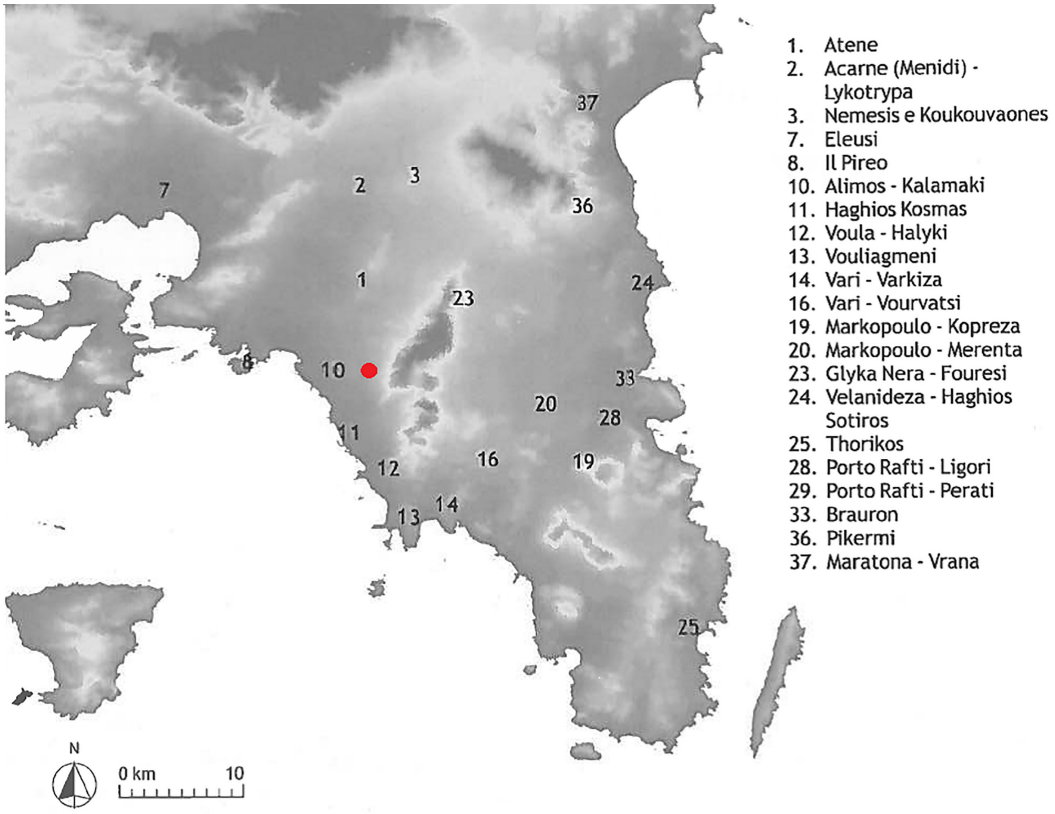

Fig. 6.1 Map of Attica in LH IIIB with Kontopigado in red (after Privitera 2013 modified by authors)

Fig. 6.2 Kontopigado. The installation with the channels (K. Kaza-Papageorgiou)

Pottery phases	Approximate dates BC	Settlement	Workshop
LH IIIA1	1400	Earliest occupation (refuse in pit)	
LH IIIA2	1370	Fill under floor	?
LH IIIA2/LH IIIB-LH IIIB	1370/1280	Dumps	?
LH IIIB2	1250	Floor ?	Well 7 (lower level)
LH IIIC Early 1	1180	Floor Floor	Pit 1

Tab. 6.1 Pottery and building phases in Kontopigado. Destruction/abandonment floors indicated with red lines (by the authors)

2. The wider context

The pottery sequence from the settlement of Kontopigado that spans from LH IIIA1 to LH IIIC Early 1 is crucial for understanding the rather fragmented character of the evidence deriving from the nearby Acropolis and other Athenian assemblages that mainly relate to funerary contexts or secondary depositions (wells and pits) (Privitera 2013: 35-39, 45-52, 57-94 for overview). The LH IIIA2 and LH IIIB1 phases are much better represented in East Attica – again often in burial contexts – and this has led to the assumption that during these phases Athens went through a period of isolation and shrinkage (Immerwahr 1971: 151-153; Pantelidou-Gkopha 1975: 226-227 especially for LH IIIA2; Ruppenstein 2010: 30). Moreover, the presence of a rich LH IIIB Early Tholos tomb in Menidi, only 10 km north of the Acropolis, is thought to further support the hypothesis that Athens, in LH IIIA2/LH IIIB1, was no longer the dominant centre of Attica (Ruppenstein 2010: 31-32).

The role of Athens and the Acropolis is still much disputed even for the later parts of LH IIIB. The date of the construction of the five terraces on top of the plateau ranges between LH IIIA1/LH IIIA2 (Mountjoy 1995: 24), LH IIIB1 (Iakovides 2006: 114) and LH IIIC Early (Privitera 2013: 174). However, the fortification wall seems to have been built for the first time in LH IIIB2, much later than the earliest construction date of the cyclopean walls in the Argolid (Iakovides 2006: 113-114, 228-231). Two main theories are currently being discussed among scholars. The first is that after LH IIIA1 and until the construction of the cyclopean walls Athens did not play an important role. Even in LH IIIB2, the existence of a palatial centre similar to those at Mycenae, Tiryns and Thebes has been questioned and Athens often appears as part of the Theban state (Wiener 2009). The hypothesis of the diminished importance of the Acropolis in these periods is largely based on the evidence from nearby cemeteries. Unlike in other parts of Central and East Attica, these show no evidence for occupation particularly during LH IIIB, whereas common LH IIIA2 Mycenaean ceramic furnishings (*e.g.* small stirrup jars) are rare (Immerwahr 1971: 151; Ruppenstein 2010: 30; Privitera 2013: 54, 83 tab. V; 91 tab. VI. But see Mountjoy 1995: 38-39). On the other hand, other scholars have postulated that Athens' leading position in Attica already began in LH IIIA1 and LH IIIA2, after important citadels and early cemeteries in East Attica were abandoned at the end of LH II (Lauter 1996: 95; Lohmann 2011: 43-46; Benvenuti 2014: 198).

Although this discussion exceeds the scope of this paper, one needs to keep in mind that the impression of shrinkage during LH IIIA2/LH IIIB may not be entirely correct. Penelope Mountjoy has pointed out that Athens followed a distinct pottery tradition during LH IIIA2 and that the identification of LH IIIB burials is difficult (Mountjoy 1995: 71). The evidence from LH IIIB2 and LH IIIC Early tombs also remains scarce in the area around the Acropolis, despite this being a period of major rebuilding activities at the site. Thus, the evidence from the cemeteries does not always accurately reflect habitation trends (see also Mountjoy 1995: 48-49, who suggests that the LH IIIB cemetery has not been located yet).

The end of LH IIIB and LH IIIC Early is a period marked by crisis across the Aegean and beyond. During

this time the palaces in the Argolid, Pylos and Thebes burnt down, eventually leading to the collapse of the palatial system (see Jung 2016: 555-560). In Athens and Salamis there are signs of unrest, but no evidence of a conflagration or an ash layer has ever been found on the Acropolis (Immerwahr 1971; Gauß 2000). However, the group of fully preserved vessels from the so-called Houses in the NE Ascent of the Acropolis has been interpreted as indicating a sudden event followed by abandonment (Broneer 1933; Mountjoy 1995: 45-46). The underground fountain on the north slope of the hill went out of use probably in LH IIIC Early and was then used as a dump (Gauß 2000; Rutter 2003). Many other sites and cemeteries in Attica, Salamis and Aegina were also abandoned (Haghios Kosmas, Kontopigado, Kanakia) (Mylonas 1959: 165; Mountjoy 1999; Marabea 2012). At the same time, new cemeteries appear like the one in Perati.

The impact of these destructions, abandonments and settlement shrinkages is immediately evident in the aspects of the material culture that relate to the former administration and political system (*e.g.* the abandonment of wall paintings, writing system). The impact on pottery production is less obvious. The long-term changes that have been observed relate to the new social realities that followed this general crisis. One example can elucidate such long-termed changes. The pottery consumed during the palatial period – in major and minor centres – is dominated by two fine wares, painted and plain ware. The latter group, consisting in large part of kylikes, almost always outnumbers other pottery wares. Plain fine vessels have been connected with everyday use as well as large scale consumption during feasting organised by the palace (Tournavitou 1995; Hruby 2006). The amount of undecorated pottery remains high during the first post-palatial phase (LH IIIC Early) but is clearly reduced in the following phase (LH IIIC Middle and LH IIIC Late) (Podzuweit 2007: supplement 38; Stockhammer 2008: fig. 72). The most plausible explanation would be that the social situation necessitating the large-scale production of plain fine ware during the palatial period did not exist anymore by this time (Jung 2006: 413).

3. The workshop installation and the settlement

The workshop installation with the channels (or Building Complex III) lies on the west foot of Hymettos, 5 km southeast of the Acropolis and 2.5 km from the coast (Kaza-Papageorgiou *et alii* 2011: 203, fig. 2; 204). The part of the installation excavated so far comprises an area of roughly 3000 sq m and it consists of a system of four 2.6 m wide parallel channels carved into the bedrock with rectangular pits between them. In all probability, the installation allowed the circulation of water from the one channel to the other, leading to the assumption that the activities there required large amounts of water. One hypothesis based on ethnographic parallels suggests the processing of flax or the production of other materials such as basketwork (Kaza-Papageorgiou 2016: 102). Several shallow wells (locally known as *kontopigada*) and pits that have been opened in the direct area of the channels may relate to these activities. In the nearby settlement (Building Complexes I and II) the LH IIIA/B-IIIC Early remains lay on top of EH I and EH II houses and a stream bed filled with EH I pottery (Kaza-Papageorgiou 2006: 27).

A very distinct feature of the area during the LBA-occupation is the existence of large pottery deposits and accumulations that have been interpreted as dumps. Such deposits were found in the area of the installation, within the aforementioned wells and other pits. Apart from pottery they contained many small finds (querns, pottery wasters, loom weights, colour pigments, a large number of bases with secondary perforation, anthropomorphic and zoomorphic figurines and figures; See Kardamaki 2015) and stones. Many of the finds were almost fully preserved (Kaza-Papageorgiou *et alii* 2011: 253, fig. 17:117; 255, fig. 18:129; 256, fig. 19:132; 257, fig. 20). The pottery found within the dump of one pit (pit 1) has been studied in detail (Kaza-Papageorgiou *et alii* 2011) and the investigation of the material from one of the wells is in progress (well 7). Pit 1 was opened very close to the channels and was filled with pottery dating to LH IIIC Early 1. It is 1.40 m deep and from its interior 20000 sherds have been counted (Kaza-Papageorgiou *et alii* 2011: 209-210). No evidence for the existence of stratification within the dump was observed. The 4.40 m deep well 7 was located close to pit 1. Here, some pottery joins between the various levels of the well were noted. However, a thin layer of ash was observed approximately 1.50 m under the mouth of the well. The pottery from the fill below the ash layer (hereafter lower levels of well 7) and those from the fill on top of the ash layer (hereafter higher levels of well 7) seem to belong to slightly different pottery phases. The pottery from the higher levels of the well possibly dates to LH IIIC Early 1. However, the largest part of the material from the lower levels of well 7, under the thin ash layer is slightly earlier – probably

roughly contemporary with the final palatial phase (LH IIIB2 Late) in the Argolid. Some sherds but also some well-preserved vessels from the lower and more rarely the upper level of the fill are assigned stylistically to even earlier sub-phases, namely LH IIIA2 and LH IIIB1. Part of this earlier material (LH IIIA2-LH IIIB1) may represent early strays, but some pots could have been in use during the time of the deposition (**Fig. 6.12**). It is still uncertain whether the aforementioned LH IIIA2 and LH IIIB1 sherds from well 7 suggest that the nearby installation with the channels and putative adjacent buildings used as workshops were built and used already during these sub-phases, but this is likely. Consequently, it is possible that the dump from the lower level of well 7 on the one hand and on the other hand those from the upper level of well 7 and from pit 1 reflect two subsequent episodes. Due to the large amount of built material (stones and stone plates that could have been used as thresholds) deposited together with the pottery and small finds within well 7 and pit 1, it is possible that these dumps relate to cleaning activities taking place in building(s) close to the channels after two destruction events, at the end of LH IIIB2 (lower levels of well 7) and in LH IIIC Early 1 (upper levels of well 7 and pit 1) respectively.

The nearby settlement consists of Building Complexes I and II, but the domestic remains and floors are much better preserved in the former (Kaza-Papageorgiou & Kardamaki 2012: 145). Beside a small number of scattered sherds dating to LH II, the earliest securely identified pottery phase dates to LH IIIA1 and is represented by the fill of a rock-cut pit under a LH IIIA2/LH IIIB building of Building Complex II (Kaza-Papageorgiou & Kardamaki forthcoming). In Building Complex I three building phases with a sequence of three floors have been recognised. The middle (or second) and final building phases have been connected with a destruction and a final abandonment horizon respectively, both events dating in LH IIIC Early 1 (Kaza-Papageorgiou & Kardamaki 2012: 192-192; 2014: 117-121). In both cases, pottery assemblages were found on the floors of the rooms and open spaces but there was no evidence of fire. Floors assigned to the early building phase (first building horizon) date generally in LH IIIB (Kaza-Papageorgiou & Kardamaki 2014: 93-94, fig. 23; 95-96) or in LH IIIB2 and LH IIIC Early 1 (Kaza-Papageorgiou & Kardamaki 2017: 21-25). Finally, a LH IIIA2 fill has been securely identified under the floor of a room (Kaza-Papageorgiou & Kardamaki 2017: figs 28-29). Large pottery accumulations again interpreted as depositions after clearing activities and house refuse were discovered all along the exterior side of Building Complex I (Kaza-Papageorgiou & Kardamaki 2012: 161-169; 2014: 97-104). Here, like in the wells and pits of the nearby workshop installation with the channels, several vessels and small finds were found fully preserved (Kaza-Papageorgiou & Kardamaki 2012: 190, fig. 24:73-74; 2014: 100, fig. 27:71). One such accumulation was found in a 0.70 m deep carving of the natural bedrock in an area of 4 x 2 m and it contained 13000 pottery sherds (Kaza-Papageorgiou & Kardamaki 2012: 188-190, fig. 24). The bulk of these dumps date mainly to the local LH IIIB2 and LH IIIC Early 1 and more rarely to LH IIIA2/LH IIIB and LH IIIB (Kaza-Papageorgiou & Kardamaki 2012: 163, fig. 10:16; 167-168, fig. 11:27-30). Some objects discovered on the floor of the rooms relate to craft activities, such as weaving (Kaza-Papageorgiou & Kardamaki 2017: 44-49, fig. 39; 193-197). Pottery wasters from the Mycenaean levels have also been found also in the settlement beside the workshop installation. In addition, part of a cylindrical clay object with a central perforation discovered in the LH IIIA/B fill of a room could have been part of an axle wheel (Kaza-Papageorgiou *et alii* 2011: 206, fig. 4).

4. The pottery

The first chemical analyses on the Mycenaean pottery from the Acropolis and Kontopigado were conducted by Joseph Maran and Hans Mommsen using the method of NAA (Mommsen 2003). Results showed that the bulk of the LH IIIB/LH IIIC Early pottery from both sites belonged to the same chemical group. Recent NAA and petrographic analyses by Gilstrap *et alii* (2016) on material from Kontopigado and several other sites across the Saronic Gulf further elaborated on pottery production in the region. They also confirmed the similarity not only between the LH IIIB/LH IIIC Early pottery from Kontopigado and the Acropolis but also with several other sites, among which Kanakia on Salamis. The presence of wasters in various contexts within the workshop installation and to a lesser extent in the settlement at Kontopigado could suggest the existence of a pottery workshop there, which could then have supplied pottery to Athens and the Acropolis. Part of the pottery from Kanakia that seems to have been imported from Attica (Marabea 2012: 177) could originate from the workshop of Kontopigado as well.

Fig. 6.3 Characteristic shapes and fabrics from Kontopigado. Plain jug from the upper level of well 7, workshop installation (LH IIIB2-LH IIIC Early 1) (L. Valsamis)

The typological study of the pottery from Kontopigado offers a good example for the development of regional styles during the late 14th and the 13th c. BC (LH IIIA-LH IIIC Early 1) (see on the subject, Sherratt 1980; Mountjoy 1999). A significant change in the pottery consumed at the site seems to have occurred after LH IIIA1. During this stage, the pottery from both Athens and Kontopigado (mainly goblets, hydriae, jugs and amphorae) is mainly represented by the so-called Acropolis Burnished Ware – a high quality, fine burnished pottery with a red/orange coating that is both hand-made and wheel-made. Besides the Acropolis Burnished Ware, another distinct LH IIIA1 pottery ware identified both at Athens and Kontopigado is represented by the so-called late matt painted pottery. The majority of these vessels were imported from the island of Aegina and mainly belong to storage jar types such as hydriae and amphorae. In addition, the majority of the cooking pottery used at Kontopigado and Athens was also imported from Aegina. The typical Mycenaean wares, such as fine plain or lustrous pattern-painted wheel-made pottery, already popular in neighbouring regions and especially the NE-Peloponnese, are virtually absent at Kontopigado and rare at the settlement of Athens as suggested by the study of their relative scarcity in the fill of well Z located on the south slope of the Acropolis (Mountjoy 1981: 70-71 tab. I; 74, only 6.3 % of the total assemblage – 4603 sherds – in well Z belongs to Mycenaean pottery; see also Pantelidou-Gkopha 1975 for another LH IIIA1 well that contains mainly local wares). On the other hand, typical Mycenaean pottery of LH IIIA1 occurs in funerary contexts at Athens (Immerwahr 1971: pls 30-31, 35-36). The next phase (LH IIIA2) at Kontopigado is marked by the disappearance of Acropolis Burnished Ware and Aeginetan late matt painted wares, on the one hand, and the introduction of typical Mycenaean wares, on the other hand (Kaza-Papageorgiou & Kardamaki forthcoming). Regarding imports from Aegina, only the hand-made cooking wares continue to appear in large numbers at Kontopigado and Athens even up to the beginning of the 12th c. BC (LH IIIC Early 1; Rutter 2003). A pottery class similar to the Acropolis Burnished Ware but described as being of inferior quality appeared at Athens in LH IIIA2: the Red Wash Ware (Mountjoy 1995: 38, fig. 50; for LH IIIA2 contexts at Athens – mainly refuse in pits and wells – see Pantelidou-Gkopha 1975: 126-130). At Kontopigado, alongside the large-scale consumption of typical Mycenaean wares (lustrous painted and plain), locally produced during LH IIIA2, a group of monochrome and plain, and sometimes burnished, vessels

that seem to continue earlier local – *e.g.* Athenian – LH IIIA1 traditions and styles appeared even up to LH IIIC Early 1. In general, the LH IIIA2-LH IIIC Early pottery from Kontopigado is wheel-made with rare exceptions of vessels that seem to be made entirely by hand (Kaza-Papageorgiou *et alii* 2011: 254, 256, fig. 19:134). The only hand-made vessels present in all the contexts of Kontopigado are the cooking vessels from Aegina. A local characteristic is the sporadic burnishing of vessel surfaces by means of a tool that leaves distinct traces (see above; Kaza-Papageorgiou & Kardamaki 2011: 215; Kardamaki 2015: 59, 66; see also Marabea 2012: 175). This surface treatment can be observed on closed monochrome vessels, (see above) but also on plain wares and on the unpainted parts of pattern-painted pottery (**Figs 6.3-6.4**). Jeremy Rutter (2003) has suggested a Cretan influence for this technique but it may derive from local traditions (see above, Acropolis Burnished Ware). Concerning the decorative modes of the painted wares, it is worth mentioning here that in all phases of the settlement monochrome – both lustrous and with sporadic burnishing marks – decoration is the most frequent (Kaza-Papageorgiou *et alii* 2011: 264, tab. 2). The macroscopic examination of the material reveals a close similarity in terms of fabric between the LH IIIA and the LH IIIB2/LH IIIC Early 1 pottery from Kontopigado. The majority of the fine wares from LH IIIB2/LH IIIC Early 1 belong to a single fine micaceous fabric group (Gilstrap *et alii* 2016: 503).

In the following sections we will discuss some examples that suggest changes in the pottery styles and, occasionally, production techniques at Kontopigado and examine whether these changes may relate to historical events that took place between roughly 1250 and 1180 BC (local LH IIIB2-LH IIIC Early 1). The main evidence for the present study is derived from well 7/lower levels (local LH IIIB2 and earlier material), pit 1 in the workshop (LH IIIC Early 1), from the primary deposits related to the last two occupation phases of the settlement (mainly LH IIIC Early 1), as well as from other dumps and fills dating in LH IIIA2 to LH IIIB.

Fig. 6.4 Characteristic shapes and fabrics from Kontopigado. Plain amphora from pit 1 (LH IIIC Early 1), workshop installation (L. Valsamis)

4.1. The deep bowls

The deep bowl FS 284 is considered to be a shape that was introduced at some point during the end of LH IIIA2 or most probably at the beginning of LH IIIB1 (Mountjoy 1999). Significant variations of the shape used for the proper distinction of LH IIIB in two sub-phases have been found in the Argolid and NE-Peloponnese. By LH IIIB2 the deep bowl had almost completely replaced the previous standard drinking vessel in the Argolid, the kylix, and had become the dominant shape of painted pottery (Podzuweit 2007: 297-298). It has been suggested that deep bowls belonged to the same use-set as the craters FS 281 and were used for the consumption of wine on special occasions (Podzuweit 2007: 297-298; Jung 2006: 412). In the majority of the contexts studied so far in Kontopigado, the deep bowl represents one of the most frequent shapes (Kaza-Papageorgiou *et alii* 2011: 263, tab. 1). Due to its popularity, the study of this shape serves to demonstrate stylistic and other typological changes throughout the various phases at the site. The most significant changes occur between the material from the lower levels of well 7 (LH IIIB2 Late) on the one hand, and pit 1 and settlement deposits (LH IIIC Early 1) on the other. In those deposits that date to LH IIIA2/LH IIIB or that contain a large amount of LH IIIA2 and LH IIIB1 material, the deep bowls are rare (deep bowl A: Kaza-Papageorgiou & Kardamaki 2012: 162, 168, fig. 11:27), and those that we do find tend to be monochrome (Kaza-Papageorgiou & Kardamaki 2012: 162. 167).

In well 7 (lower level) most examples of the shape are monochrome (**Fig. 6.8**) (60 %) and the pattern-painted versions only account for 22 % (*cf.* Podzuweit 2007: supplementary. 36). Regarding the pattern-painted bowls, these are, unlike the Argive types, characterised by a lack of standardisation. This is seen in the rim types and general shapes, but also in the decoration. Very few specimens exhibit the globular body with the more or less straight sides and flaring rim regarded as the 'canonical' version of the shape and known from the Argolid and NE-Peloponnese from LH IIIB1 onwards (**Figs 6.5-6.7**) (*cf.* Wardle 1969: 274-275; 1973: 313, fig. 9: 36-42). The most frequent shape is the one with a deep body, a straight upper part and a lipless rim or a rim that is slightly everted (**Figs 6.8-6.11**). Other examples have a slight carination under the handle (**Fig. 6.11**). LH IIIB1 and LH IIIB2 deep bowls with globular shapes and flaring rims, common in the Argolid, are known from LH IIIB funerary contexts in East Attica and from the LH IIIB2-LH IIIC Early fill in the underground cistern of the Acropolis (Mountjoy 1999: 551, fig. 200: nos 245, 247-249; 202: nos 264-266, 269). Their rarity at Kontopigado during LH IIIB2 Late (well 7/lower levels) may suggest local diversity. On the other hand, it should be kept in mind that the pottery appearing in funerary contexts, may not always be representative of what was in use in the settlements. And in the case of the underground cisterns that contain material from more than one phase (LH IIIB2-LH IIIC Middle) (Gauß 2000: 172-173) it would be interesting to see whether some of the Kontopigado types occur at all.

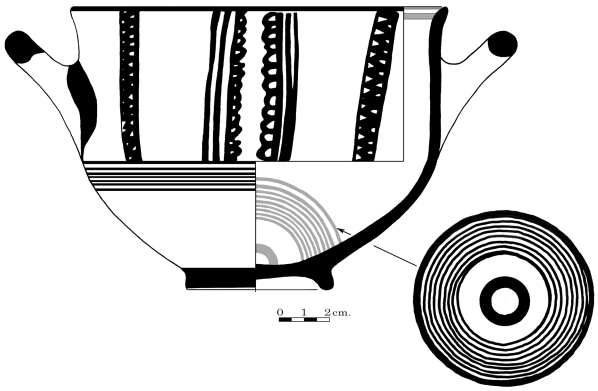

Fig. 6.5 Deep bowl of type A from Tiryns. LH IIIB2 Late (E. Kardamaki, R. Tsembera)

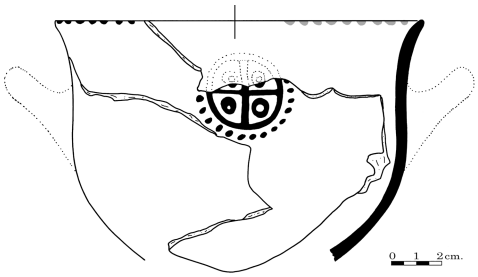

Fig. 6.6 Rosette deep bowl from Tiryns. LH IIIB2 Late (E. Kardamaki, R. Tsembera)

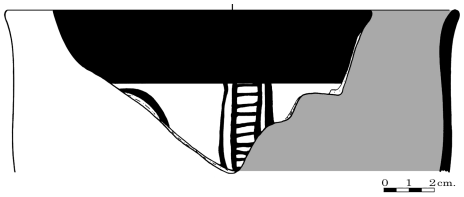

Fig. 6.7 Deep bowl of type B from Tiryns. LH IIIC Early 1 (E. Kardamaki, R. Tsembera)

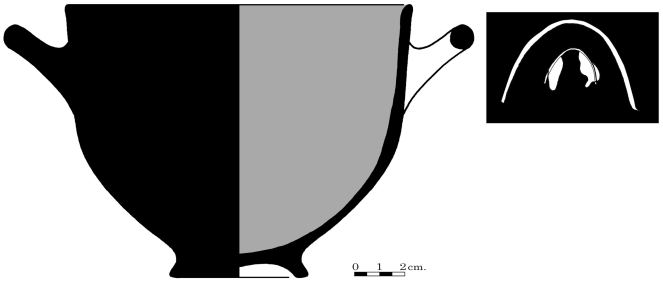

Fig. 6.8 Kontopigado, well 7, lower level (LH IIIB2 Late), workshop installation. Solidly painted deep bowl (E. Kardamaki)

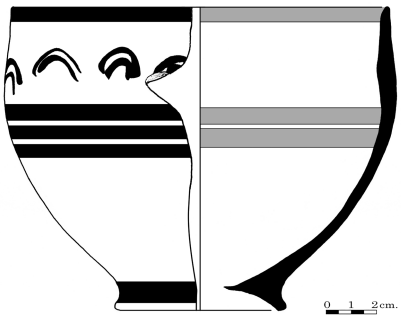

Fig. 6.9 Kontopigado, well 7, lower level (LH IIIB2 Late), workshop installation. Deep bowl of type A variant (E. Kardamaki)

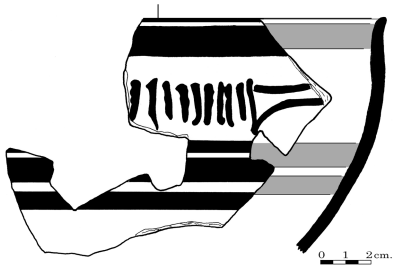

Fig. 6.10 Kontopigado, well 7, lower level (LH IIIB2 Late), workshop installation. Deep bowl of type A variant (E. Kardamaki)

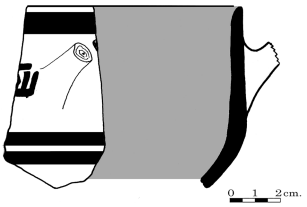

Fig. 6.11 Kontopigado, well 7, lower level (LH IIIB2 Late), workshop installation. Deep bowl of type A variant with monochrome interior (E. Kardamaki)

Of the characteristic LH IIIB2 types recognised in the Argolid (**Figs 6.5-6.7**) (French 1969: 75; Kardamaki 2013) there are only a few rare examples that are attested at the lower level of well 7 (group B) and some do not occur at all (*e.g.* rosette deep bowl). The LH IIIB1-LH IIIB2 common type A (**Fig. 6.5**) is equally rare (Wardle 1973: fig. 9). The majority of the specimens from well 7 belong to local variants of the type with linear decorations on the interior body, the rim banding of a stemmed bowl and a narrow decorative zone (**Figs 6.9-6.11**). In general, some of the deep bowls from the lower levels of well 7 (**Figs 6.10-6.11, 6.13**) resemble Mountjoy's so-called Transitional LH IIIB2-LH IIIC Early deep bowl types (Mountjoy 1999: 560-561, fig. 205: nos 288-289, 291-292). Although the Transitional LH IIIB2-LH IIIC Early phase postdates the LH IIIB2 destructions in most cases (Mountjoy 1999: 36), it is now generally accepted that the so-called Transitional deep bowl types emerged in LH IIIB2 (Vitale 2006; Kardamaki 2015). At the same time other features reflect LH IIIA2/LH IIIB1 styles and shapes. This is clear for some of the decorative motifs (stemmed spirals, whorl shells, wavy bands, other row motifs and floral motifs) (**Figs 6.9-6.10, 6.12-6.13**) (*cf.* Papadopoulos & Kontorli-Papadopoulou 2014: 39, fig. 3.88; 104, fig. 3.279 for wavy bands on LH IIIA2 deep bowl and stemmed spirals from LH IIIB1 kylix respectively, from the cemetery in Vrauron) as well as the shape of some vessels (**Figs 6.8, 6.12**) (*cf.* French 1967: fig. 7, for the profile of two LH IIIB1 bowls from Mycenae). The decorative zone that extends to the base of the vessel is another typical LH IIIA2 feature (**Fig. 6.12**) (French 1965: 194, fig. 11; Mountjoy 1999: fig. 196: no. 205) but it has been observed on later deep bowls (Marabea 2012: 201, fig. 11:1; Adrimi-Sismani 2013: 173, fig. 6: B36002). The whorl shells appear, but in a stylised version, placed horizontally to resemble LH IIIA2 traditions (**Fig. 6.10**) (*cf.* Salavoura 2007: fig. 14, for a LH IIIA2 cup with a similar motif from a tomb in Merenta). Noteworthy is the near absence of common LH IIIB2 Argive motifs, such as triglyphs FM75 (Wardle 1973: 320, fig. 13a; Podzuweit 2007: supplementary. 3).

The globular deep bowls with a straight upper part and narrow zonal decorations are of particular interest as they represent a local style without obvious (published) parallels elsewhere in Attica (**Fig. 6.9**). They demonstrate features (rim types, profile, banding, motifs) that recall the shapes from Crete and especially Khania (Hallager 2003: pls 49-50). The presence of Cretan features (motifs, surface treatment) in LH IIIC Early 1 pottery from Attica has already been demonstrated by Rutter (2003) but this phenomenon may have started during LH IIIB2.

In the phases that followed the deposition of the dump in well 7, some changes have been observed concerning the deep bowls, even though the shape continues a local line of development, as the quality of the vessels is the same and the burnishing of the surfaces still appears. The monochrome versions remain the most frequent type (**Fig. 6.14**) (Kaza-Papageorgiou *et alii* 2011: 264, tab. 2). However, many of the features present in well 7 and described above,

such as deep bowls with motifs extending from rim to base or narrow decoration zone, are respectively absent or very rare. Many of the LH IIIA2/LH IIIB1 motifs identified (whorl shells, row motifs) have disappeared, but the wavy band continues to be popular. The spirals become more common, whereas triglyphs are as before still very rare (**Figs 6.15-6.18**) (Kaza-Papageorgiou & Kardamaki 2011: 210-211, 234-236, figs 6-7). Some examples from pit 1 can be identified as having the canonical shape with the flaring rim (*cf.* Gauß 2000: figs 5:6-8, 6:2; 2003: fig. 2:3). The type A variant known from the Argolid and elsewhere is still rare but appears more often than in well 7 (lower levels) (**Fig. 6.15**) (*cf.* Gauß 2000: fig. 187: 2) and there is also one example of type B (**Fig. 6.18**), a variant otherwise very rarely attested at Kontopigado (*cf.* Mountjoy 1999: 555, fig. 202: nos 264-266, 269). Moreover, deep bowls featuring only linear decoration (medium-banded deep bowls and linear painted deep bowls with monochrome interior) are more common in pit 1 and in the settlement than they were in the lower levels of well 7 (Kaza-Papageorgiou *et alii* 2011: fig. 7: 26-27; fig. 8: 28-29; Kaza-Papageorgiou & Kardamaki 2012: fig. 16: 47; Kaza-Papageorgiou & Kardamaki 2014: fig. 24: 63; *cf.* Broneer 1933: 369, fig. 41; Mountjoy 1999: fig. 206: nos 294-295). In sum, the LH IIIC Early 1 deep bowls from Kontopigado continue in the local style (dominance of monochrome deep bowls, wavy bands). At the same time many of the old motifs disappeared or became very rare (whorl shells), whereas some examples show morphological profiles and variants known from other regions (Peloponnese and Boeotia).

Fig. 6.12 Kontopigado, well 7, lower level (LH IIIB2 Late), workshop installation. Deep bowl of type A variant with non-canonical decoration (LH IIIB1?) (B. Konnemann)

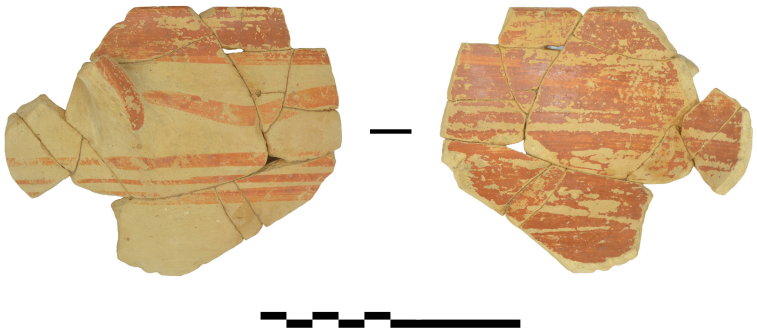

Fig. 6.13 Kontopigado, well 7, lower level (LH IIIB2 Late), workshop installation. Deep bowl/stemmed bowl with wavy band (L. Valsamis)

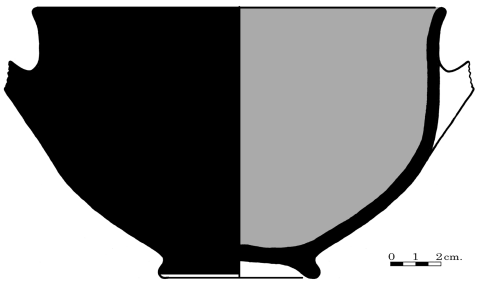

Fig. 6.14 Kontopigado, pit 1 (LH IIIC Early 1), workshop installation. Monochrome painted deep bowl (E. Kardamaki)

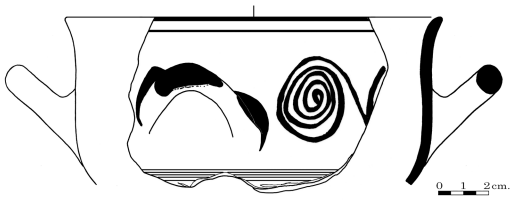

Fig. 6.15 Kontopigado, pit 1 (LH IIIC Early 1), workshop installation. Deep bowl of type A (E. Kardamaki)

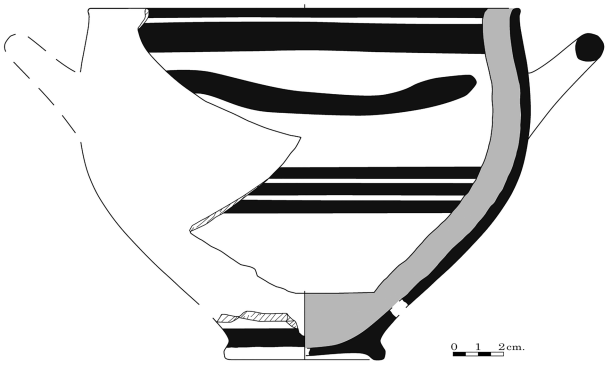

Fig. 6.16 Kontopigado, settlement, floor deposit, middle building phase (LH IIIC Early 1). Deep bowl with wavy band (B. Konnemann)

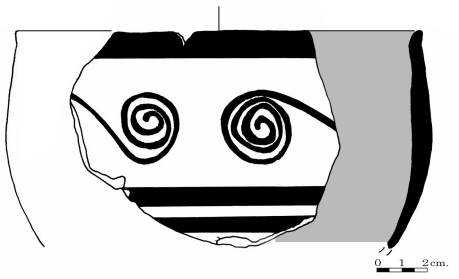

Fig. 6.17 Kontopigado, settlement, exterior dumps. Deep bowl of type A variant with monochrome interior (LH IIIB2-LH IIIC Early 1) (E. Kardamaki)

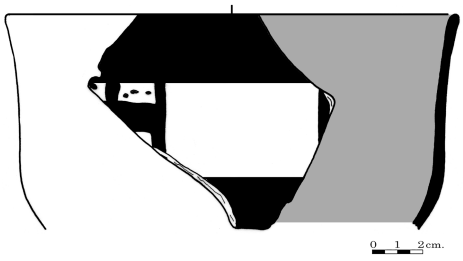

Fig. 6.18 Kontopigado, pit 1 (LH IIIC Early 1), workshop installation. Deep bowl of type B (E. Kardamaki)

4.2. Brown fabric ware with a whitish slip

In the LH IIIC Early 1 deposits one very characteristic ware has been identified that stands out from the bulk of the material. The pottery in this group was made in a brown clay that appears highly fired. The surface is covered in a thick whitish slip that is easily abraded and shows sporadic burnishing marks. Examples of this ware exist in well 7/lower level (**Fig. 6.19**), but the number of these vessels clearly increased in the later deposits (**Figs 6.20-6.21**). The majority of the overfired vessels are plain amphorae, hydriae and jugs (Kaza-Papageorgiou *et alii* 2011), but some vessels were decorated as well. In fact, the painted vessels of this ware often have elaborate decoration or belong to special shapes such as large stirrup jars (**Fig. 6.19**). Open vessels in this ware-type are rare. One large piriform jar, the upper part of which was discovered in primary deposition within the stone enclosure of room E, belongs to this fabric group (**Fig. 6.21**). It was accompanied by one plain jug, a plain basin and one squat stirrup jar. This group of four vessels is interesting since stratigraphically it belongs to the final phase of the settlement but stylistically it resembles pottery of LH IIIA2 and LH IIIB1 (Kaza-Papageorgiou & Kardamaki 2012: 181-182). The piriform jar with the net pattern on its shoulder clearly imitates earlier LH IIIA2 vases, but no parallels can be found for the outlined solid triangles on its belly that anticipate later motifs known from the East Aegean and with a likely origin in Crete (Mountjoy 1999: 986; 2013: 567; 2014: fig. 14: 3). It is possible that vessels of this ware could have been products of a different workshop but the clay texture and inclusions as well as the secondary surface treatment (sporadic burnishing) are similar to the rest of the pottery from Kontopigado.

Fig. 6.19 Kontopigado, well 7, lower level (LH IIIB2 Late), workshop installation. Stirrup jar of brown fabric ware with white slip (overfired?) (L. Valsamis)

Fig. 6.20 Kontopigado, pit 1 (LH IIIC Early 1), workshop installation. Closed shape of brown fabric ware with white slip (Overfired?) (L. Valsamis)

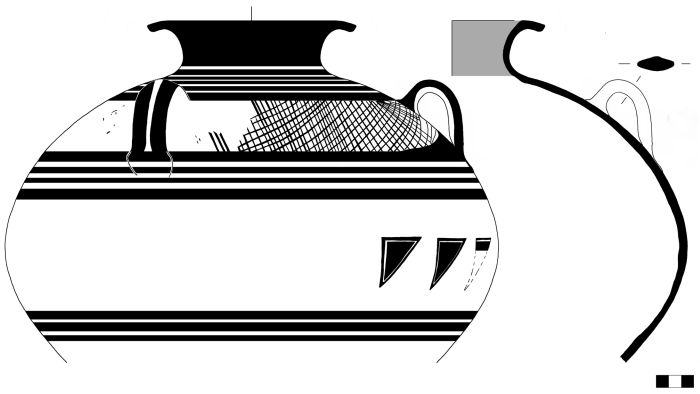

Fig. 6.21 Kontopigado, settlement, floor deposit, upper building phase (LH IIIC Early 1). Piriform jar of brown ware with white slip (E. Kardamaki)

4.3. The hand-made collar-necked jars

One group of hand-made or partly hand-made vessels appears for the first time in the LH IIIC Early 1 contexts. These are the hand-made collar-necked jars that are large with thick walls (Kaza-Papageorgiou *et alii* 2011: 250, fig. 15:103). They are rare and only one example is almost entirely preserved (**Fig. 6.22**). It was found in the court of Building Complex I and comes from the second building phase of the settlement (Kaza-Papageorgiou & Kardamaki 2014: figs 15, 26). It represents a very rare shape with short tripod legs. This collar-necked jar was found together with mixing bowls, a hollow bovine figure (Kaza-Papageorgiou & Kardamaki 2014: figs 15: 27; 16: 28-30; Kardamaki 2015: fig. 8) and it has been suggested that it was used in the course of a feasting activity. Examples of collar-necked jars with legs are found in roughly contemporary contexts from other regions (Mountjoy 1999: 348, fig. 118: 101; Adrimi-Sismani 2013: fig. 10: B35831); however, the shape originates from Crete (Kaza-Papageorgiou & Kardamaki 2014: 84; see Hallager 2011: 316-317, pl. 107, for discussion and parallels). The best-preserved collar-necked jar from Kontopigado is elaborately decorated with a solidly painted octopus. This motif is not attested elsewhere at the site. It derives from the LH IIIA2 repertoire but again it represents a very common Cretan decorative theme (Alberti 2013: 69-76). Octopuses reappear during the post-palatial period as a very popular decorative theme on stirrup jars (Mountjoy 1999: fig. 219: nos 439-440). The clay of the collar-necked jars seems to be local. Vessels shaped without the use of the wheel are rare in Kontopigado but are confirmed by a few examples of various wares and shapes (fine plain cups, monochrome closed vessels) (Kaza-Papageorgiou *et alii* 2011).

4.4. Cooking pottery

In almost all contexts studied so far, the cooking pottery includes two large groups. The first is the group of hand-made cooking pots imported from Aegina. They have a distinct rim typology and are made in a sandy clay with gold mica, small black volcanic stones and are easily distinguished wherever they occur (Maran 1992). Aeginetan cooking vessels had a wide distribution from the late MBA to the early post-palatial period (LH IIIC Early) (Lindblom 2001: 41). The largest amounts of Aeginetan cooking pottery have been found in the regions across the Saronic Gulf. For the LH IIIC Early 1 sub-phase at Kanakia on Salamis Aeginetan cooking ware is the only known cooking fabric (Marabea 2012). At Kontopigado Aeginetan cooking pots (FS 320) are most often encountered as tripods (**Fig. 6.26**) but handled jars (**Fig. 6.25**) and very big cooking craters occur as well, albeit rarely (Kaza-Papageorgiou & Kardamaki 2012).

The second group of cooking pottery in Kontopigado is represented by well-fired wheel-made vessels that are locally produced, probably at the site (Gilstrap *et alii* 2016: 505 silty fabric with sandstone, metasandstone and schist). The shapes of the cooking pots in both fabrics are in general similar but there are typological differences

concerning the exact profile of rims and bases (**Figs 6.27-6.29, 6.31-6.32**) (Kaza-Papageorgiou & Kardamaki 2012). Moreover, the Aeginetan cooking pots belong to large and medium size cooking vessels (average capacity: 8 l), while the local pots are mainly of small to medium size (average capacity: 1.5 l). The repertoire of local cooking pottery also encompasses a greater variety of shapes. Apart from tripods and jugs, basins, baking trays, grills and lids are made in the same or a similar clay paste as well (**Fig. 6.30**) (Gilstrap *et alii* 2016: 507). The lids have an average diameter of approximately 13 cm and were seemingly used to respond to a demand for small-sized cooking vessels (Kaza-Papageorgiou *et alii* 2011: 218 and fig. 24: 156; Kaza-Papageorgiou & Kardamaki 2012: figs 14: 43, 22: 63; 2014: fig. 19: 55; 2017: fig. 16: 34). Although cooking lids are quite a frequent find at Kontopigado there are no good parallels among the published records of other Mainland sites. Aeginetan lids made in the distinct volcanic fabric are known as well but these have quite a different shape (Marabea 2012: 211, fig. 24:4). Apparently, the closest parallels for the local cooking lids at Kontopigado exist on Crete (Hallager 2003: 244, pl. 119d: 1).

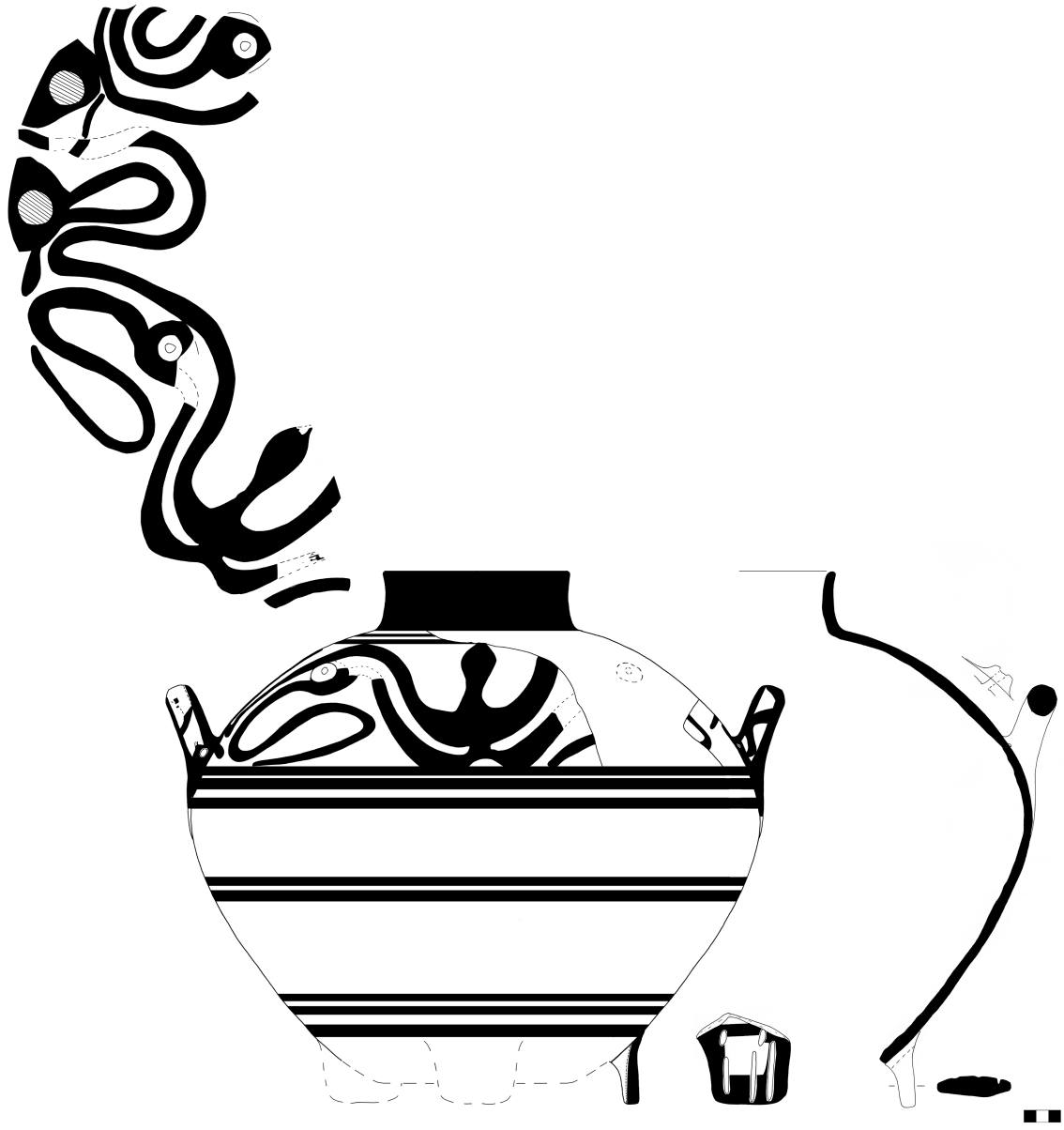

Fig. 6.22 Kontopigado, settlement, floor deposit, middle building phase (LH IIIC Early 1). Hand-made collar-necked jar with legs (E. Kardamaki)

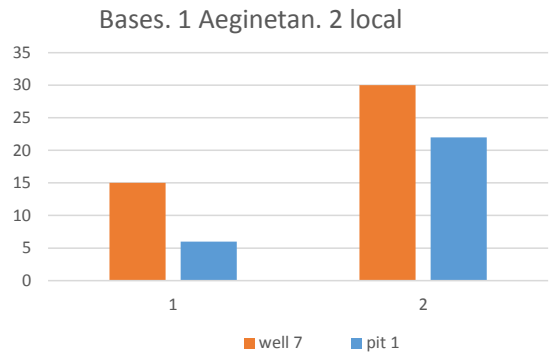

Fig. 6.23 Percentages of Aeginetan and wheel-made bases from cooking pots in well 7 and pit 1 (by the authors)

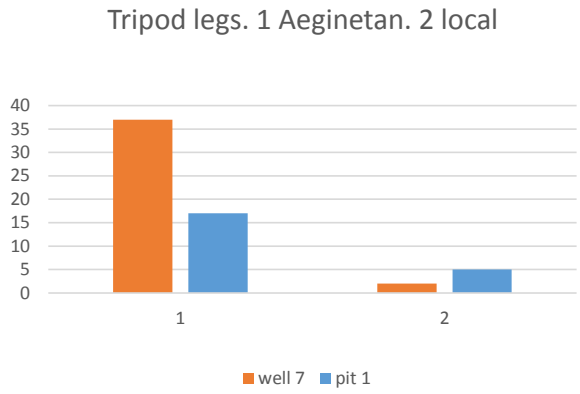

Fig. 6.24 Percentages of legs from Aeginetan and wheel-made tripod cooking pots in well 7 and pit 1 (by the authors)

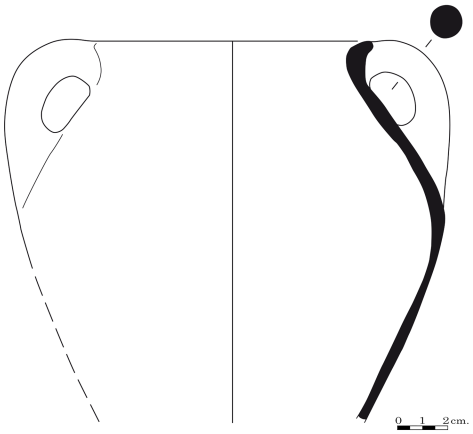

Fig. 6.25 Kontopigado, well 7, lower level, workshop installation. Aeginetan cooking jar (LH IIIB2 Late) (B. Konnemann)

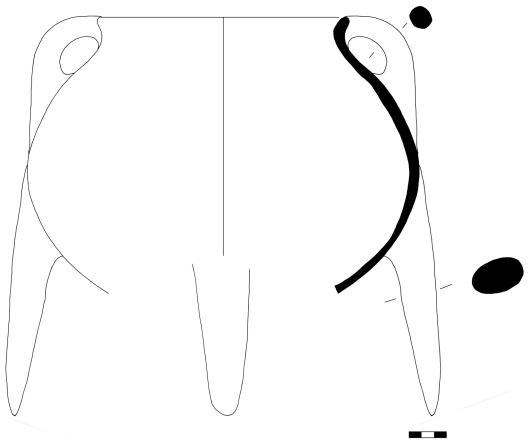

Fig. 6.26 Kontopigado, settlement, floor deposit, middle building phase (LH IIIC Early 1). Aeginetan tripod cooking pot (E. Kardamaki)

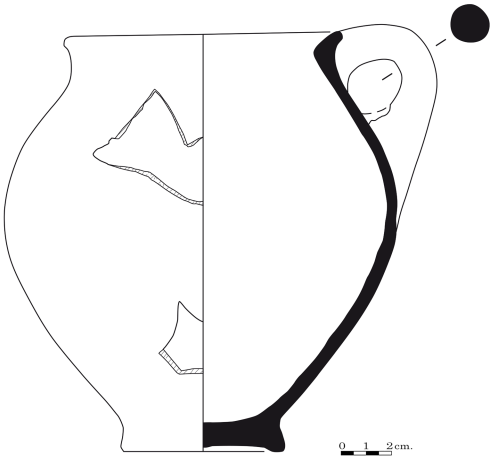

Fig. 6.27 Kontopigado, well 7, lower level (LH IIIB2 Late), workshop installation. Local wheel-made cooking jug (B. Konnemann)

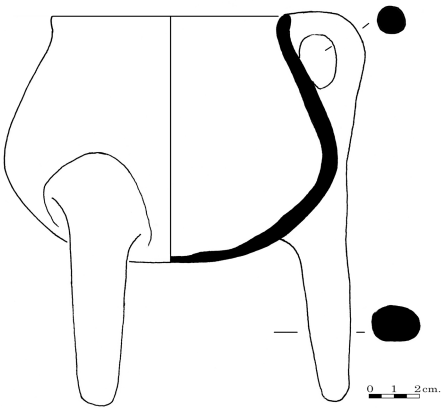

Fig. 6.28 Kontopigado, settlement, exterior dump. Local wheel-made cooking tripod (LH IIIB2 Late-LH IIIC Early 1) (V. Hachtmann; E. Kardamaki)

Fig. 6.29 Kontopigado, well 7 (LH IIIB2 Late), lower level, workshop installation. Local wheel-made cooking jug (L. Valsamis)

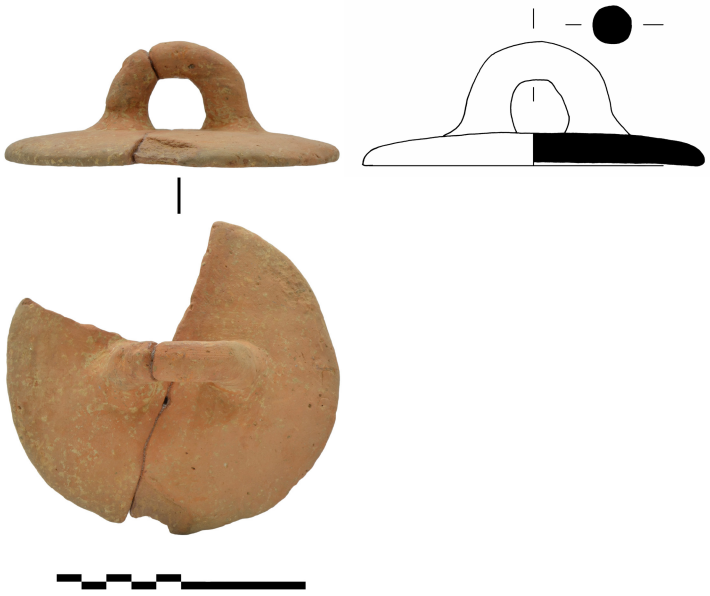

Fig. 6.30 Kontopigado, settlement. Local cooking lid (LH IIIB2 Late-LH IIIC Early 1) (E. Kardamaki; L. Valsamis)

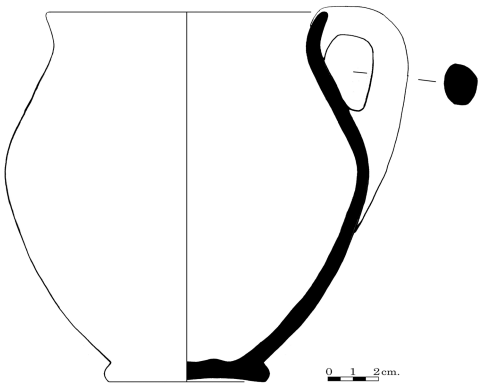

Fig. 6.31 Kontopigado, settlement, floor deposit, middle building phase (LH IIIC Early 1). Local wheel-made cooking pot (V. Hachtmann, E. Kardamaki)

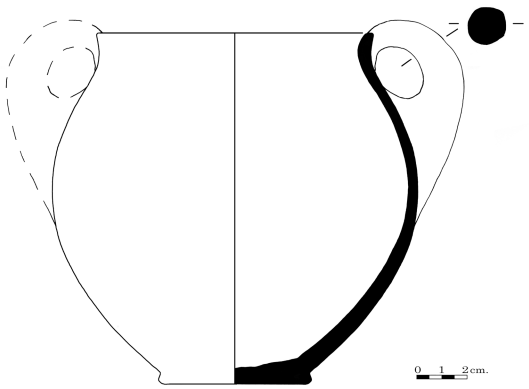

Fig. 6.32 Kontopigado, settlement, floor deposit, middle building phase (LH IIIC Early 1). Local wheel-made cooking pot (V. Hachtmann, E. Kardamaki)

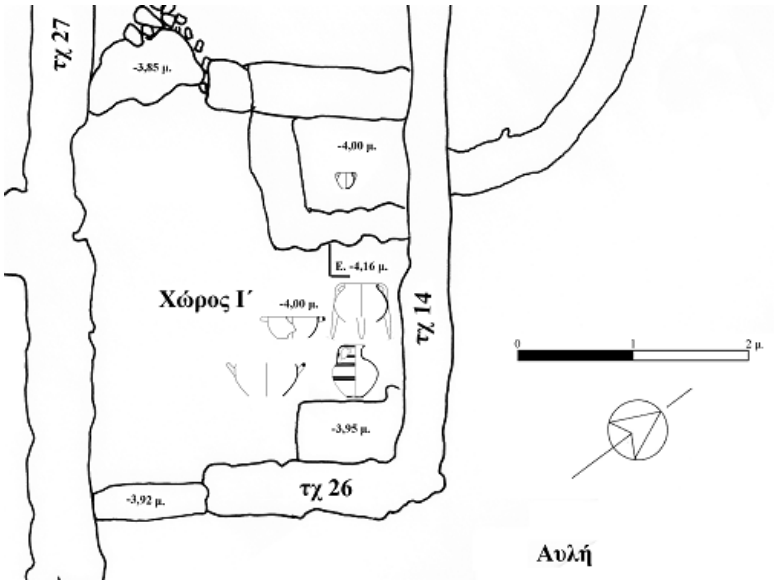

Fig. 6.33 Kontopigado, settlement, middle building phase. Cooking installation with cooking pot of Figure 32, and Aeginetan cooking tripod of Figure 26 with other vessels directly on the floor, outside the cooking installation (modified after Kaza-Papageorgiou & Kardamaki 2017: plan 3)

In almost all of the LH IIIB2 Late and LH IIIC Early 1 contexts of Kontopigado the local wheel-made cooking pots and Aeginetan ones occur together in the same contexts (Kaza-Papageorgiou & Kardamaki 2017). Among the Aeginetan imports, the tripods were frequent whereas at the same time the local tripods were rare (**Figs 6.23-6.24, 6.33**).

Other than with the Aeginetan cooking pottery that appears in many LBA contexts of Attica, the development of the wheel-made cooking wares during the late Mycenaean period and until LH IIIC Early 1 is difficult to understand as only a few examples of this ware have been published. Some wheel-made cooking pots are known from LH IIIA2 and LH IIIB1 tombs (Papadopoulos & Kontorli-Papadopoulou 2014: 83, fig. 3.206), from the Acropolis (Gauß 2003: 97, fig. 2:4; Rutter 2003: 207, fig. 7:1)[2], and possibly Thorikos (Mountjoy 1995). Evidence from Kontopigado seems to support the hypothesis that during LH IIIA1-LH IIIB1 the wheel-made cooking pots were rare (Kaza-Papageorgiou & Kardamaki 2012; 2017; forthcoming). In the only pure

2 I thank B. Lis very much for drawing my attention to this vessel.

LH IIIA1 and LH IIIA2 contexts from Kontopigado (Building Complex II and I respectively) the amount of the wheel-made cooking ware is rare or negligible (Kaza-Papageorgiou & Kardamaki forthcoming). A small fragment from the handle of a local cooking pot has been found in the LH IIIA2 fill but it cannot be excluded that it is intrusive. Another early deposit from Building Complex I forms part of a dump sealed by stone slabs arranged as a pavement. Some sherds clearly date to LH IIIB2 or LH IIIC Early but the majority of the material probably dates to LH IIIA2/LH IIIB. Among 177 sherds, the cooking pottery comprises 5 % of the total. The latter is represented only by fragments of Aeginetan cooking pottery (Kaza-Papageorgiou & Kardamaki 2012: 167). In another dump that contained a higher amount of LH IIIB1 pottery directly to the south of the aforementioned deposit sealed by slabs, a fill of pebbles and pottery was found on top of the bedrock. Again, the cooking pottery comprises 5 % of the material uncovered and is predominated by the Aeginetan class. Only one sherd belongs to the local fabric (Kaza-Papageorgiou & Kardamaki 2012). In contrast, in the floor deposits of the settlement that date from LH IIIB2 Late to LH IIIC Early, as well as in pit 1 (LH IIIC Early) and in well 7 (LH IIIB2), the local cooking pots are very frequent (Kaza-Papageorgiou *et alii* 2011; Kaza-Papageorgiou & Kardamaki 2017). The highest amount of local cooking pottery is observed in well 7 and in pit 1. In the latter it represents 61 % of the cooking pottery. Consequently, we suggest that the large-scale production of wheel-made cooking pots started in Athens and likely in Kontopigado as late as LH IIIB2, probably even in the latest stage of this phase. The fabric and manufacturing technique of the local Kontopigado cooking pots – wheel-made red clay with a sandy feeling – resembles that known from other regions such as the Argolid and Boeotia during LH IIIB2/LH IIIC Early. In the NE-Peloponnese, wheel-made cooking pots have a long tradition and they are very well represented from LH IIIA1 onwards (Wace 1954: 282, fig. 13; Frizell 1980: 15, fig. 12:262; Thomas 2011: 217, fig. 25:279-287). Regarding their shape, the Kontopigado cooking pots have their best parallels in LH IIIC Early contexts (Lefkandi: Popham *et alii* 2006: 208, fig. 2.33:1; Mycenae: French 2011: 391) but a few earlier, LH IIIB2 Late examples exist as well (Mycenae: French & Taylour 2007: 367, 420). On the other hand, some of the Kontopigado pots strongly resemble their Aeginetan counterparts (*cf*. **Figs 6.25, 6.27**). In sum, it seems that this local production of wheel-made cooking pots followed a manufacture process common to other Mycenaean neighbouring sites (Boetia, Argolid) but in regard to the shapes this production was also influenced by the products of Aeginetan workshops (hand-made cooking pots; see Lis *et alii* 2015: 71, figs 7-8 for a discussion on Aeginetan cooking traits occuring in wheel-made fabrics in LH IIIC Early). The frequent use of flat lids with handles, uncommon elsewhere on the Mainland, even suggests a connection to Crete, as good parallels for these utensils exist only there.

4.5. ‘Industrial’ and specialised vessels

Several finds from the lower part of well 7 could relate to industrial activities taking place in the area close to the channels, or even in the channels. They include an unusual high number of ground stones and unique types of loomweights. In addition, a couple of vessels were found that could have had a special function. Most of these are medium coarse, low-fired vessels with organic temper (Kaza-Papageorgiou *et alii* 2011; Gilstrap *et alii* 2016: 506 [micaceous fabric with organic temper]) but others are made with the clay used for the cooking pottery. Together with some unusual shapes (**Fig. 6.34**), the highest concentration of bathtubs and small as well as medium-sized tubs FS 1 with lugs comes from well 7 (**Fig. 6.35**). Elsewhere in Kontopigado the small and medium-sized tubs are extremely rare (Kaza-Papageorgiou & Kardamaki 2012). Moreover, examples of certain unusual types of vessels (*e.g*. **Fig. 6.34**) have not been identified beyond well 7 and the area of the channels. The only objects that continue to appear until the final phase of the settlement in LH IIIC Early 1 are the large bathtubs probably used for storage (Kaza-Papageorgiou & Kardamaki 2012; 2017).

Fig. 6.34 Kontopigado. Well 7, lower level (LH IIIB2 Late), workshop installation. 'Industrial' vessel (L. Valsamis)

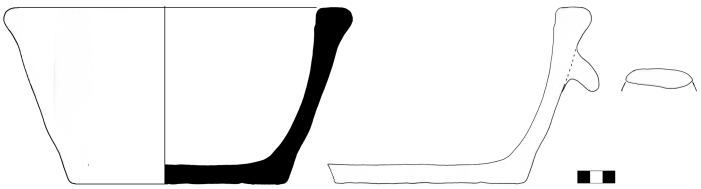

Fig. 6.35 Kontopigado. Well 7, lower level (LH IIIB2 Late), workshop installation. Medium-sized tub (E. Kardamaki)

5. Conclusions

The late 13th and early 12th c. BC (LH IIIB2-LH IIIC Early) was a period of crisis in the Aegean and was marked by destructions of the Mycenaean palaces. This led to a period of general unrest and very likely of movements of people after the abandonment of many old settlements (Kilian 1988: 135). Athens and many other sites in Attica or across the Saronic Gulf (*e.g.* Haghios Kosmas, Kontopigado, Kanakia Salamis, and Kolonna) were not excluded from this picture. While the main evidence so far relates with the abandonment of many of these settlements, the new investigation at Kontopigado suggests that prior to the final abandonment of the settlement two destruction events that did not include fire may have occurred in LH IIIB2 (the deposition of the lower fill in well 7) and LH IIIC Early 1 (pit 1, second building phase at the settlement) respectively. In this respect, the study of the pottery from the relevant deposits could elucidate whether or to what extent the aforementioned events had any impact on the pottery consumed and produced at Kontopigado. It has been demonstrated that the pottery from Kontopigado is characterised by a local continuous tradition which makes its exact synchronisation with other regions difficult. For the same reason it is not always easy to identify the exact point when technological or stylistic changes are introduced to the pottery repertoire and whether these changes are sudden or take place more gradually. In LH IIIB2 the use of wheel-made cooking vessels and pattern-painted deep bowls had increased but otherwise the pottery clearly continued from a LH IIIA2 tradition as evident by the choice of decoration styles and motifs. This is also true for the deep bowls with vertical upper

parts and narrow decorative zones (*cf.* Mountjoy 1999: fig. 295: 76, 77, 79 for LH IIIA2 deep bowls FS 283 and FS 284 from Phokis). However, it has been argued that they also resemble LM IIIB examples of the shape (**Fig. 6.9**). Whether the increase of the wheel-made cooking pottery or the pattern-painted deep bowls during LH IIIB2 is to be associated with any significant historical event (destructions at the end of LH IIIB1, construction of the Cyclopean wall at Athens) it is impossible to say as the exact length of the local LH IIIB2 phase and its correlation to the Argolid are still not well known.

The comparison with the Argolid elucidates the different courses of development among the pottery styles of the region and could allow some further hypothesis regarding continuous use of LH IIIA1 and LH IIIA2 features until LH IIIB2 in the pottery from Kontopigado. The Argolidan/NE-Peloponnese workshops demonstrate an innovative character that is almost unparalleled among other sites in Southern Greece. The introduction of new pottery types that are almost always connected with conspicuous consumption of pattern-painted pottery seem to coincide with the successive destruction events at the end of LH IIIA2, in LH IIIB Middle and in LH IIIB2 (earthquakes or fire destructions). Remarkably, these innovative pottery types (such as deep bowls of type A, painted kylix FS 258A and B in LH IIIB1, deep bowls of type B, rosette deep bowls for LH IIIB2) (*cf.* **Figs 6.5-6.7**) rapidly became frequent and were produced in large numbers. It is difficult to understand what lies behind these constant innovations in the pottery repertoire of the Argolid but one could mention the following two features as relevant: the high quality of the clay and paint in the majority of the painted pottery produced in the Argolid/NE-Peloponnese and the system of exchange-oriented production. At least until the end of LH IIIB1 the pattern-painted – among which a special case is the pictorial pottery – as well as monochrome pottery were widely exported in the Aegean (Marketou *et alii* 2006), but also in the Eastern and Central Mediterranean (Zuckerman *et alii* 2010). In almost all cases, where the provenance of the exported Mycenaean material has been examined, pottery from workshops outside the Argolid/NE-Peloponnese is very rare (Jung 2015). Perhaps the goal to produce high quality pottery for export could have led to competition between different workshops of the NE-Peloponnese and this in turn to constant innovations in production. But to what extent are the innovations introduced in workshop(s) of the Argolid/NE-Peloponnese adapted elsewhere? Athens and Attica offer a good example of how uneven the distribution of the innovative shapes from the Argolid may be. While on the one hand, several of these shapes occur in funerary contexts (especially the LH IIIB1 pattern-painted kylikes and deep bowls A; see Mountjoy 1999: fig. 200: 242-251), their overall presence in settlement deposits is very small. Otherwise, at Kontopigado, during LH IIIB1 people apparently continue to use the pottery types known in the previous period (especially monochrome kylikes, stemmed bowls and deep bowls/ truncated stemmed bowls). The same is true for LH IIIB2. Furthermore, some of the new shapes appearing in the Argolid (*e.g.* rosette deep bowl) are totally absent at Kontopigado and very rare in Athens, and others such as the deep bowl B are rare at both sites (Immerwahr 1971: 265, pl. 64: 496; Mountjoy 1999: 555, fig. 202: 264-269). The most common mixing bowls related with the consumption of wine, the craters, also clearly differ from those in the Argolid during LH IIIB2. In Athens, they are spouted – a very rare feature in the Argolid – and almost always decorated with wavy bands, although other decorations occur as well (**Figs 6.36-6.37**). All these differences may not only relate with specific stylistic preferences but could also reflect divergent consumption practices or alternatively a lack of close contact between the two regions (Sherratt 1980) at least in regard to pottery styles.

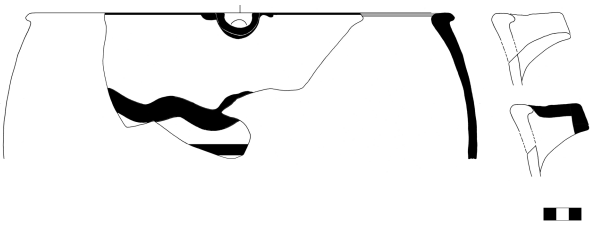

Fig. 6.36 Kontopigado. Floor deposit, middle building phase (LH IIIC Early 1). Spouted crater with wavy band (E. Kardamaki)

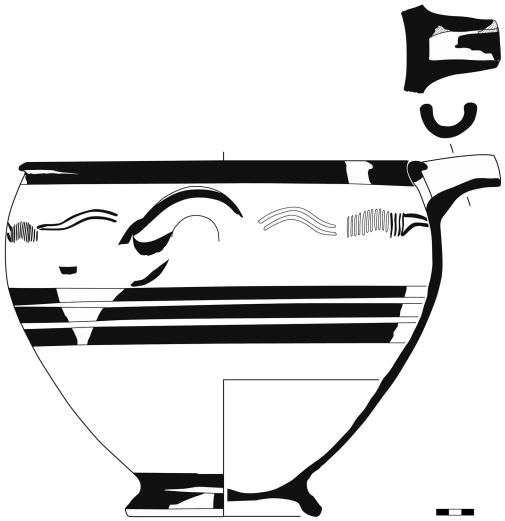

Fig. 6.37 Kontopigado. Well 7, lower level, workshop installation. Spouted crater with horizontal whorl shells (LH IIIB2 Late) (B. Konnemann)

Considering the history of Kontopigado and other regions another point is striking. The first signs possibly related to destruction events and abandonment occur at Kontopigado in LH IIIB2 Late (deposition of lower levels in well 7 in the workshop installation) and later in LH IIIC Early 1 (primary floor deposits with vessels in the middle and final phase of the settlement). The high amount of material dumped around the settlement could originate from clearing activities after such destructions but part of it could also come from regular cleaning of rooms throughout LH IIIB. It is even possible that some floors were used throughout the largest part of the 13th c. BC. Based on the sherd material and the fully preserved vessels in one room of the settlement it has been argued that the floor was constructed at some point during LH IIIB1 and was in use until LH IIIC Early 1 (middle building phase) (Kaza-Papageorgiou & Kardamaki 2017: 41). A long use of rooms and floors has been observed also in the settlement of Kanakia at Salamis. There the excavator Yiannis Lolos notes the presence of a single floor for a time span between LH IIIB1 and LH IIIC Early 1 (roughly 100 years) (Marabea 2012: 163, 165). During its lifetime no destruction took place and there is no evidence for significant alterations in the plan of the buildings. Such a long use of rooms/floors contrasts with the situation in the palaces of the Argolid and Thebes where we have a sequence of floors or evidence for more than one destruction event within LH IIIB. Whether this situation suggests the existence of an environment without much stress at Kontopigado, needs to be left open. But if this is true, this more 'stable' environment could reflect itself in the general development of pottery traditions that can be described as continuous between LH IIIA2 and LH IIIB2. At some point during LH IIIB2 there is an increase of wheel-made cooking pottery and the use of pattern-painted deep bowls (**Figs 6.9-6.11, 6.13, 6.27, 6.29**). But even then, the motifs and the general shapes of the vessels are still closely connected to the LH IIIA2 tradition. This would explain the fact that almost all of the observed changes do not suggest the type of discontinuity that is often related with important historical and cultural changes (Roux 2008). Even in the next sub-phase, LH IIIC Early 1 – after a putative destruction event in LH IIIB2 Late (lower levels of well 7) – there is no evidence for discontinuity in the pottery of Kontopigado. During this stage, many of the LH IIIA2-like motifs disappear, the deep bowls more often have a flaring rim – like those in the Argolid – and overfired vessels appear to be more common as well. All these features rather relate to the performative aspect of production and manufacture in the local workshops, probably suggesting influences from other regions. However, this does not indicate a real break with local tradition, nor the introduction of new traits. The most serious change is the almost complete disappearance of the industrial vases from the LH IIIC Early deposits indicating the interruption of some or all of the production activities in those workshops. Therefore, it is surprising that such an immense political and social event as the destruction of the palaces in the Argolid and Thebes did not significantly affect the pottery production in this region or indeed at Athens. In this respect, one may note that the changes observed in the pottery of Kontopigado some 150 years earlier were much more obvious. At the end of LH IIIA1 distinct common wares

as those known from Athens disappeared (monochrome and unburnished wares) or became rare (monochrome burnished). At the same time the large-scale use of typical locally-produced Mycenaean wares (fine plain, lustrous pattern-painted, lustrous monochrome) emerged at the settlement (Kaza-Papageorgiou & Kardamaki forthcoming). This has been related to the general spread of Mycenaean wares in Southern Greece that seemingly took place later at Kontopigado and Athens than in other regions like the NE-Peloponnese where this process had already started during LH II. However, the available evidence from the settlement is still too limited to allow conclusions to be drawn about any destructions or major rebuilding events at the end of LH IIIA1 at Kontopigado. On the contrary, based on the evidence from Kontopigado and Athens for the phases after LH IIIB2 and LH IIIC Early 1 we do not see the replacement of old wares or the appearance of new manufacture techniques. One significant change relates to the abandonment of the site of Kolonna, and the gradual decrease of the Aeginetan hand-made cooking tripods and amphorae that were produced there, until their final disappearance after LH IIIC Early. This cooking ware represented a substantial part of the cooking assemblages at several sites across the Saronic Gulf from the late MBA. In some cases, cooking pots of this type were produced in other wares but with similar manufacture methods, either by dislocated Aeginetan potters or by potters who imitated these vessels (Lis *et alii* 2015). However, this lack of Aeginetan vessels does not seem to have affected the cooking practices in any serious way. Tripods and amphorae continued to be in use, produced in local wares. A general continuity is observed in the pottery of other regions as well. The so-called hand-made and burnished ware that reproduces Italian shapes on the Greek mainland is a rare ware, almost absent in Attica, whereas in the Argolid it had already made its appearance before the destruction events, suggesting that the ware did not appear as a response to these events. However, the increase in the number of hand-made and burnished wares at several sites and especially the Argolid during LH IIIC Early could have been facilitated by the new environment created after the destruction of the palaces. Finally, in the course of LH IIIC Middle, the plain drinking assemblages, previously connected with mass production sponsored by palaces, decreased in number. However, the production of the pattern-painted and monochrome Mycenaean tablewares that represent the greatest part of the LH IIIC Early and LH IIIC Middle assemblages continued uninterrupted and even flourished after the destruction of the palaces. Some new shapes appeared, and some previously plain drinking vessels started to incorporate painted decoration (see Borgna & Levi 2015 for recent discussion), however, the painted deep bowls and craters remained the core of the drinking assemblages. Thus, in most regions any identified change seems to relate to the new economic and social environment after the collapse of the palaces, rather than suggesting a break with the pre-existing pottery traditions, consumption practices, and technologies. The production of painted and – during LH IIIC Early – plain pottery was not among crafts that were affected or interrupted by the destruction of the palaces (*e.g*. wall paintings). Whether this suggests that pottery workshops in Southern Greece recovered from the crisis events very quickly or that their base of organisation was not totally dependent on the palatial system is at the moment difficult to determine but the latter assumption could represent an intriguing possibility.

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7. Hand-made pottery groups in Mainland Greece during the 13th and 12th c. BC as a sign of economic crisis?

Bartłomiej Lis[1]

1. Introduction[2]

The discussion of hand-made pottery in the second half of the Late Bronze Age (LBA – *ca*. 1680/1600-1060 BC) in the Greek mainland is dominated by Hand-made Burnished Ware (HBW), *aka* Barbarian Ware. Since its discovery (Rutter 1975; French & Rutter 1977), a number of publications have discussed, and continue to discuss this group not only with regard to its formal and technological characteristics, but also to the reasons behind its appearance (for most recent comprehensive coverage of the topic, see Jung 2006; see also Lis 2009; and an appendix in Iacono 2013). Apart from those who linked this pottery with population groups coming from regions located to the west and north of Greece, there were also less numerous attempts to explain it as a result of local, indigenous developments. Therefore, different models have been used to explain its appearance, and such a diversity is an obviously positive development. In a way, however, the concentration on HBW in general, and its foreign formal characteristics in particular has had a negative effect on the study of other, less unusual or strikingly different groups of pottery that were manufactured without any use of the wheel. Moreover, there is a conventional belief concerning Mycenaean pottery – that it was all wheel-made – which upon a closer scrutiny is not entirely valid either for the Early Mycenaean period or even for the more mature LBA (**Vitale**, **this volume**; Lis 2016). Thus, I would risk saying that we are not fully prepared to correctly recognise, and interpret, the various groups of hand-made pottery on the Greek mainland towards the end of the LBA.

Another aspect of the study of hand-made pottery is a tendency to lump all hand-made and burnished pottery into one big group. This constituted the major obstacle for attempts at explaining the appearance of hand-made pottery and the role of its producers. These attempts include the model proposed by David Small (1990), which assumes that hand-made pottery was produced by households that were facing economic stress, which was probably triggered by increased demands from the palace administration. The exchange of such goods was a way to generate additional income in order to supplement agricultural production. As already pointed out by Jeremy Rutter (1990: 32) in his reply to Small's article, this model only applies to the part of the hand-made pottery found on the Greek mainland, but not to the majority of Hand-made Burnished Ware with its distinct typological and decorative features.

In an article that resulted from a 2006 conference held in Oxford (Lis 2009), I tried to deconstruct this broad group and suggest a new division in order to enable a more contextualised discussion of the circumstances that led to the appearance of each of the identified subgroups of hand-made pottery. HBW was considered the first of at least three distinct groups of hand-made pottery in the Aegean. The second termed West Anatolian Hand-made Pottery, comprised in fact two groups – Coarse and Knobbed Ware – with Troy as its main findspot. The most intriguing, and at the same time understudied and poorly understood group of pottery was the third one, which I proposed to call Hand-made Domestic Pottery (HDP). It comprised pottery of predominantly storage and cooking function, mostly, but not exclusively, burnished. These vessels either copied Mycenaean

1 Polish Academy of Sciences.

2 In addition to thanking the organisers of the 'Technology in Crisis' conference – Charlotte Langohr and Ilaria Caloi – for the opportunity to take a fresh look at one of the first problems I dealt with during my research, I would like to acknowledge support of project directors that facilitated my study of hand-made pottery over the years and provided me with necessary permissions: Aleydis Van de Moortel and Eleni Zahou (Mitrou), Sharon Stocker (Pylos), Joseph Maran (Tiryns), Reiner Felsch (Kalapodi), Anthi Batziou (Pefkakia), and Efi Karantzali (Frantzis).

counterparts or had very simple, basic forms. In contrast to HBW, its typology does not point to foreign influence or provenance. I think that after 10 years this distinction still holds, however, there are some new groups to be discussed.

2. Hand-made pottery on the Greek mainland during the 13th c. BC

When approaching the topic of hand-made pottery in the later part of the LBA, there is a more or less immediate association with the LH IIIC period, the 12th and part of the 11th c. BC. This is also the best candidate for a period of trouble and crisis on the Mainland. Accepting the invitation to the conference out of which this volume originates, inspired me to extend the analysis of this issue into the 13th c. BC. While we know that during the 13th c. BC there were some signs of decline, trouble, and crisis – eventually culminating in the collapse of palatial system – it is difficult to describe this time on the Mainland as a general *period* of trouble, as in many respects, it witnessed the peak of Mycenaean activity and achievements, especially in its earlier part. Therefore, I believe that for the 13th c. BC we need to reverse the question a bit: one needs to first investigate pottery in search for changes in technological choices and then see whether they betray signs of troubled times, disruption, economic stress, *etc*. With such a research question, I decided to investigate the issue of hand-made pottery in the 13th c. BC, targeting in the first instance some of the deposits that I examined over the last years.

What I would like to achieve in this paper is to provide a broad review of the topic, concentrating on those groups of hand-made pottery that can be tied more directly to socio-economic developments on the Greek mainland primarily during the 13th c. BC, but also the century that followed it. For this reason, and also in order to shift the emphasis in the study of hand-made pottery, I will devote only a very limited amount of space to the phenomenon of Hand-made Burnished Ware, concentrating instead on the group I classified as HDP, as well as new groups of hand-made pottery that do not fit previous classificatory schemes.

2.1. Hand-made Burnished Ware

As already mentioned, it is not my intention to provide any substantial update on this particular group of pottery. There is a continuous increase of publications on HBW that take care of this (see for example a number of papers in Karageorghis & Kouka 2011). Let me only recapitulate the most important points of this discussion. Certain typological characteristics leave no doubt as to the origin of this group, which must be sought in the Southern Italian Peninsula (Jung 2006: 21-47). Petrographic analysis of such pottery found on the Mainland and beyond confirms its local production, highlighting at least one peculiarity with regard to technological choices – the use of grog temper (Boileau *et alii* 2010; Whitbread 1992). In all, there remains very little room to doubt that HBW was produced by population groups that derive from the Southern Italian Peninsula and made their way to the Greek mainland and beyond. The first instances of HBW date to the LM/LH IIIB period, and its earliest appearances are attested at Khania, Crete (Hallager & Hallager 2003: 253-254, pls 84-85) and Tiryns (Kilian 2007) (**Fig. 7.1)**. At Midea (**Fig. 7.1**) this pottery has already shown up by the end of the palatial period (Demakopoulou *et alii* 2003: 10-11, 14-15, figs 9, 22). The situation at Mycenae (**Fig. 7.1**) is unclear, as most of the material is fragmentary, but among the pre-LH IIIC hand-made pottery, there is no published fragment that could securely constitute a member of the HBW group (Romanos 2011). In LH IIIC Early we witness an increase in the number of sites at which HBW is present, but not necessarily an increase in the amounts of material at a single site – these remain rather limited, apart from some possible concentrations at Tiryns (Stockhammer 2008: 283-294) and possibly also Dimini (**Fig. 7.1**) (Adrimi-Sismani 2006, although no quantitative data provided). Nevertheless, this geographical expansion probably reflects more substantial numbers of people moving east from the Central Mediterranean. This shows that there were less constraints for the inflow of new population groups, in itself a sign of troubled times on the Mycenaean mainland and a rather straightforward consequence of the fall of the palaces. Obviously, these were difficult times for a segment of the indigenous populations, but for others, like the newcomers, this was an opening of new perspectives.

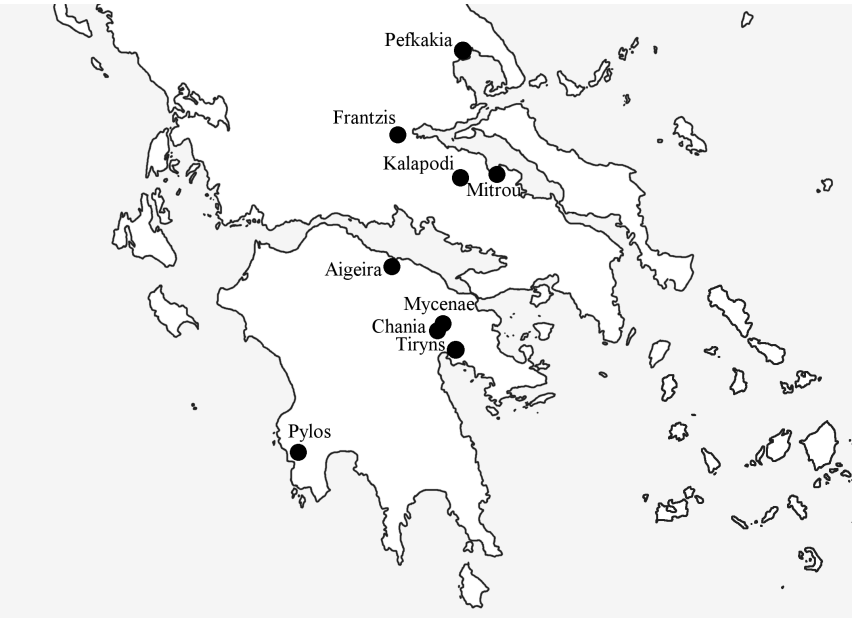

Fig. 7.1 Map of Greece showing the location of sites discussed in the text (by the author)

2.2. Hand-made Domestic Pottery

In a previous article (Lis 2009), I mentioned two major sites for which HDP was identified in the LH IIIC levels in substantial quantities – Kalapodi (Phokis) and Mitrou (East Lokris) (**Fig. 7.1**). I also noted that given the prolonged presence of hand-made pottery in Tiryns and Mycenae (both Argolid), it is not unlikely that this material contains at least some examples of HDP. A recent PhD on hand-made pottery from Mycenae dating to both the LH IIIB and IIIC periods includes a number of previously unpublished fragments (Romanos 2011). They are not differentiated any further, and most of the small fragments cannot be ascribed with any certainty to either HBW or HDP. Nevertheless, some pieces clearly belong to HBW for the presence of plain decorative bands, while others should be classified as HDP. Most striking is a one-handled cooking pot with rounded base, which would feel much more at home in an Early Iron Age (EIA) context (French 1989: 39, fig. 3; Romanos 2011 [Vol. II]: 35). However, it was found in an LH IIIB level, *i.e.* still in the 13th c. BC.

The rich assemblage from Tiryns also yielded fragments that more likely belong to HDP rather than HBW (see for instance Kilian 2007: nos 198-224, figs 17-19). An important settlement in the discussion of HDP is Aigeira (Achaia) (**Fig. 7.1**), one of the sites that were discussed very early on with regard to Hand-made Burnished Ware (Deger-Jalkotzy 1977). However, according to the analysis by Reinhard Jung, hand-made pottery from Aigeira dating to the LH IIIC period does not have any Italian features and should thus belong to a different group (Jung 2006: 43-46). This finding, together with recently published material deriving from new excavations at the site directed by Walter Gauss (Gauss *et alii* 2013: 77, fig. 7:2), suggest that Aigeira features exclusively Hand-made Domestic Pottery. It is a fairly unexpected conclusion, as the presence of true HBW would be hardly surprising at Aigeira, given the geographical position of Achaia and its strong ties with the Southern Italian Peninsula (Eder & Jung 2005).

A new site with HDP pottery is Frantzis near the town of Lamia, Central Greece, located further north than Kalapodi or Mitrou (**Fig. 7.1**). There, one- and two-handled simple hand-made and burnished jars (**Fig. 7.2**) were found together with regular wheel-made Mycenaean fine pottery of the palatial period (Karantzali 2013: 141). Profile-wise these cooking pots are not very different from the EIA pottery or the aforementioned specimen from LH IIIB Mycenae. They were found in a building complex used during the LH IIIA2-B period and destroyed in the LH IIIB2/IIIC Early. Even further north, at the site of Pefkakia located at the Pagasetic

Gulf very close to the modern city of Volos (**Fig. 7.1**), at least one hand-made and burnished cooking pot was found in a room defined as a workshop area (**Fig. 7.3**). The context has been dated to LH IIIB2/IIIC Early (Batziou-Efstathiou 2015).

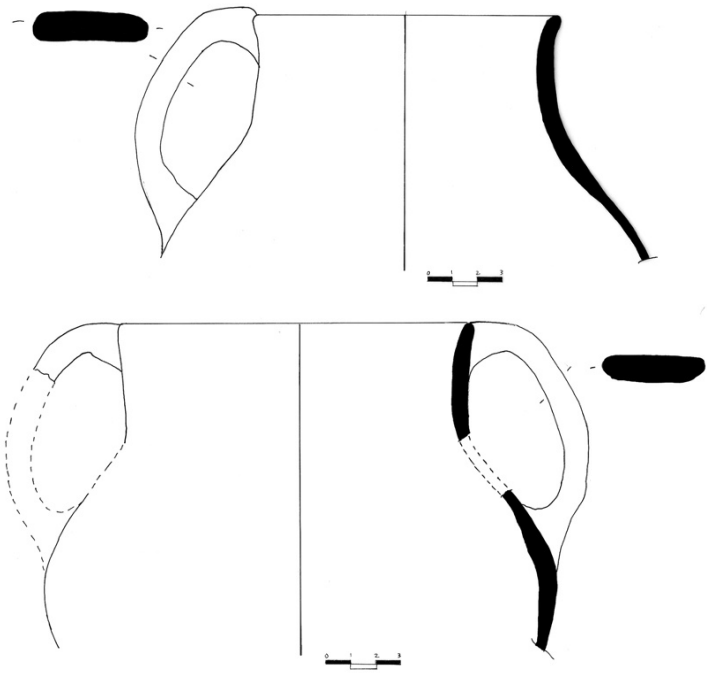

Fig. 7.2 Frantzis. Hand-made and burnished cooking pots (after Karantzali 2013: fig. 10: 54-55 and 54-55b)

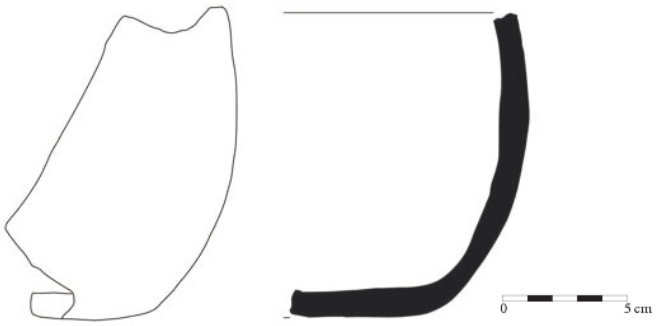

Fig. 7.3 Pefkakia. Hand-made and burnished cooking pot (after Batziou-Efstathiou 2015: fig. 46 [BE 50895])

There are three vessels from the Palace at Pylos (**Fig. 7.1**), from Rooms 98 and 99, belonging to shape No. 39 in local typology (**Fig. 7.4**), which resemble some of the typical examples of HDP (*cf.* **Figs 7.2-7.3**), and they are described in the publication as "coarse hand-made, rounded bottom" (Blegen & Rawson 1966: 378). Even though these vessels were already published in 1960's, they did not trigger any interest in the literature and have not been cited it the discussion on hand-made pottery, as opposed to a single sherd (not illustrated, now apparently lost) from the settlement of Nichoria (McDonald & Wilkie 1992: 512).

Fig. 7.4 Palace of Pylos. Hand-made jug (after Blegen & Rawson 1966: figs 343 and 370 [no. 829])

A slightly different variant of hand-made pottery comes from an LH IIIB2 deposit at Mitrou (**Fig. 7.1**). It does not include simple burnished jars, but relatively standard Mycenaean shapes, fired at high temperatures, without burnished surfaces. They seem to be manufactured in the same fabrics as those used before for wheel-made pottery, a fact that may suggest that they were produced in workshops which were in operation for quite some time (Lis 2012b). The only real difference is that the wheel does not appear to have been used in the process anymore (**Fig. 7.5**). If this reconstruction is correct, then it signals certain changes in the activity of some workshops, suggesting some sort of decline in the labour input or the level of investment in the process. Maybe because of economic constraints, the skills related to the use of the wheel were no longer passed on to potters entering the craft. Interestingly, in the next decades (already during the 12th c. BC) some of the cooking pottery was still produced on the wheel, but it was executed in a different fabric than the hand-made specimens. This particular fabric sub-group died out after the palatial period.

Fig. 7.5 Mitrou. LH IIIB2 deposit. Hand-made tripods cooking pots (LP782-030-018 and LP782-033-028) (by the author, courtesy of Mitrou Archaeological Project)

The example of Mitrou demonstrates that even cooking pottery with typically Mycenaean traits could be manufactured without the use of the wheel. But this development apparently also encompasses other types of

regular Mycenaean pottery. In a small LH IIIB storeroom of the settlement of Chania in the Argolid (**Fig. 7.1**) (Palaiologou 2015: 65-66), most of the large unpainted closed shapes are hand-made (**Fig. 7.6**). It is the only instance known to me of such shapes being hand-made, but this may be due to the lack of appropriate attention towards the manufacture of Mycenaean pottery in the literature (Berg 2013). Interestingly, it was the dark-surfaced cooking pottery and the pale-surfaced storage vessels that would be consistently hand-made during the Greek Early Iron Age (Strack 2007).

Speaking of hand-made pottery in the 13th c. BC, one should not forget cooking pottery produced on Aegina and exported to a number of locations in mainland Greece (*e.g.* **Kardamaki & Kaza-Papageorgiou, this volume**) and beyond (for instance, Scoglio del Tonno in Apulia; Jones *et alii* 2014: 260). This group, however, represents the final stage of a long-standing tradition of hand-made manufacture that can be traced back to at least the EH III period (Gauss & Kiriatzi 2011). All in all, it is a very unique group of hand-made pottery telling quite a different story.

This brief overview highlights one important fact – that the phenomenon of Hand-made Domestic Pottery without Italian/foreign affinities can be traced back to the 13th c. BC. The present evidence is far from impressive, but as I indicated in the introduction – and I will prove it further on – we were reluctant to recognise and discuss hand-made pottery in the palatial period. Back in 2009, I associated the appearance of HDP with a reaction on the household level to problems in the supply of wheel-made pottery with similar functionality, which affected not entire regions, but rather particular settlements (Lis 2009: 159-161). Nevertheless, this was an explanation valid for the LH IIIC period, especially its more advanced parts. Can we see any disruptions in pottery production and supply in the palatial period, and if so, can they be linked with the appearance of hand-made pottery? The answer is positive, and the best example of such developments comes from the Palace of Pylos. The vast ceramic assemblage recovered there includes many hand-made vessels, in quantities exceeding at least my own expectations.

Fig. 7.6 Chania near Mycenae. LH IIIB deposit. Hand-made piriform jar (after Palaiologou 2015: 65-66, fig. 16 [BE 27338])

3. Pylos – ceramic production in crisis?

Let us start with signs of disruption in pottery production and likely also supply at Pylos. The palace is famous for its impressive quantities of fine unpainted pottery, mostly kylikes, stored in just a few rooms. However, upon a closer inspection, this assemblage becomes much less impressive, at least on a technological level. According to a thorough study by Julie Hruby (2006: 192-195; 2014), many vessels are warped. Numerous pots display very deep ridges from wheel-throwing, which she refers to as corkscrew spirals, that may indicate speedy manufacturing process and lack of care or time to smooth them out in the final stage. Deviations from circularity in rim and base shapes are frequent, and so is the presence of pre-firing repairs, such as clay pellets filling accidental perforations from trimming, or the overlapping of the sides of torn rims. In total 8 % of vessels show evidence of pre-firing holes or tears. There is also evidence for slumping. As Hruby (2014: 56) puts it: "the Pylos potter, while he may have been 'wanakteros' or royal, seems – especially by comparison with his contemporaries elsewhere in Greece and his immediate predecessors in Messenia – to have been working quickly, carelessly, and without finesse, presumably reflecting a need to produce quantity over quality". In her PhD dissertation (Hruby 2006), she also considered the potter inexperienced, and I think this could be the way to explain the general quality: the work of an inexperienced potter working under time pressure. The profusion of flaws is a strong argument in favour of the suggestion that the Palace of Pylos was facing problems in acquiring standard quality finewares during the last stages of its functioning. And there is much more to it. The very low quantity of decorated pottery for consumption of food and drinks – not only by comparison to pantries (Rooms 18-22) – fits neither standard expectations as to the palace inventory nor that what we know from other contemporary Mycenaean palaces. At Tiryns, huge amounts of decorated open shapes were found in Epichosis, a deposit deriving most likely from clearing the palace area after the destruction (Voigtländer 2003). The less prominent settlement of Tsoungiza, displays a high degree of similarity with palatial sites in the LH IIIB1 period in terms of the functional and decorative composition of its pottery assemblage (Thomas 2005: 539). A number of decorated pots from the palace at Pylos are painted in a manner that can be described at least as 'idiosyncratic', sometimes poorly referencing designs common in other areas of the Peloponnese. Some of the pottery can only be described as *weird*, especially when found in a late palatial context. These vessels consist of a number of large decorated shapes which seem to imitate, in a very unskilled manner, palatial-style jars of the LH IIA period (Mountjoy 1999: 343; see Rutter 2005: 38-40, who considers them Kytheran products). The styles they mimic are at least 200 years older than those pots at Pylos that are roughly contemporary with the destruction. In order to avoid my own biases, I am quoting the original publication regarding their quality (Blegen & Rawson 1966: 390-391): "the potters were certainly more successful in reproducing shapes than the vase-painters were in adapting the decorative motifs" and "the whole scheme of decoration is characterized by a crude undisciplined exuberance almost unparalleled in Mycenaean pottery decoration." The reasons behind the manufacture of such imitations are unclear. However, what is important for the current discussion is that these vessels provide yet more evidence that the potter (or potters) who was active at Pylos, or Kythera if the vessels are imports, had a skill level that was clearly lower than the average for the Mainland.

It is against such a background that the contents of Room 60, one of the pottery pantries in the Palace of Pylos should be judged. The pottery stored in that room, close to 1000 pieces, has been frequently discussed in the context of either the palace's involvement in feasting or the pottery production in the kingdom of Pylos. The coarser and darker nature of the fabric is the most frequently cited piece of information stemming from the original publication, heavily influencing interpretations of this assemblage. The fact that the final publication described one of the shapes – the so-called milk-bowl – as hand-made and polished (Blegen & Rawson 1966: 352), once again has not triggered any major interest or discussion in the literature.

The detailed discussion of the ceramic assemblage of Room 60 has been published elsewhere (Lis 2016). Here it suffices to provide a summarised discussion of the most important observations. There are several shapes that are manufactured in a hand-made technique. In addition to the milk-bowls (Shape 10[3]), they include the basin (Shape 2), the spouted bowl (Shapes 7 and 8), and the jug with a tubular spout and a basket handle (Shape 41). In the case of each of these shapes, only some examples are entirely hand-made; others are either made partly on the wheel, or the manufacturing method cannot be determined due to subsequent surface treatment.

3 All shape numbers refer to the typology worked out for Pylos.

The most common surface treatment in this group characterised by a (partial) hand-made technique is burnishing, usually applied in a cursory manner. Apart from burnishing, paring (or scraping) was applied to the exterior surfaces, in particular in places like the attachments of handles or spouts. This is in strong contrast to Mycenaean pottery for which such a treatment is usually visible on the lower bodies. Moreover, parallel and usually oblique ripples are visible on the exterior surfaces of some of the vessels and are indicative of the selective use of the paddle and anvil technique.

The shapes of these vessels do not diverge strongly from the standard Mycenaean repertoire, but, apart from the 'feeding bottle' (Shape 41), they cannot be described as typical. The presence of a few additional pots in Room 60, which in their form and manufacture appear to bridge the gap between the discussed group and the pottery executed in the Mycenaean tradition of the palatial period, provides a clue to the understanding of this group. It seems that these pots served as models for the potter who manufactured the discussed group. The difference between the copies and the models directs us towards an intriguing hypothesis that their producer was a potter who had been trained in a non-Mycenaean tradition. He might have derived from regions of the Peloponnese in which certain non-Mycenaean or pre-Mycenaean traditions utilising only hand-made techniques survived longer than elsewhere, and the closest such region could be that of Elis, where, at Makrysia Chania, a very close parallel for Shape 7 has been found. Furthermore, indirect evidence suggests that the pottery stored in Room 60 could have been manufactured in the part of Messenia relatively close to Elis (Lis 2016).

Pottery stored in Room 60 seems to point to problems in pottery supply that the palace administration was facing. It is important to mention it was a supply for one of its most crucial activities, as the functional study of this partly hand-made group points to its usage in the manufacture of perfumed oil. It is impossible to define how directly involved the palace was in the acquisition of those pots, but it is certain that a non-Mycenaean potter was involved in their manufacture, a situation not recognised in any other Mycenaean palace. We may assume that this would not have happened if it was possible to acquire or commission such pots at a nearby operating workshop without any problems.

4. Conclusions

What I hope to have demonstrated in this contribution is that there is neither a single and uniform group of hand-made (and burnished) pottery on the Greek mainland nor is there a single explanation for the appearance of the various groups discussed in this study. Those variegated explanations provide new insights into the socio-economic and sometimes also political reality during the 13th and 12th c. BC, not only confirming what can be concluded from the study of the wheel-made pottery but sometimes also providing brand new and refreshing evidence.

The appearance of the standard HDP can be associated with problems of supply, and, at a more individual level, economic stress faced by particular households. When we talk about the supply of wheel-made cooking pottery, it is worth highlighting a certain chronological pattern. Looking at the LBA history of cooking pottery production on the Mainland, it is very instructive to note that this group is usually the last one to become standardised and wheel-made, which points to its late inclusion in the production process at professional workshops. At the same time, it is also the first group to be dropped from this particular mode of production. At Mitrou, cooking pots transitioned into wheel-made relatively early, by the LH IIA period (Lis 2012b). But at other sites, like Tsoungiza, even by the LH IIIA2 Early, a considerable number of cooking pots were still hand-made (Lis *in press*). This is true for a few contemporary vessels from Mitrou as well (Lis 2017). At the Menelaion, the majority of the LH IIB/IIIA button-based jugs are hand-made (Catling 2009: 424). Towards the end of the LBA, the first group of pottery that became more frequently manufactured without the wheel was cooking pottery. If we look at the Early Iron Age, for a few centuries, cooking, and to a certain extent also storage vessels were by and large hand-made, while tableware remained wheel-made. Therefore, I would like to suggest that factors like fluctuations in the demand for cooking pottery, disruptions of established exchange networks and other developments affecting the economic viability of large-scale pottery production could lead to the breakdown in the manufacture of wheel-made cooking pottery by certain workshops. As a consequence, it becomes necessary for households to produce pottery on their own.

Obviously, the utilitarian pottery did not cease to be available all at once. Nevertheless, because it was not as easily available as it used to be, it might have been easier to replace a broken pot with something that could be manufactured quickly within the house or to get one from a neighbour who was producing such pots in slightly larger quantities. Furthermore, even if workshop-produced utilitarian pottery was easily available, it had to be exchanged for something. If, during the palatial period, a particular household was experiencing shortages resulting from crop failure or increased demands from the authorities, it would try to fill the gap in its ceramic assemblage in a manner that did not deplete its resources. Here is where the model outlined by David Small (1990) comes into play. However, production for sale, to gain an additional source of profit, which constitutes part of his model, can only happen if multiple households are experiencing economic problems, and workshop-produced vessels are either not available or more expensive than those produced by individual households. Otherwise, there would be no demand for such household production.

Moving to the LH IIIB2 hand-made cooking pots from Mitrou, they offer us a glimpse into the operation of particular workshops, suggesting some internal problems and the abandonment of the wheel in the manufacturing process. It may be that these workshops fell victim to increased competition and that it proved inviable to continue producing cooking pots at this level. Indeed, the main source of trouble might have been the widely available Aeginetan cooking pottery (incidentally also hand-made), which during LH IIIB2 constituted *ca*. 50 % of the entire cooking repertoire at Mitrou (Lis 2012a).

The fascinating example of Pylos, with its multiple strands of evidence, highlights problems faced by a palace attempting to organise its ceramic supply in a period of trouble. All these local stories featuring hand-made pottery add a great deal to our understanding of the developments not only within the ceramic production sphere but also in the broader socio-economic realm. What they reflect is perhaps not a period of trouble, but definitely *episodes* of trouble. However, there is something more about the pottery from Room 60 which is of significance when thinking about troubled times. It bears witness to a particular phenomenon, that of human mobility, as the potter must have moved to Messenia to produce the pottery found in Room 60. The same phenomenon, only on a geographically greater scale, is behind the appearance of the Hand-made Burnished Ware. Another group of hand-made pottery mentioned here – Aeginetan cooking pottery – appears in a number of locations in the early 12th c. BC but is executed in local fabrics and not imported as before. This attests to the mobility of its producers (Lis *et alii* 2015). It is unquestionable that mobility was part of every-day life in the Mediterranean during any period (Broodbank 2013). To a certain extent it was also a necessity, not only to survive but also to prosper. Nevertheless, it may be true that the scale of this phenomenon increased in periods of trouble, even to such an extent that mobility could function as a good measure of crisis. On the one hand, if any existing central authority was dealing with a crisis situation, its control over population movements must have become less effective or ceased completely, providing new opportunities for those willing to move. On the other hand, each crisis situation also creates a number of push factors, as people might be forced to leave their homes in order to search for safer areas or better economic conditions.

Finishing my contribution, I would like to point out one thing that all these various hand-made pottery groups have in common: their appearances are highly localised, *i.e.* idiosyncratic, and they do not simultaneously affect an entire region, but only impact certain sites. Ceramic supply for the Palace at Pylos was apparently highly problematic, but this does not seem to be the case for Nichoria in the same region of Messenia. Hand-made domestic pottery shows up early in LH IIIC contexts at Kalapodi, but not at Kynos or Lefkandi. And while a substantial part of the LH IIIB2 cooking pottery from Mitrou is hand-made, I have yet to see the same development evidenced at any other site.

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8. The troubled century?

Potting practices and socio-political changes at Mitrou, East Lokris, between the end of the 14th and the beginning of the 12th c. BC

Salvatore Vitale

The analysis of pottery production practices as a tool to understand socio-cultural, economic, and/or political dynamics (Gosselain 2000; Roux 1994; Roux & Courty 1998; 2013; Roux & Jeffra 2015) is relatively new to Aegean archaeology. The same applies to the study of that complex assemblage of interrelated actions that constitute the pottery manufacturing process or *chaîne opératoire*. Little attention has also been given to the investigation of those factors impacting and orienting pottery consumption practices during the Greek Bronze Age, especially from the end of the user.

While this is generally true, it should be noted that different geographic and cultural areas of the Aegean, as well as different chronological phases within certain regions, have been granted different treatments. Since the second half of the 1990's, the aforementioned aspects of ceramic analysis have received increased attention by specialists working on Minoan Crete (Whitelaw *et alii* 1997; Van de Moortel 2002: 189; 2006; Moody *et alii* 2003; all with previous bibliography), the Cyclades (Davis & Lewis 1985; Berg 2007a; 2007b; 2009; all with previous bibliography), and Early to Middle Helladic Greece (Rutter 1995; Zerner 2008; Pullen 2011; Gauss & Kiriatzi 2011; Choleva 2012; all with previous bibliography). By contrast, they have remained largely neglected in Mycenaean pottery studies. This fact is probably the outcome of the influential pathways designed by scholars such as Arne Furumark (1941a; 1941b) and Elizabeth French (1964; 1965; 1966; 1967; 1969), who have used pottery mostly for dating purposes, setting the foundations for an exceptionally refined typological and chronological sequence for Late Bronze Age (LBA) mainland Greece (Dickinson 1972; 1977; Rutter 1977; 1978; Mountjoy 1986; 1999; Jung 2006; Podzuweit 2007; Vitale 2006; 2011; French 2011; Kardamaki 2015). In recent years, however, a growing number of publications shows that this long-standing trend is gradually changing, demonstrating a fresh interest in the potential contribution of Mycenaean pottery studies to our understanding of broader research questions (Berg 2013; Vitale 2016: 84; Vitale & Trecarichi 2015: 330-331; Vitale *et alii* 2017: especially 255-267; Lis 2016: 497-498; 2017; see also Rückl & Jacobs 2016: 299). Such a tendency is confirmed by the contributions collected within this volume, which provide new important data and case studies.

Within this wider framework, the specific aim of this paper is to examine manufacturing practices in the pottery assemblages of Mitrou, East Lokris, between the end of the 14th and the very beginning of the 12th c. BC and to investigate their potential meaning in the socio-political context of Central Greece (**Fig. 8.1**)[1]. More specifically, significant choices made by the potters at different stages of the production process are discussed to determine whether and how they reflect the irreversible crisis of the Mycenaean Palatial system during the second half of Late Helladic (LH) IIIB. In order to achieve this goal, Mitrou's LH IIIA2 Late, LH IIIB1, and LH IIIB2 Late ceramic assemblages (early, mature, and final Palatial period) are compared with the evidence from two other significant horizons dating to previous phases of Mycenaean civilisation, specifically LH IIA and LH IIIA2 Early (early and final Prepalatial period).

This contribution is subdivided into six sections. The first sets the theoretical and methodological backgrounds for the analysis proposed within this paper. The second provides a brief overview of Mitrou's extraordinarily rich occupational and ceramic sequences. The third section is focused on Mitrou's 'political trajectories' from the beginning of the LBA to the end of the Mycenaean Palatial period. The fourth examines relevant aspects of potting practices during the periods of interest. The fifth and sixth sections include a discussion of the socio-political meaning of Mitrou ceramics in the wider context of Central Greece, as well as some final statements on the potential theoretical significance of this case study.

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FIG. 8.1 MAP SHOWING THE LOCATION OF MITROU AND OTHER IMPORTANT CENTRAL GREEK SITES MENTIONED IN THE TEXT (B. LIS & T. ROSS)

1. Methodology

1.1. Pots and politics in the Mycenaean Palatial period

The geopolitical landscape of Mycenaean Greece during the Palatial period has lately been the subject of some debate. Two important recent studies, one by Birgitta Eder & Reinhard Jung (2015) and the other only by Jung (2015), argue for a unified administrative organisation in the Southern and Central Aegean, under the leadership of a single king or *wanax*[2]. In Jung's view, the *wanax* may have travelled from one palace to the other, in order to promote his symbolic role and exert political control over his lands (Jung 2015: 257). These two articles also imply that the Argolid and Mycenae played a prominent role in the context of a wide and structured political system (Eder & Jung 2015: 119; Jung: 258). For example, Mycenae may have gained particular significance as the burial seat of the ruling dynasty (Jung 2015: 258). Eder & Jung's model has the advantage of addressing the distinctive cultural *koine* of Mycenaean Greece during LH IIIA2 and LH IIIB. However, it remains to be demonstrated through future research, based on a more in-depth discussion of relevant theoretical, textual, contextual, and archaeological evidence[3]. In the absence of more decisive arguments, peer polity interaction

2 A unified political administration in the Aegean during the Mycenaean Palatial period has recently been suggested also by Jorrit Kelder (2010). For a critical review of some aspects of Kelder's arguments, see Eder & Jung 2015: 130-132.

3 The weakest point of Eder & Jung's articles is the absence of a thorough review of the available theoretical models used to interpret the geopolitical landscape of the Mycenaean mainland during the Palatial period. Eder and Jung's contributions would also benefit from a less Argolid-centric approach. After all, the largest Palatial citadel (Gla) and the most technologically advanced engineering complex (the Copaic Basin dyke system) are both located in Central Greece (Iakovidis 1989; 1998a; 1998b). The earliest evidence

(Cherry & Renfrew 1986; Nakassis *et alii* 2010) remains the most solid model to account for the current dataset and is thus employed in this paper.

As in the case of Mycenaean geopolitical landscapes, studies of Mycenaean palaces and ceramic productions have not yet reached unanimous conclusions. Based on the ceramic assemblages stored within the Palace of Nestor at Pylos, Carl Blegen (Blegen *et alii* 1973: 20) and James Wright (1984) suggested that individual potters' workshops, which contributed to the Palatial economy, may have been controlled by the Palatial bureaucracy. Todd Whitelaw (2001: 77-79) and Michael Galaty (2007: 85-86), however, maintained that there is no definitive evidence to support Blegen and Wright's hypothesis[4]. At the same time, Galaty (2007: 86) suggested that Pylian elites may have contributed to the commercialisation of ceramic production. More specifically, considering their prominent concern for wealth goods, Palatial administrators may have had a greater interest in the circulation of kylikes and other fine fabric vessels than utilitarian containers. Despite the disparity of views on the extent of Palatial direct control over pottery production, Galaty's point about the iconic, if not 'political', value of certain fine vessel types has received consensus among scholars including, most recently, Julie Hruby (2013: 424; 2014: 54, n. 42, with previous bibliography).

1.2. The Mitrou case study

As the interplay between socio-political changes and potting practices during the Mycenaean Palatial period is the subject of this paper, the present analysis is not focused on the entire body of Mitrou's ceramics, but rather on the so-called 'tableware'. This term is defined here in its broader possible meaning and includes the fine and medium-coarse vessels that were used for eating, drinking, mixing, ladling, and pouring purposes, as well as the higher end of utilitarian and ritual ceramic vessels, such as alabastra, rhyta, askoi, *etc*. (see Vitale 2013: 124, table 2, under the category of 'serving vessels').

Following in the footsteps traced by Aleydis Van de Moortel's analysis of pottery changes at the transition from the Minoan Protopalatial to Neopalatial periods on Crete (Van de Moortel 2002), the present study of Mitrou's tableware considers three steps of the manufacturing process: clay preparation, formation of the vessel's body, and finishing (Rye 1981; Van de Moortel 2002: 192). For the first of these steps, all of the tableware vessels from Mitrou's significant deposits dating to the periods under study were counted and charted for comparative purposes. In the case of the second and the third steps of the manufacturing process, counts were possible only for inventoried vessels[5] and were necessarily limited to two specific aspects, namely primary formation of the vessel's body for step two and surface treatment for step three. No systematic counts were undertaken for data concerning vessels' secondary formation, including type and quality of appendages' attachments, and for other relevant aspects of the finishing stage, such as the smoothing of interior surfaces, the quality of paint, and the complexity of decoration (see Rye 1981; Van de Moortel 2002: 192). Instead, for all these features of the manufacturing process for which counts were not systematically carried out, research

for Linear B scripts and archives on the Mainland (Iklaina in Messenia and Haghios Vasilios in Laconia) comes from the Southern Peloponnese (Cosmopoulos 2010: 43-46, fig. 8, pl. 30a; 2016: 55; Aravantinos & Vasilogamvrou 2012). Finally, the first example of a Megaron type structure (the Menelaion in Laconia) also comes from the Southern Peloponnese (Catling 2009: 12-17, figs 12-16). Finally, besides Mycenae, other authors have suggested alternative seats for the king of Ahhiyawa located within the Greek mainland or the Dodecanese, but these proposals are not thoroughly discussed by Eder & Jung (see Hope Simpson 2003: 231-236, with previous bibliography).

4 Whitelaw (2001:78-79), however, suggests that while such a conclusion is valid for Pylos, no comparably decisive evidence exists at the moment to prove that ceramic production was not controlled directly by Palatial authorities in other Mycenaean kingdoms.

5 The criteria for the selection of inventoried pots were designed by the author to produce a representative sample of the defining features of each pottery phase. The form used to record Mitrou inventoried ceramic finds includes the following data: (a) The main dimensions of the objects; (b) The identification of forms and decorations; (c) The assessment of fabric types, surface treatments, and primary formation methods; (d) The description of the colours of surfaces, paints, and fractures, according to the Munsell Soil Color Charts; (e) The percentages of preserved parts (such as rims, handles, bodies, bases, *etc*.); (f) The measurement of the fabric hardness, according to Moh's scale; (g) The classification of fabric inclusions; and (h) The evaluation of the degree of use and depositional wear. In addition to these data, which are recorded through check boxes with a predefined list of options, Mitrou's form includes a space for the narrative description of aspects concerning the process of vessels' secondary formation. Within this section, particular attention is devoted to details of pottery manufacture, such as the way in which appendages were shaped and attached to the main body of the vessel.

was conducted through the methodical and consistent observation, description, and documentation of broader diachronic trends represented in Mitrou's significant pottery deposits.

In the absence of chemical analyses, the provenance of each of the vessels examined in this study cannot be definitely established. Nevertheless, it should be emphasised that, based on stylistic, manufacturing, and macroscopic fabric analysis, the majority of these vessels can be considered 'local'. This term is used in its broadest possible meaning. As such, it does not imply necessarily that some or all of the analysed vessels were produced at Mitrou. Rather, it is likely that most of the LH IIA to LH IIIB2 Late pottery recovered at the site was manufactured at one or multiple nearby workshops that supplied Mitrou's pottery consumption needs constantly over a long time span, including the entire Middle Helladic and LH periods. This fact is suggested by a striking continuity in terms of surface colours, surface treatments, and forming methods.

Although obviously imported specimens were excluded from the counts provided in this article, it is possible that a smaller portion of the analysed vessels originated from other regions. Potential imports, however, do not seem to follow different patterns from those characterising local vessels, as far as the three manufacturing steps considered within this article are concerned. Thus, the counts included in this paper reflect the practices of the local potting community as well as the broader trajectories of the entire Mitrou ceramic assemblage through time.

2. Mitrou's occupational and ceramic sequences

Mitrou is an ideal site for studying the long-term significance of cultural and social practices in their wider political context, including ceramic manufacture. The 2004-2008 excavation seasons directed by Aleydis Van de Moortel and Eleni Zahou have brought to light a long occupational sequence (**Figs 8.2-8.4**)[6]. The pottery evidence indicates that Mitrou was already visited during the Neolithic period. The oldest architectural remains uncovered at the site thus far have been assigned to Early Helladic IIB. From this phase onwards, Mitrou was continuously settled up until Late Protogeometric (**Fig. 8.4**), as is demonstrated by a copious amount of buildings and occupational surfaces, often stratified on top of one another (Van de Moortel & Zahou 2012).

The excavated contexts produced a long and detailed sequence of pottery deposits unprecedented on the Central Greek mainland. This is particularly true for the LBA period, where a total of 12 distinct horizons were identified from LH I to LH IIIB2 Late, covering the long period between the first half of the 17th and the very beginning of the 12th c. BC (**Figs 8.2-8.4**)[7]. Within this time span, except for LH IIIB1, all the phases considered in this study are abundantly represented and widely distributed at Mitrou. Moreover, these stratified and 'qualified find groups' (see Furumark 1941b: 32) consist of a diverse array of contexts in terms of site formation processes, including complete or mendable pots from floor deposits, fills of pits, and one-time dump episodes, as well as more fragmented vessels from subsurface terracing fills, fills sealed in-between street levels, and miscellaneous dumps and pits (**Table 8.1**).

3. Mitrou's political trajectories

The information discussed in this section is particularly significant for understanding Mitrou's pottery assemblages within their wider social, economic, and political context. Previous studies have suggested that during the Prepalatial period Mitrou was an important centre in East Lokris (Van de Moortel 2007: 247; 2016; Van de Moortel & Zahou 2012: 1133-1136; Maran & Van de Moortel 2014: 535-540; Vitale 2012: 1174-1152; 2013: 127). Evidence for the emergence of a political elite is apparent since the beginning of the LBA, when the local architectural and mortuary landscapes were reshaped to express wealth and power (Van de Moortel 2016:

6 The Mitrou Archaeological Project (www.mitrou.org) is a joint undertaking of the University of Tennessee and the Ephorate of Antiquities of Phthiotida and Evrytania, under the auspices of the American School of Classical Studies at Athens. For general reports on Mitrou excavations, see Van de Moortel 2007; 2009; Van de Moortel & Zahou 2005; 2011; 2012 (all with previous bibliography).

7 These ceramic horizons include four sub-phases during LH I and three sub-phases during LH IIIA2, while only a single phase was recognised for LH IIA, LH IIB, LH IIIA1, LH IIIB1, and LH IIIB2 Late respectively (see Vitale 2011; 2012; 2013; Vitale & Van de Moortel, forthcoming; Maran & Van de Moortel 2014: 532, nn 5-7, fig. 5; Hale *et alii* 2016).

91-101). During the first half of LH I, two monumental complexes named Buildings H and D (**Figs 8.2-8.4**) were constructed in connection with an orthogonal network of paved roads (Maran & Van de Moortel 2014: 535-537, figs 2-4; Van de Moortel 2016: 91-98, figs 1, 3, 5; Van de Moortel & Zahou 2012: 1133-1134, figs 6-7). During the same phase, Tomb 51, an unusually large slab-built cist tomb, was constructed at the northeast extremity of the islet, forming part of a grave plot possibly covered by a tumulus (Van de Moortel 2016: 101-102, figs 1-2). Slightly later, in the second half of LH I, Tomb 73, an L-shaped rectangular built chamber tomb (for the typology see Papadimitriou 2001: 1-3, 153), was constructed in the northwest corner of Building D (**Figs 8.3-8.4**) and surrounded by a rectangular enclosure obliterating much of the previous architecture (Van de Moortel 2016: 102-107, figs 1, 3-4). Although robbed already in Antiquity, the quality of the finds recovered from Tomb 73, including jewellery, weapons, and ceramics, demonstrates the high status and prosperity of the deceased (Van de Moortel 2016: 106; Van de Moortel & Zahou 2012: 1136, fig. 10a-c; Van de Moortel *et alii*, forthcoming; Vitale 2013: 127, fig. 3:c). Buildings H and D continued to be used into LH IIIA1 and LH IIIA2 Early respectively (Vitale 2011: 332, table 1; 2013: 123-124, fig. 1). While Tomb 51 was most likely no longer used after LH I, the last burial episode in Tomb 73 can be firmly dated to LH IIIA1 based on ceramic evidence (Vitale 2013: 127, fig. 3:c).

The Prepalatial period at Mitrou was brought to a close by a fire destruction affecting the NE excavation sector of the site during LH IIIA2 Early (Van de Moortel 2007: 247; Van de Moortel & Zahou 2005: 41; 2012: 1136; Vitale 2008: 230-236, pls XLIV-XLVI, XLVIII; 2011: 332, table 1, figs 2, 3:1-4; 2012: 1148-1150, figs 2-3). After this event, it is likely that Mitrou and East Lokris (**Fig. 8.1**) fell under the sphere of influence of a Palatial authority that, based on topographic evidence, may have been Orchomenos (Van de Moortel 2007: 253; 2016: 107; Van de Moortel *et alii*, forthcoming; Kramer-Hajos 2008: 125; Vitale 2012: 1152; 2013: 127; Vitale & Van de Moortel, forthcoming). This political scenario, however, probably changed towards the end of LH IIIB. The LH IIIB2 Late deposits from Mitrou postdate the materials dating the destruction of Gla, which took place in LH IIIB2 Early (Iakovidis 1989: 258; Iakovidis 1998a: 190; Vitale & Van de Moortel, forthcoming). The materials from Orchomenos are poorly published. However, it is generally assumed that Orchomenos may have been destroyed more or less at the same time as Gla, because these two sites were strongly interrelated (Iakovidis 1989; Iakovidis 1998a). This simple chronological information raises the question of Mitrou's political connections during the very final phase of the Mycenaean Palatial period. As far as chronology is concerned, the LH IIIB2 Late deposits from Mitrou closely match the ceramics from the destruction of the Palatial buildings at Thebes (for Mitrou, see Vitale 2012: 1150-1151, fig. 5; for Thebes, see Vitale 2006: 191-193, fig. 10, with previous bibliography). Mitrou's deposits include several likely Theban pottery imports and there are many significant typological and functional parallels in the assemblages from these two sites. One of the most striking features is the high incidence of a new type of painted drinking vessel: the linear semi-globular cup FS 215 (Vitale 2006: 192, fig. 10:2; Vitale 2012: 1150, fig. 5:c). Based on this pottery evidence and the indications for a LH IIIB2 Late Palatial-style building at Mitrou including roof tiles (Van de Moortel & Zahou 2012: 1137; Vitale 2012: 1150-1151, figs 6-7, tab. 2), it is possible that Mitrou and East Lokris passed from Orchomenos to Theban control during the final decades of the 13th c. BC (see Aravantinos *et alii* 2001: 355; Vitale & Van de Moortel, forthcoming; for a different opinion, see Kramer-Hajos 2006). By controlling East Lokris, Thebes would have gained access to the important trade routes leading from the Bay of Atalanti to the Pagasetic Gulf, where the Palace of Dimini was located.

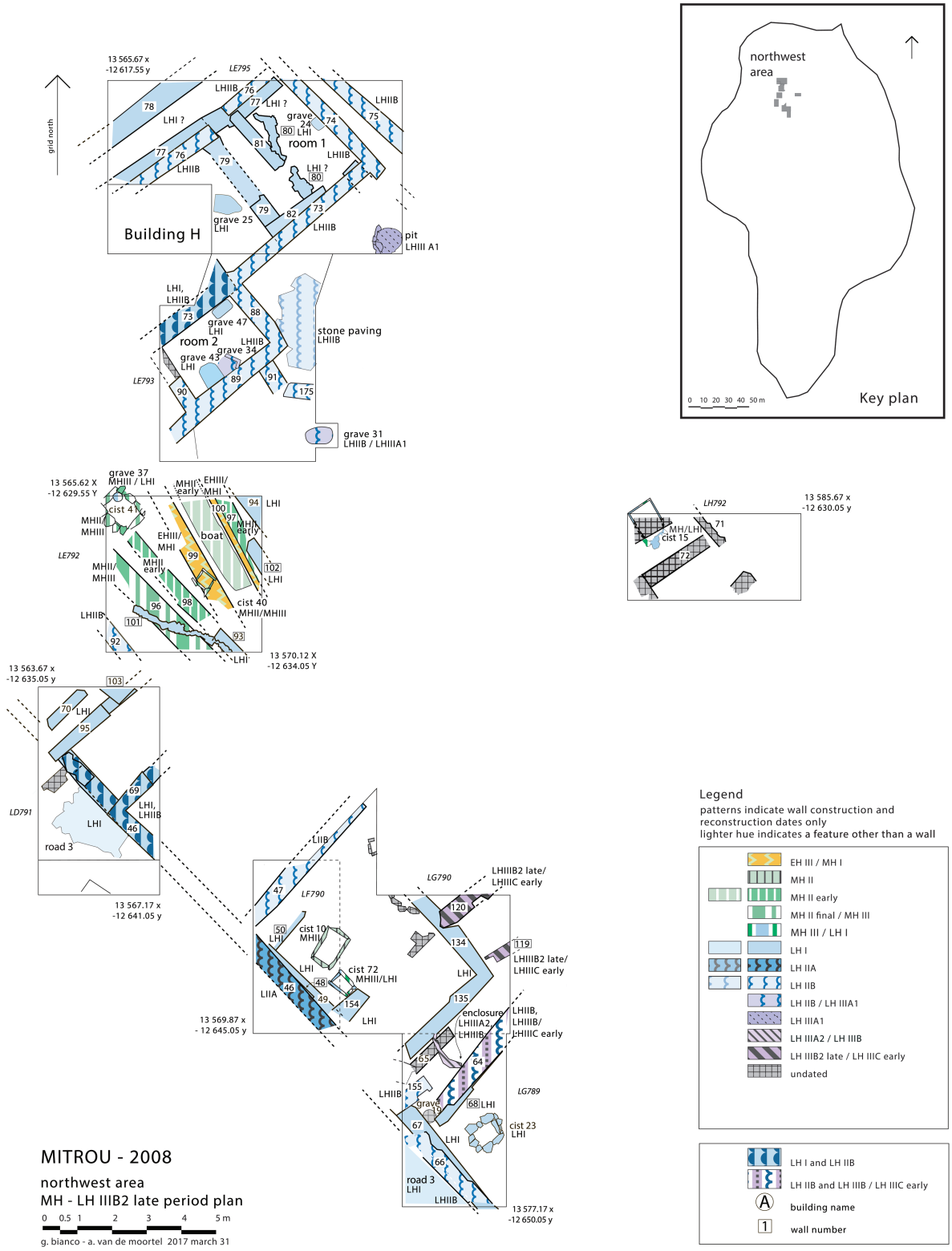

FIG. 8.2 MITROU, NW EXCAVATION SECTOR, MH TO LH IIIB2 LATE PERIOD PLAN (G. BIANCO & A. VAN DE MOORTEL)

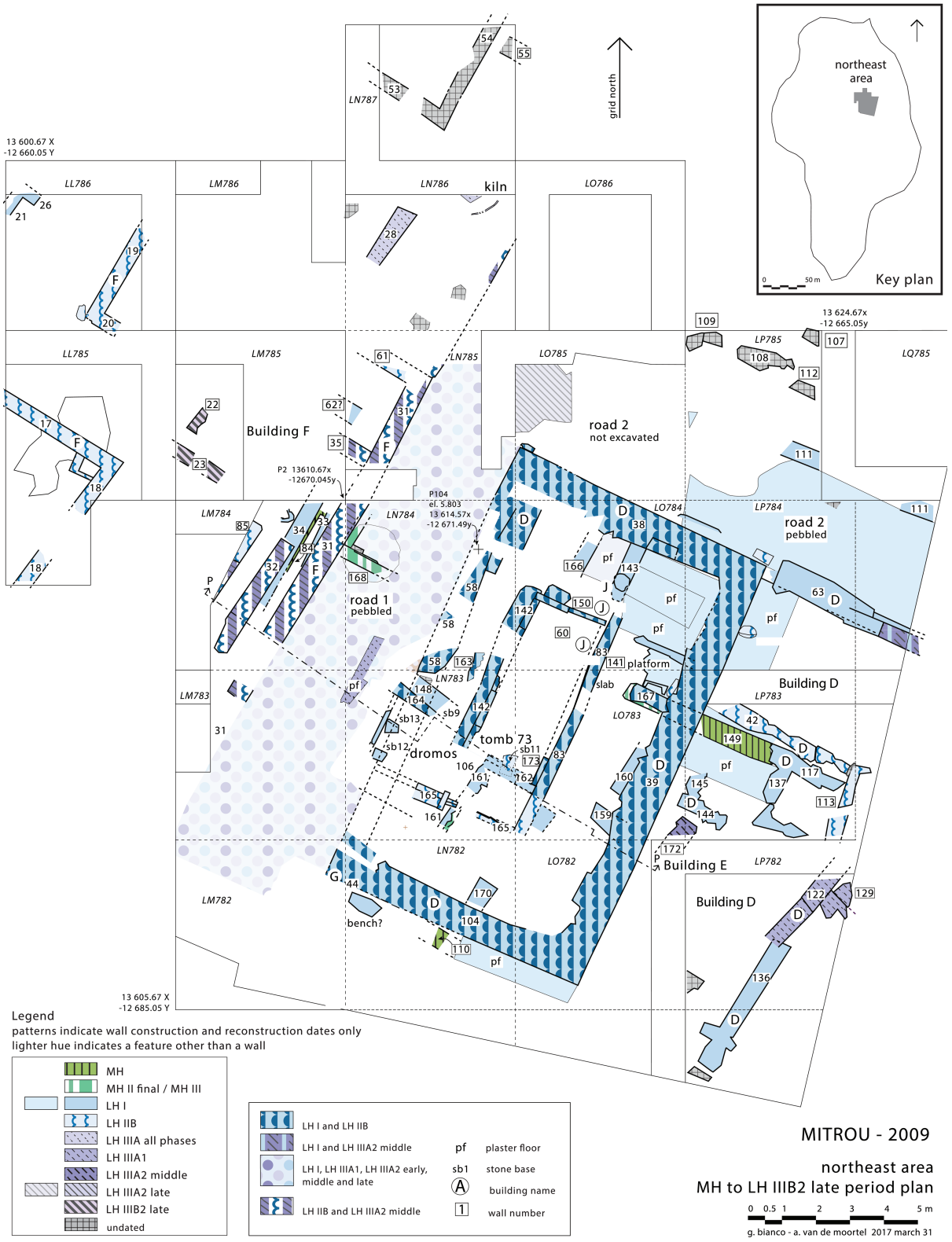

FIG. 8.3 MITROU, NE EXCAVATION SECTOR, MH TO LH IIIB2 LATE PERIOD PLAN (G. BIANCO & A. VAN DE MOORTEL)

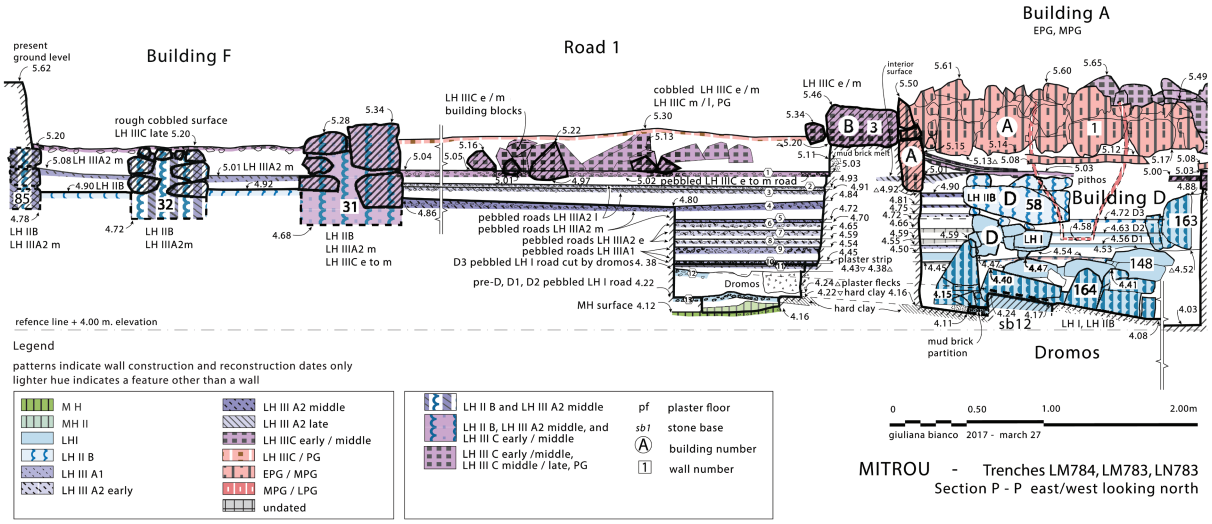

FIG. 8.4 MITROU, NE EXCAVATION SECTOR, SECTION P-P EAST-WEST LOOKING NORTH, TRENCHES LM784, LM783, AND LN783 (G. BIANCO & A. VAN DE MOORTEL)

Ceramic Phase	Floor Deposits or Disturbed Floor Deposits	Miscellaneous Fills	Fills Sealed In-Between Street Levels	Miscellaneous Dumps	Miscellaneous Pits or Dumps	Broad Chronological and Cultural Phases on the Greek Mainland During the Late Bronze Age (Based on the Presence or Absence of Mycenaean Palaces)	Mitrou's Political Trajectories
LH IIIB2 Late	1. LM785*				1. LP782*	Final Palatial Period	Secondary Centre under a Palatial Polity (Possibly Thebes)
LH IIIB1				1. LP784		Mature Palatial Period	Secondary Centre under a Palatial Polity (Possibly Orchomenos)
LH IIIA2 Late	1. LM/LN 784*		1. LM783; 2. LO785			Early Palatial Period	
LH IIIA2 Early	1. LL784/785*; 2. LP782*		1. LM783	1. LM/LN 784*	1. LP785	Final Prepalatial Period	Independent Locally Emerging Centre
LH IIA	1. LG789*; 2. LG790*; 3. LE792/793*	1. LP783		1. LF790*		Early Prepalatial Period	
* Deposits including a significant amount of complete or mendable vessels							

TAB. 8.1 TYPOLOGY OF MITROU DEPOSITS BASED ON SITE FORMATION PROCESSES (BY THE AUTHOR)

4. Presentation of the evidence

The presentation of the evidence begins with the analysis of those aspects of the manufacturing process for which systematic counts are available. For clay preparation (first analytical step), Mitrou's tableware assemblage was divided into 'fine' and 'medium-coarse' fabrics (Shepard 1965: 118; Rutter 1974: 14-16; 1995: 53-55). Fine vessels are characterised by the occurrence of non-plastic inclusions with a grain size no larger than 2 mm, a 'fine' to 'medium' density of non-plastic inclusions to the paste (1-10 % ratio of inclusions to matrix), and a well-sorted texture (**Fig. 8.5a-b**). On the other hand, medium-coarse vessels (**Fig. 8.5c-d**) are typified by non-plastic inclusions ranging between 2 and 4 mm, a 'medium' to 'medium-coarse' density of non-plastic inclusions to the paste (7-20 % ratio of inclusions to matrix), and a well-to-moderately-sorted texture (Moody *et alii* 2003: 61, 63, 67, 70-71, 82, 88, 88, 94; Vitale *et alii* 2017: 257-258, tables XVI-XVII; Vitale & Morrison 2017: 88-89, tables 8:4-5).

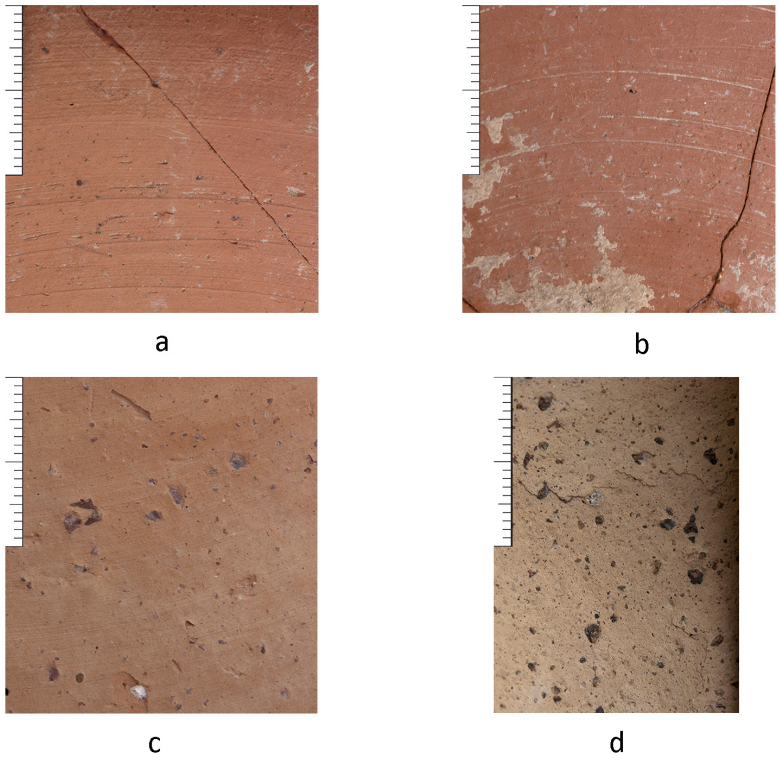

Fig. 8.5 Clay preparation practices in Mitrou's pottery assemblages. a-b: Mitrou's fine fabrics; c-d: Mitrou's medium-coarse fabrics (S. Vitale)

Mitrou data suggest that the percentage of medium-coarse tableware vessels remained rather low throughout the phases examined (**Table 8.2**). However, within the Palatial period, a gradual increase of the medium-coarse fraction can be observed, indicating that the proportion of medium-coarse specimens during LH IIIB2 Late (2.2 %) was exactly double the proportion during LH IIIA2 Late (1.1 %). Comparison with the Prepalatial period, shows a diverse picture. The proportion of medium-coarse tableware vessels was almost non-existent during LH IIA (0.1 %), but raised during LH IIIA2 Early (1.2 %), especially when decorated specimens are considered (5.9 %). Because the preparation of finer fabric mixes may involve a longer process to remove the natural inclusions present in the raw clay deposits (Rice 1987), the moderate growth of medium-coarse tableware vessels may imply a slight decrease in labour investment from LH IIA to LH IIIB2 Late. Overall, however, changes in clay preparation practices within the Mitrou assemblage do not appear to have been particularly impressive during the periods of interest.

Ceramic Phase	Clay Preparation - All Tableware			Ceramic Phase	Clay Preparation - Painted Tableware			Broad Chronological and Cultural Phases on the Greek Mainland During the Late Bronze Age (Based on the Presence or Absence of Mycenaean Palaces)	Mitrou's Political Trajectories
	Fine	Medium-Coarse	Total		Fine	Medium-Coarse	Total		
LH IIIB2 Late	3233	73	3306	LH IIIB2 Late	1084	73	1157	Final Palatial Period	Secondary Centre under a Palatial Polity (Possibly Thebes)
	97.8%	2.2%	100.0%		93.7%	6.3%	100.0%		
LH IIIB1	379	7	386	LH IIIB1	163	7	170	Mature Palatial Period	Secondary Centre under a Palatial Polity (Possibly Orchomenos)
	98.2%	1.8%	100.0%		95.9%	4.1%	100.0%		
LH IIIA2 Late	3110	34	3144	LH IIIA2 Late	1127	34	1161	Early Palatial Period	
	98.9%	1.1%	100.0%		97.1%	2.9%	100.0%		
LH IIIA2 Early	2447	30	2477	LH IIIA2 Early	478	30	508	Final Prepalatial Period	Independent Locally Emerging Centre
	98.8%	1.2%	100.0%		94.1%	5.9%	100.0%		
LH IIA	2105	1	2106	LH IIA	268	1	269	Early Prepalatial Period	
	99.9%	0.1%	100.0%		99.6%	0.4%	100.0%		
* Based on all tableware vessels' counts from significant ceramic deposits									

Tab. 8.2 Correlation between clay preparation, cultural phases, and Mitrou's political history* (by the author)

For primary formation of the vessel body (second analytical step), the sample was subdivided into two broad groups, one including vessels constructed fully by hand, and the other including coil-built and wheel-fashioned as well as possible wheel-thrown specimens (**Figs 8.6, 8.7**), as defined by Valentine Roux (1994), Maria Choleva (2012), and Stepan Rückl & Loe Jacobs (2016). Scholars have associated the gradual spread of the wheel technology in the Aegean with an increase in potter specialisation and a need for more effective production strategies, which led in some instances to a certain degree of mechanisation and standardisation of the manufacturing process (Davis & Lewis 1985; Van de Moortel 2002: 196; for different interpretations, see Costin 1991: 33-34; Costin & Hagstrum 1995: 622). Mitrou's data on the distribution of forming techniques, show a clear and linear diachronic development towards an increase in the use of the wheel (**Table 8.3**). Whereas in LH IIA 58 % of Mitrou's tableware was fully hand-made, by LH IIIA2 Late, this had declined to 7.8 % and this technique basically disappeared during LH IIIB1 (nothing) and LH IIIB2 Late (1.8 %). These data indicate that the abandonment of fully hand-made forming methods at Mitrou may have been connected to changes that occurred at the site during the mature (LH IIIB1) and final (LH IIIIB2 Late) stages of the Palatial period.

For surface treatments (third analytical step), all methods identified at Mitrou were lumped into two broad groups characterised respectively by less labour-intensive and more labour-intensive methods. The first group includes smoothing and wiping, while the second includes burnishing and polishing (Rutter 1974: 11-14; 1995: 55-58). Smoothed signifies a non-lustrous (**Fig. 8.8a**) or moderately lustrous (**Fig. 8.8b**) evened surface exhibiting no obvious tool marks. Wiped indicates a non-lustrous evened surface characterised by the presence of parallel groups of fine striations, which were produced by the tool used to smooth the vessel (**Fig. 8.8c**). Burnished signifies a heavily lustrous surface on which the marks of the tool used to smooth the vessel and to give it lustre are clearly visible (**Fig. 8.8d-e**). Polished indicates a heavily lustrous surface on which the marks of the tool used to smooth the vessel and to give it lustre are not visible (**Fig. 8.8f**).

Mitrou's data on the diachronic distribution of surface treatments show a continuous decrease in the use labour-intensive methods (**Table 8.4**). It is important to observe, however, that until the early Palatial period (LH IIIA2 Late), burnishing and polishing (70.6 %; **Fig. 8.8f**) were still largely more common than wiping and smoothing (29.4 %). During LH IIIB1 more and less intensive labour methods were roughly equally represented. By the end of the Palatial period, in LH IIIB2 Late, on the other hand, less intensive labour methods (**Fig. 8.8a-b**) represented 59.3 % of the sample.

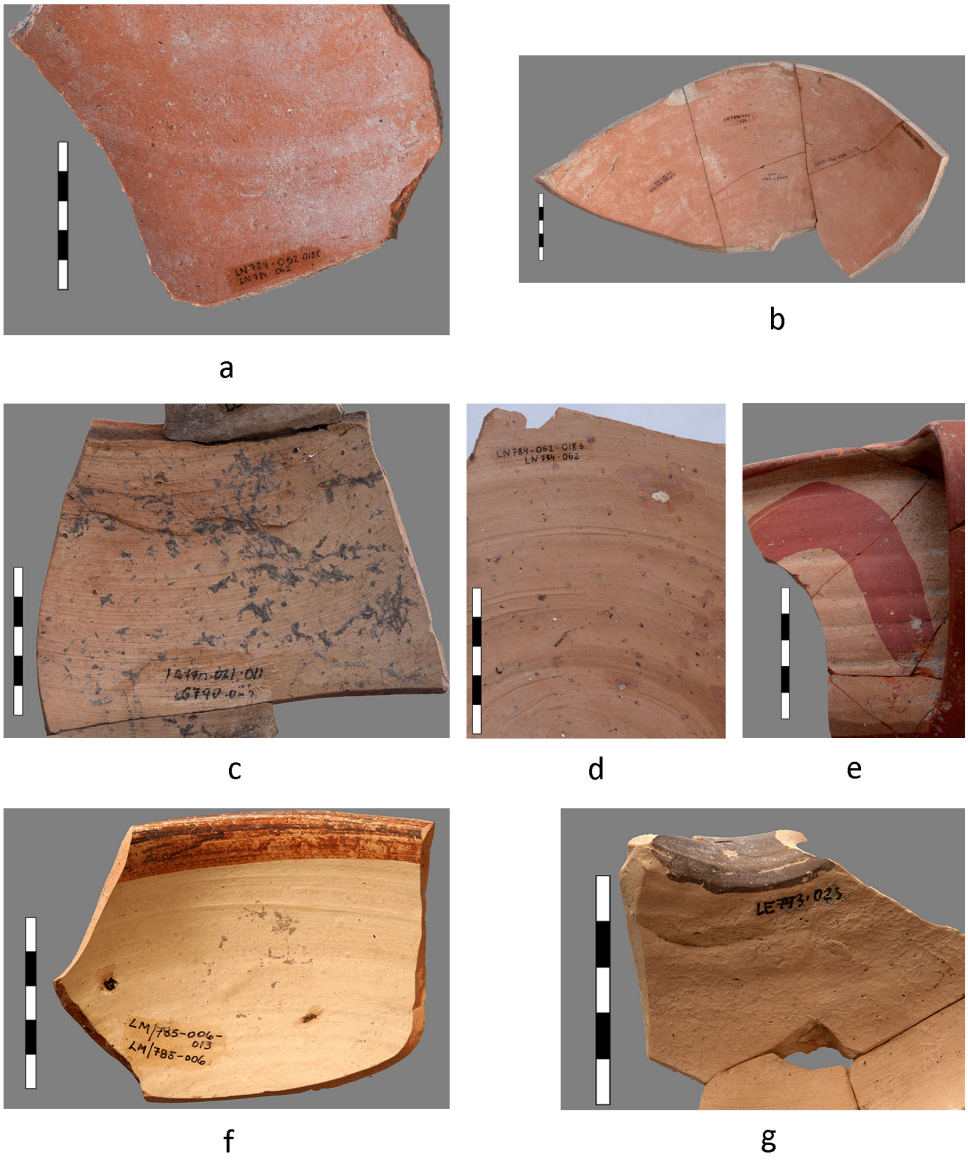

FIG. 8.6 PRIMARY VESSEL BODY FORMATION METHODS IN MITROU'S POTTERY ASSEMBLAGES. A-B: POSSIBLY COIL-BUILT AND WHEEL-FASHIONED LH IIIA2 EARLY COOKING AND STORAGE SHAPES; C: POSSIBLY COIL-BUILT AND WHEEL-FASHIONED LH IIA ALABASTRON; D: POSSIBLY COIL-BUILT AND WHEEL-FASHIONED LH IIIA2 EARLY CLOSED SHAPE; E: POSSIBLY COIL-BUILT AND WHEEL-FASHIONED LH IIIA2 EARLY STEMMED KRATER; F: POSSIBLY COIL-BUILT AND WHEEL-FASHIONED LH IIIB2 LATE DEEP SEMI-GLOBULAR CUP; G: COMBINATION OF COIL-BUILT (UPPER BODY) AND COIL-BUILT AND WHEEL-FASHIONED OR WHEEL-THROWN METHODS ON AN LH IIA ALABASTRON (A-B: H. TSIKOULOS & S. VITALE; C-G: S. VITALE)

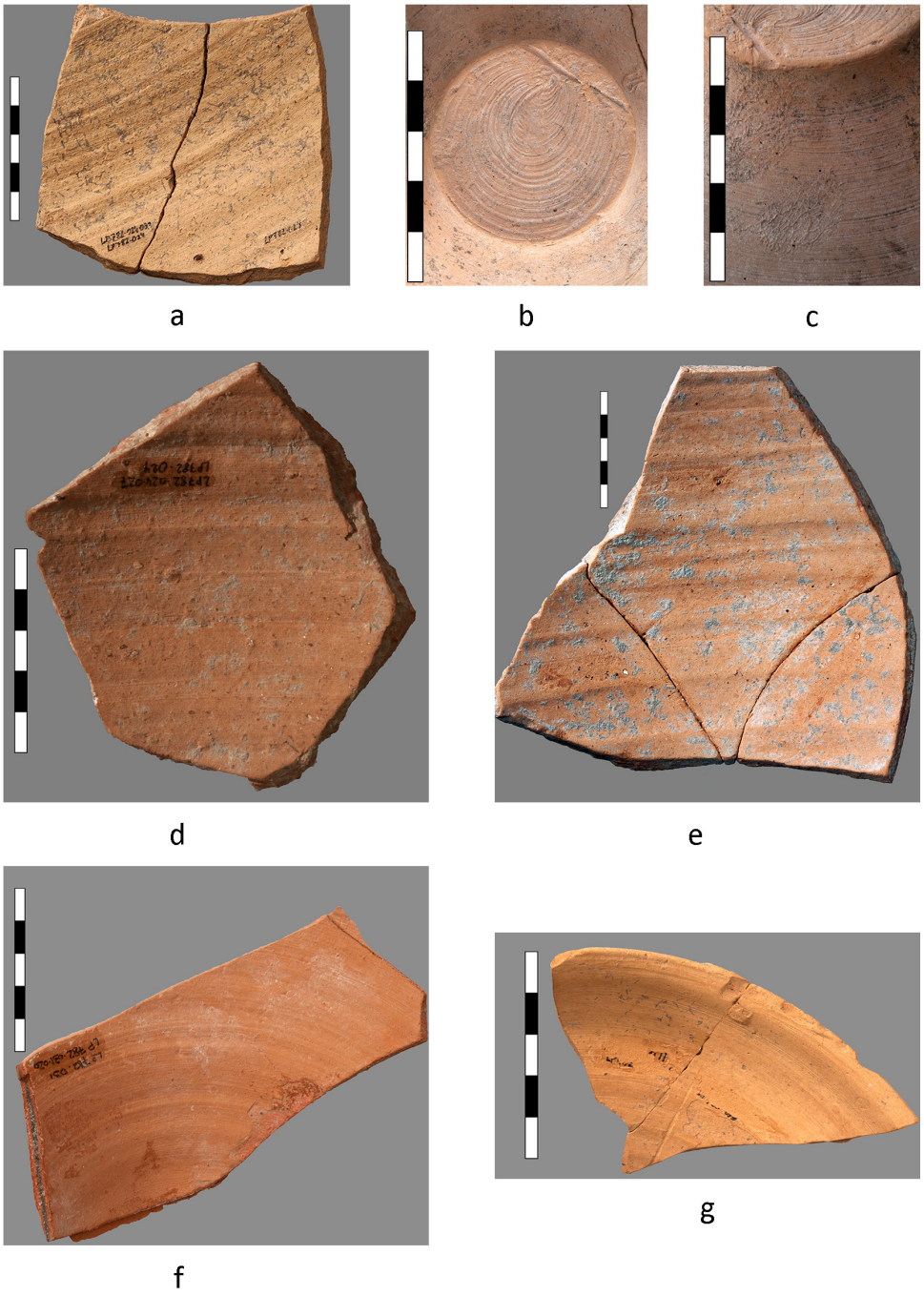

FIG. 8.7 PRIMARY VESSEL BODY FORMATION METHODS IN MITROU'S POTTERY ASSEMBLAGES. A: POSSIBLY COIL-BUILT AND WHEEL-FASHIONED LH IIIB2 LATE CLOSED SHAPE; B-C: POSSIBLY WHEEL-THROWN LH IIIA2 EARLY CONICAL CUP; D-E: COIL-BUILT AND WHEEL-FASHIONED OR WHEEL-THROWN LH IIIB2 LATE CLOSED SHAPES; F-G: COIL-BUILT AND WHEEL-FASHIONED OR WHEEL-THROWN LH IIIB2 LATE OPEN SHAPES (S. VITALE)

Ceramic Phase	Forming Techniques			Broad Chronological and Cultural Phases on the Greek Mainland During the Late Bronze Age (Based on the Presence or Absence of Mycenaean Palaces)	Mitrou's Political Trajectories
	Fully Handmade	Coil-Built and Wheel-Fashioned / Wheel-Thrown	Total		
LH IIIB2 Late	2	111	113	Final Palatial Period	Secondary Centre under a Palatial Polity (Possibly Thebes)
	1.8%	98.2%	100.0%		
LH IIIB1	0	33	33	Mature Palatial Period	Secondary Centre under a Palatial Polity (Possibly Orchomenos)
	0.0%	100.0%	100.0%		
LH IIIA2 Late	4	47	51	Early Palatial Period	
	7.8%	92.2%	100.0%		
LH IIIA2 Early	11	69	80	Final Prepalatial Period	Independent Locally Emerging Centre
	13.7%	86.3%	100.0%		
LH IIA	40	29	69	Early Prepalatial Period	
	58.0%	42.0%	100.0%		
* Based on inventoried tableware vessels from significant ceramic deposits					

Tab. 8.3 Correlation between forming techniques, cultural phases, and Mitrou's political history* (by the author)

Another way to look at broad trends in surface treatment practices is to observe the percentages of monochrome interiors in open shapes with a patterned-painted or linear-painted exterior (**Fig. 8.9**). This approach is meaningful only when non-labour-intensive surface treatments are comparatively popular. In fact, when simpler treatments are widespread, coating interiors with a solid paint may not represent merely a decorative preference, but also an easier and faster way to make the surface of the pots less permeable for liquid and solid contents, without the need for more labour-intensive solutions, such as polishing or burnishing (see Sherratt 1980: 191). Bearing this in mind, aside from LH IIA, when the occurrence of less labour-intensive surface treatments is only around 8.7 %, the increased preference for monochrome interiors during the examined phases again follows a clear and linear diachronic pattern, with LH IIIB1 (25 %; **Fig. 8.9a**) and, most prominently LH IIIB2 Late (44.3 %; **Fig. 8.9b-h**) standing out as phases of dramatic growth (**Table 8.5**).

Within the Mitrou ceramic assemblage, the progressive tendency towards less labour-intensive manufacturing practices from the Prepalatial to the Palatial period is confirmed by the observation of four additional aspects of the ceramic manufacturing process for which no systematic counts are available. First, comparatively abrupt attachments of appendages, especially handles and necks (**Fig. 8.10a-b**), became gradually more frequent from LH IIA to LH IIIB2 Late. Second, during these phases, there was a decrease in the smoothing of wheel rilling and ridges on the interior surfaces of open (**Fig. 8.7f-g**) and closed shapes (**Fig. 8.7a, d-e**). Third, there was a gradual drop in paint quality (**Fig. 8.10c-h**), which can be observed in the decrease of lustrous-painted specimens (**Fig. 8.10c-d**) and the growth through time of dull-painted specimens (**Figs 8.8a, 8.10f**), especially during the last decades of the 13th c. BC. Fourth, there was an obvious diachronic increase of simple decorative styles, which eventually led to the almost complete disappearance of complex decorative schemes in the later part of the Palatial period (LH IIIB1 and LH IIIB2 Late). This is demonstrated particularly well by the dearth of what Arne Furumark (1941a: 112-116; see also Walberg 1992: 98-102) defined as 'unity decoration'. In contrast with 'zonal' or 'tectonic decoration', unity decoration (**Fig. 8.11**) implies the compositional ability of the painter to adapt complex patterns, especially pictorial (vegetal and/or zoomorphic) motifs, to the three-dimensional surface of the vessel.

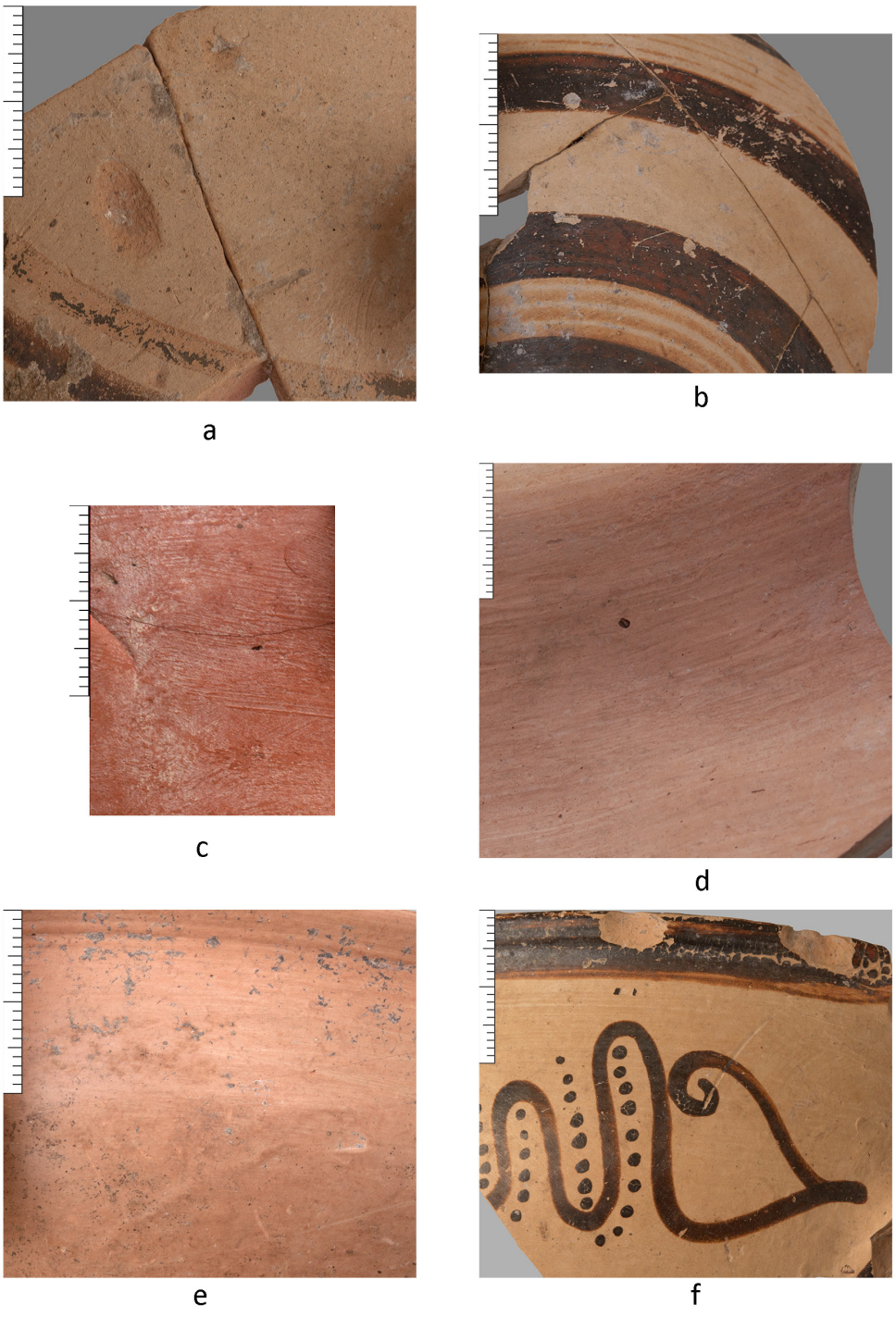

FIG. 8.8 SURFACE TREATMENTS IN MITROU'S POTTERY ASSEMBLAGES. A-B: SMOOTHED LH IIIB2 LATE STIRRUP JARS; C: WIPED LH IIIA2 EARLY KYLIX; D-E: BURNISHED LH IIIA2 EARLY KRATER AND KYLIX; F: POLISHED LH IIIA2 LATE ONE-HANDLED BOWL (S. VITALE)

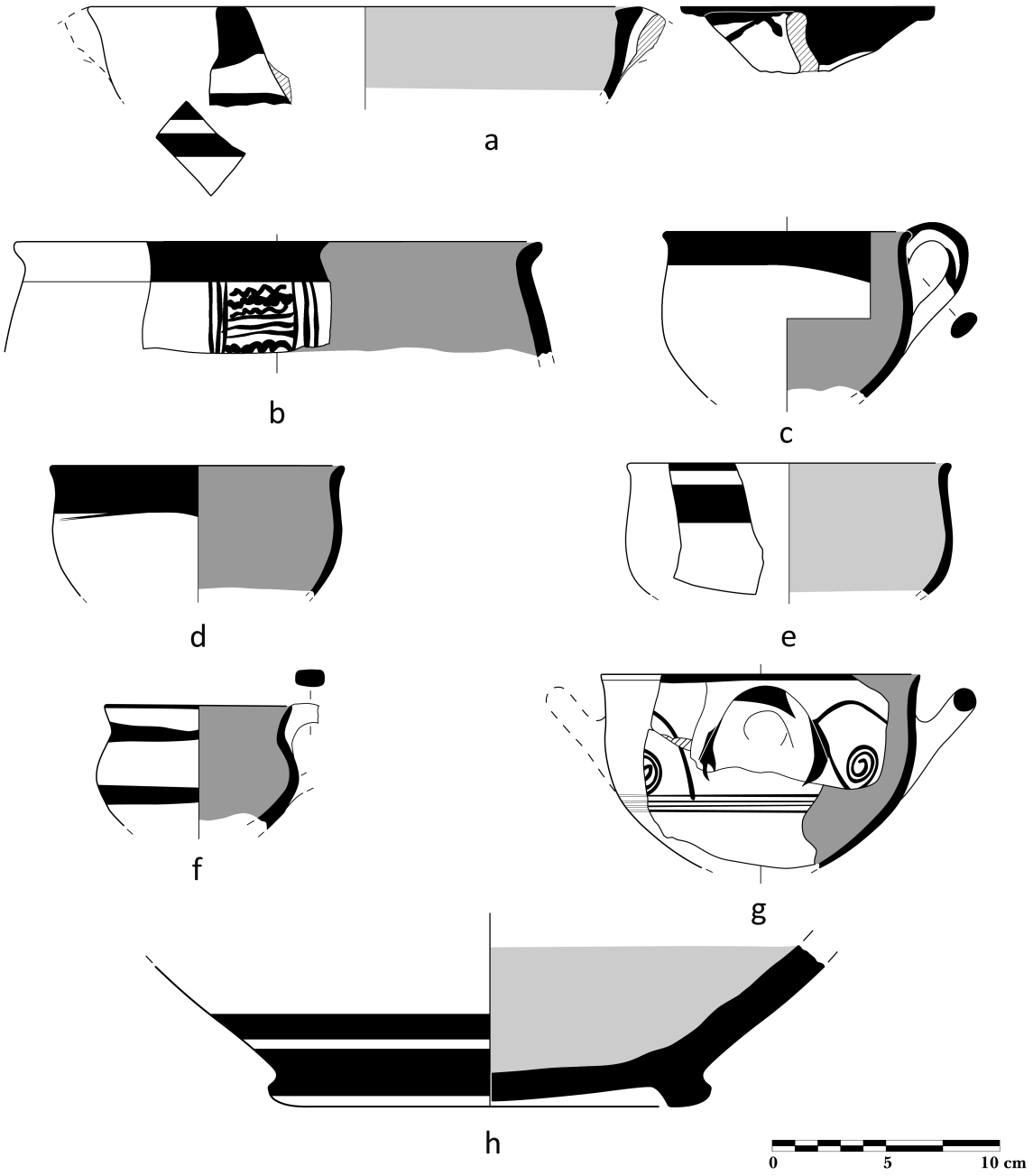

Fig. 8.9 Open shapes with patterned- or linear-painted exteriors and monochrome interiors in Mitrou's pottery assemblages. a: LH IIIB1 bowl; b-h: LH IIIB2 Late small stemmed krater or large stemmed bowl, deep semi-globular cups, spouted cup, Group A/B deep bowl and ring-based krater (a, e: M. Rossin & T. Ross; b-d, f-g: T. Ross)

Ceramic Phase	Surface Treatments			Broad Chronological and Cultural Phases on the Greek Mainland During the Late Bronze Age (Based on the Presence or Absence of Mycenaean Palaces)	Mitrou's Political Trajectories
	More Labour-intensive	Less Labour-intensive	Total		
	Polished + Burnished	Wiped + Smoothed			
LH IIIB2 Late	46	67	113	Final Palatial Period	Secondary Centre under a Palatial Polity (Possibly Thebes)
	40.7%	59.3%	100.0%		
LH IIIB1	16	17	33	Mature Palatial Period	Secondary Centre under a Palatial Polity (Possibly Orchomenos)
	48.5%	51.5%	100.0%		
LH IIIA2 Late	36	15	51	Early Palatial Period	
	70.6%	29.4%	100.0%		
LH IIIA2 Early	58	22	80	Final Prepalatial Period	Independent Locally Emerging Centre
	72.5%	27.5%	100.0%		
LH IIA	63	6	69	Early Prepalatial Period	
	91.3%	8.7%	100.0%		
* Based on inventoried tableware vessels from significant ceramic deposits					

TAB. 8.4 CORRELATION BETWEEN SURFACE TREATMENTS, CULTURAL PHASES, AND MITROU'S POLITICAL HISTORY* (BY THE AUTHOR)

Ceramic Phase	Treatment of Open Shape Interiors			Broad Chronological and Cultural Phases on the Greek Mainland During the Late Bronze Age (Based on the Presence or Absence of Mycenaean Palaces)	Mitrou's Political Trajectories
	Miscellaneous Interior Treatments	Monochrome Interior Treatments	Total		
LH IIIB2 Late	223	177	400	Final Palatial Period	Secondary Centre under a Palatial Polity (Possibly Thebes)
	55.7%	44.3%	100.0%		
LH IIIB1	30	10	40	Mature Palatial Period	Secondary Centre under a Palatial Polity (Possibly Orchomenos)
	75.0%	25.0%	100.0%		
LH IIIA2 Late	299	20	319	Early Palatial Period	
	93.7%	6.3%	100.0%		
LH IIIA2 Early	91	7	98	Final Prepalatial Period	Independent Locally Emerging Centre
	92.9%	7.1%	100.0%		
LH IIA	89	16	105	Early Prepalatial Period	
	84.8%	15.2%	100.0%		
* Based on all tableware painted vessels' counts from significant ceramic deposits					

TAB. 8.5 CORRELATION BETWEEN TREATMENTS OF OPEN SHAPE INTERIORS, CULTURAL PHASES, AND MITROU'S POLITICAL HISTORY* (BY THE AUTHOR)

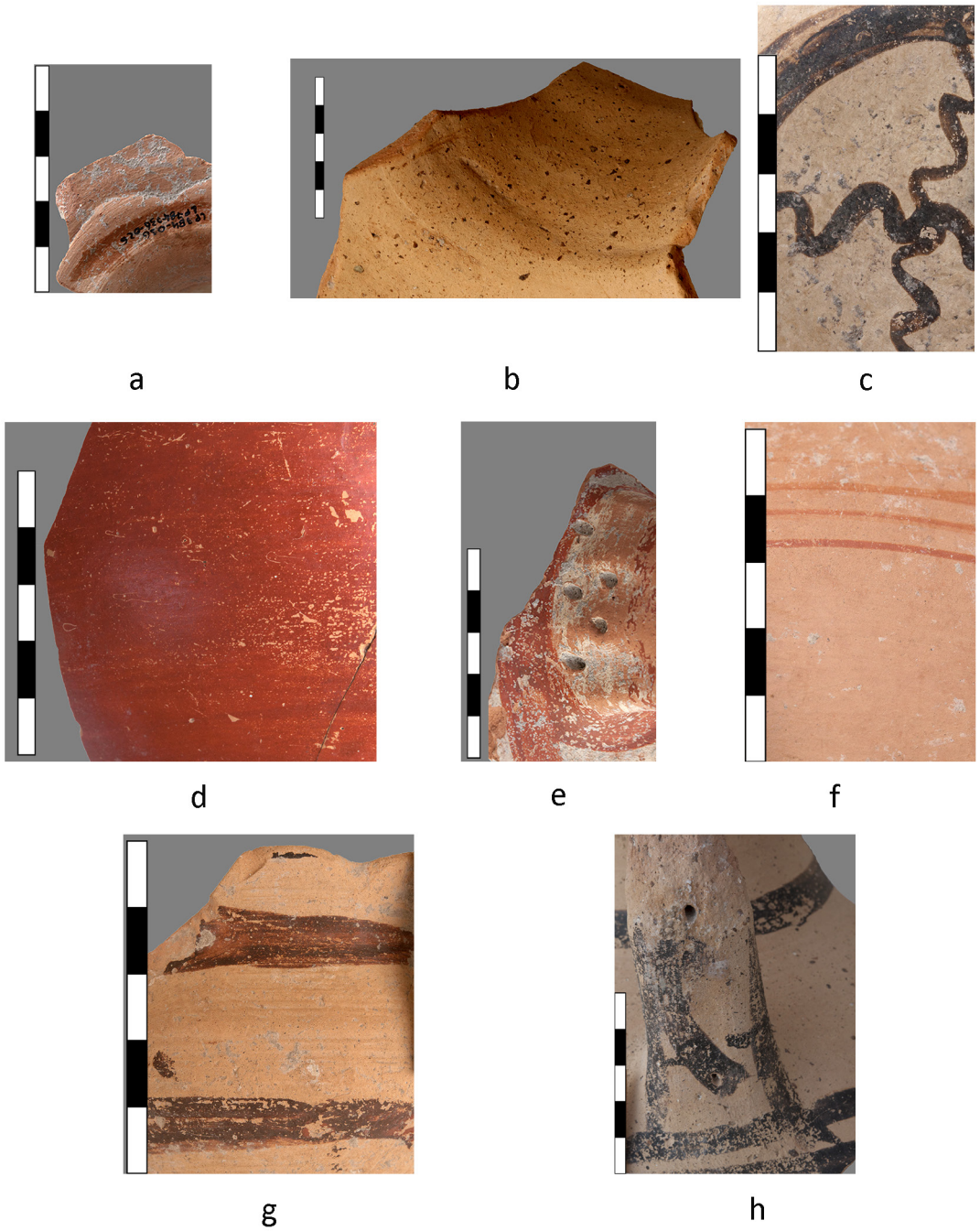

Fig. 8.10 Vessels' secondary formation and finishing practices in Mitrou's pottery assemblages. a: LH IIIB1 jug; b, h: LH IIIB2 Late amphora; c: LH IIA alabastron; d: LH IIIA2 Early kylix; e: LH IIIB1 closed shape; f-g: LH IIIB2 Late Group A/B deep bowl and spouted cup (S. Vitale)

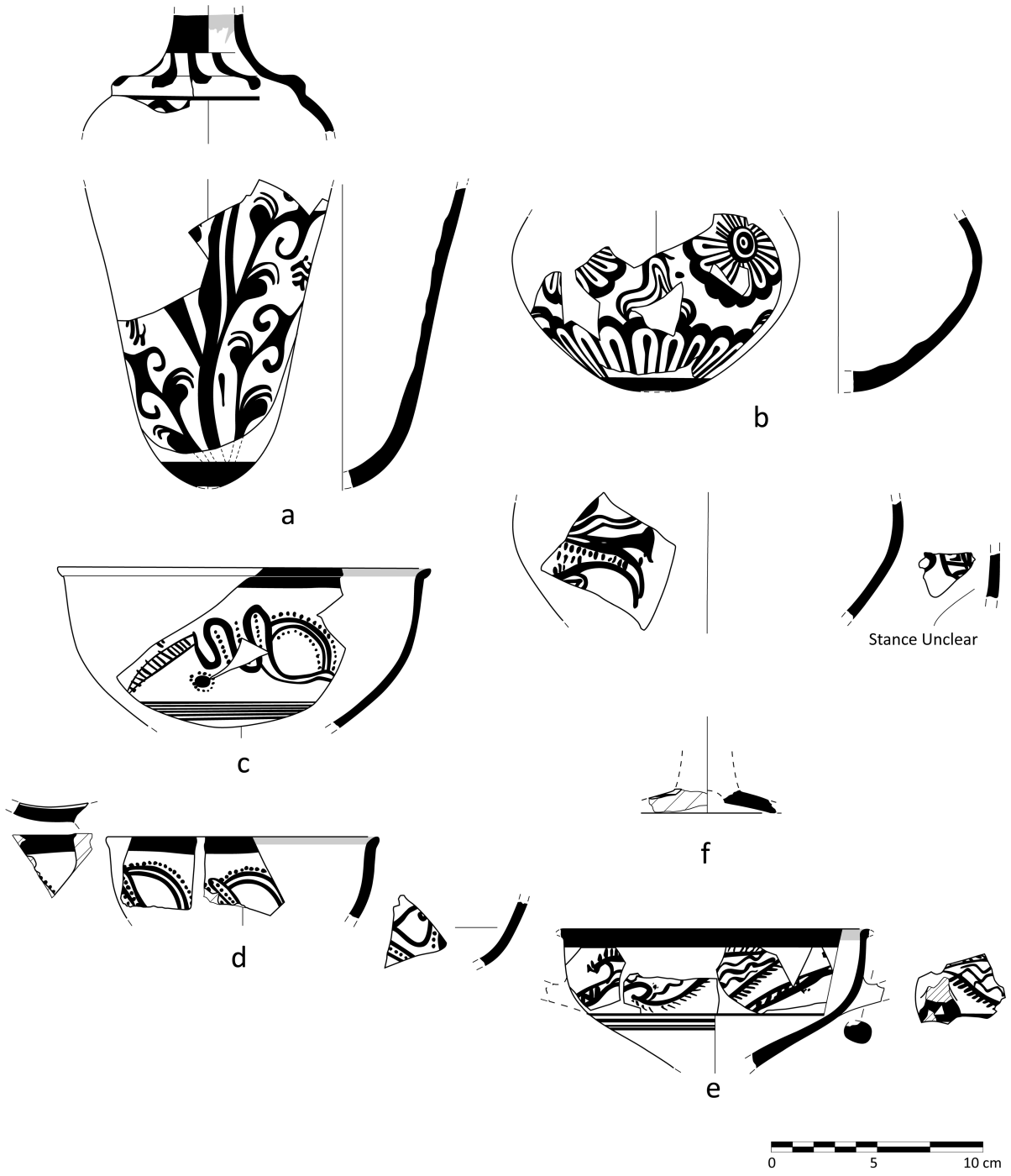

Fig. 8.11 Examples of complex decoration in Mitrou's pottery assemblages. a-b: LH IIA rhyta; c-f: LH IIIA2 Late kylikes (a-b, d-f: T. Ross; c: B. Konnemann & T. Ross)

Concluding this presentation of the evidence, it may be relevant to notice a final interesting feature which distinguishes LH IIIB2 Late ceramic assemblages at Mitrou from those of the previous phases. This is the emergence of idiosyncrasies, which may be interpreted as an initial form of regionalism, a phenomenon typical of the following LH IIIC ceramic styles (Rutter 1977; Sherratt 1980: 176; Mountjoy 1986: 134; 1999: 38). These local preferences include the following:

- (a) The occurrence of open shapes with a group of thin lines framed by two thicker bands (**Fig. 8.12a-b**), the so-called 'Boeotian Stripe' (see Mountjoy 1999: 31, 646, 671, 678, 771-773, fig. 255:111-112; 116-117, 121, figs 258:150, 302:157; 162-163, 168; Vitale 2012: 1151-1152);
- (b) The high frequency of semi-globular cups with linear decoration and a monochrome interior (**Fig. 8.9c-e**);
- (c) The dearth of medium-band deep bowls, the continuation from LH IIIA2 of patterned-painted shallow cups (**Fig. 8.12c**), and the occurrence of Group A deep bowls decorated with different patterns on either side (**Fig. 8.12d**) (for parallels from Attica, see Mountjoy 1999: 560, fig. 205:290) or with uncanonical and rare motifs (**Fig. 8.12e**).

The emergence of local idiosyncrasies during LH IIIB2 Late is in sharp contrast with the evidence from LH IIIA2 Late and LH IIIB1, when Mitrou's ceramic assemblage was in harmony with the mainstream Mycenaean repertoire of the Central and Southern Greek mainland (Vitale 2011: 339, 342-343, tables 4:a-b, 5; fig. 3:13-21; Vitale & Van de Moortel, forthcoming).

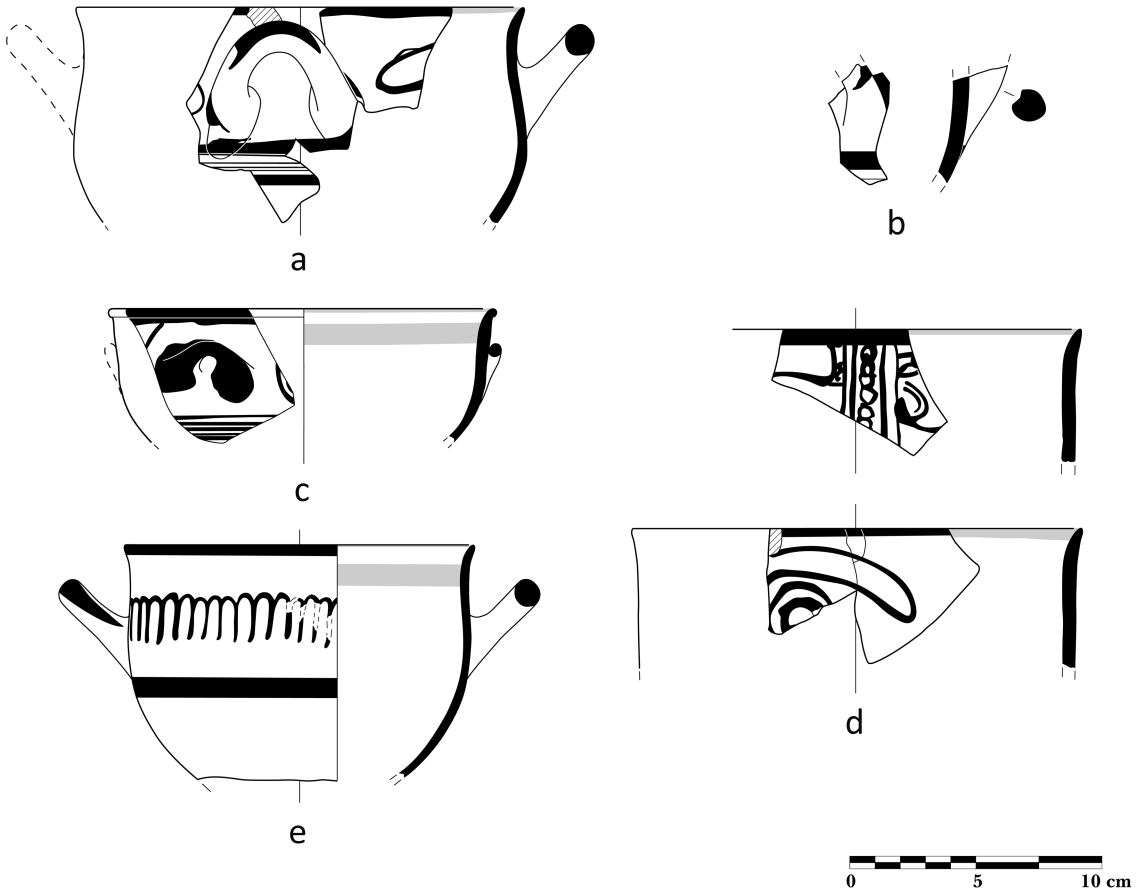

Fig. 8.12 Local idiosyncrasies in Mitrou's pottery assemblages. a-b: LH IIIB2 Late Group A deep bowls with Boeotian Stripe; c: LH IIIB2 Late shallow cup; d: LH IIIB2 Late Group A deep bowl with different patterns on either sides; e: LH IIIB2 Late Group A deep bowl with inverted U-pattern (a, c-e: T. Ross; b: M. Rossin & T. Ross)

5. Discussion

The analysis of Mitrou's ceramic assemblages suggests the existence of a shift from elaborate manufacturing methods, characteristic of the Prepalatial period, towards faster and less labour-intensive methods, typical of the Palatial period. This trend is particularly obvious in terms of vessel formation and finishing practices, while it is less evident in clay preparation preferences. These developments in pottery manufacture correspond to Mitrou's transition from an independent locally emerging centre in East Lokris to a secondary centre under a Palatial polity, which may have been initially Orchomenos and then, following the destruction of Gla at the end of LH IIIB2 Early, Thebes (Vitale & Van de Moortel, forthcoming).

Within the Palatial period, however, significant differences emerge between the LH IIIA2 Late, LH IIIB1, and LH IIIB2 Late ceramic assemblages at Mitrou, with the latter representing a more extreme move towards simplification. In addition, while LH IIIA2 Late and LH IIIB1 ceramics largely conformed to the so-called Mycenaean *koine*, LH IIIB2 Late pottery included some idiosyncrasies that suggest an initial shift towards regionalism (**Fig. 8.12**). These facts may imply the existence of changed socio-economic and political conditions between LH IIIA2 Late, LH IIIB1, and LH IIIB2 Late. Throughout these three phases, the less labour-intensive methods used at Mitrou were possibly the result of cost-controlling and mass production strategies. These strategies may have been favoured by the competitive environment determined by Palatial regional and supra-regional trade networks, which would have required more efficient and time-saving approaches (Davis & Lewis 1995; Van de Moortel 2002: 204-207). However, the significant reduction in labour of LH IIIB2 Late potters, as well as the introduction of local preferences, require additional explanations.

The crisis of Mycenaean Palatial society may have been one of the factors impacting production standards at Mitrou at the transition between the 13th and the 12th c. BC. More specifically, growing competition between Thebes and Orchomenos over the rich agricultural supplies of the Copaic Basin may have led to an increasingly hostile environment, which eventually culminated in the destruction of Gla and a general destabilisation of the whole region (Vitale & Van de Moortel, forthcoming). Political upheavals could have contributed to a drop in the quality of pottery manufacturing and the development of regionalism, as an outcome of economic instability and increasingly unsafe trade conditions in the market networks.

Obviously, other factors could also have played a role. For example, changes in potters' preferences and/or different consumer demands may also have been important (Costin 1991: 33-34; Costin & Hagstrum 1995: 622). In fact, the shift towards simplified decorative treatments initiated slightly before 1200 BC constitute a major element of continuity between late LH IIIB and early LH IIIC ceramics, as well as a hallmark of LH IIIC pottery productions not only at Mitrou, but, more generally, on the whole Greek mainland throughout the end of the Bronze Age (Rutter 1977; Mountjoy 1986: 134-200, figs 166-269; 1999: 38-58, figs 4-7).

6. Conclusions

In conclusion, it is important to consider the potential implications of Mitrou's case study to the primary theoretical question raised by the editors of this volume: can technological preferences and/or shifts seen in archaeological ceramic assemblages reflect periods of disruptions, crisis, and/or transformation of social, political, economic, and environmental conditions? To address this point, it is necessary to introduce the distinction between the notions of 'continuous' and 'discontinuous change', recently outlined by Valentine Roux and Marie-Agnès Courty (2013). The former takes place when "there is continuous social learning between generations and among peers" in a given community and reflects periods of gradual change and/or transition. The latter occurs when "there is a complete cessation of transmission" and implies periods of crisis and/or severe disruption.

According to these definitions, all of the shifts observed at Mitrou in the pottery manufacturing process during the phases analysed in this study qualify as cases of continuous rather than discontinuous change. Among the assemblages discussed in this paper, at least those dating to LH IIIA2 Early and LH IIIB2 Late belong to periods of remarkable social tension at this site (Vitale 2011; 2012). It is questionable, however, if these tensions can be technically defined as moments of crisis. In any case, in the author's experience, none of the major cultural, socio-political, and/or economic breakdowns in the Aegean region during the 3rd and the 2nd millennia BC implied a complete cessation of technological transmission in the pottery manufacturing process. Thus, while a holistic

approach to ceramic analysis can help in capturing periods of transition, defined as socio-political and economic transformations, pottery analysis may not necessarily provide valuable data to isolate moments of crisis and/or disruption. More specifically, that transitions and crises may produce similar outcomes in the ceramic record and may thus be indistinguishable based solely on pottery.

By contrast, other forms of transmitted skills and/or technological knowledge may behave differently, if not opposite to pottery manufacturing practices, at least in the Aegean Bronze Age. For example, after the destruction of the Mycenaean palaces, at the end of LH IIIB2 and the beginning of LH IIIC Early, discontinuous changes occurred in the use of writing and the ability of building monumental architectural complexes (Dickinson 2010). Comparable forms of discontinuous change also took place after the destruction of the House of the Tiles at Lerna towards the end of Early Helladic IIB (Wiencke 2000; Rutter 1995). However, while the analysis of forms of transmitted skills and/or technological knowledge, such as writing and monumental architecture, may help capturing moments of crisis and disruption better than ceramics, they may be less sensitive than pottery when it comes to providing data on more gradual social transformations.

These final remarks may have a very trivial story to tell. This story does not contain any major revelation, but rather a simple reminder. There is much to learn from ceramics if one uses the powerful array of analytical approaches now available to pottery analysts. Nevertheless, pottery analysis cannot fully capture the complexity of socio-political changes that occurred in the past, if it is not integrated in the wider examination of all aspects of archaeological contexts (Haggis & Antonaccio 2015).

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9. From the hand to the wheel

Revisiting the transformations of the Late Cypriot ceramic industry of finewares during the 13th-to-12th c. BC transition

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On a pan-Mediterranean level, Cyprus constitutes a critical case-study with regards to the temporal introduction of the potter's wheel, the dynamic processes by which it was established and the persistence of hand-made forms. During the critical period of *ca.* 1200 BC, the Cypriot ceramic industry endorsed the efficiencies presented by the potter's wheel on a widespread scale for the first time, reaching an unprecedented expediency in production. This contribution elucidates the political, societal, economic and other factors underlying the technological transformations observed in the pottery production of the Late Cypriot finewares during the transition from the 13th to the 12th c. BC, based on a contextual *longue durée* analysis.

1. Contextualising ceramic transformations: the Cypriot polities during the 13th-to-12th c. BC transition

The transition from the 13th to the 12th c. BC in Cyprus coincides with a period of substantial transformations in the island's material culture, best seen in the ceramic industry, and especially with regards to the production of finewares. This transformative period saw the gradual abandonment of the two Late Cypriot hand-made wares known as Base-ring and White Slip Wares **(Figs 9.2-9.3)** and the establishment of wheel-made finewares that principally draw on Aegean prototypes **(Figs 9.7-9.9)**. In attempting to untangle the forceful transformations that characterise the production of Cypriot ceramics at the close of the Late Bronze Age, it is a prerequisite to provide the political, social and economic framework for the island during the critical years of the 13th-to-12th c. BC transition (see the discussion in Liverani 1987: 69). In order to fulfil this challenging task, a macro-historic and contextual analysis of 'Cyprus from within' (Iacovou 2013a: 16-17) is a *conditio sine qua non*.

The island's rigorous involvement in Eastern Mediterranean trading and diplomatic connections was instigated at the dawn of the Late Bronze Age, around the middle of the 17th c. BC (Peltenburg 1996: 37) **(Table 9.1)**. During this period, the island's settlement pattern underwent substantial changes (Crewe 2007a: 41-47; Georgiou 2007: 457), with the purpose of accommodating the emergent economic system that relied on the procurement of copper and the metal's extra-insular bulk transhipment across the Mediterranean (Keswani 2005: 392-393; Knapp 2013a: 36-37). Newly founded coastal settlements functioned as the regional terminal points in a chain of settlements, whose point of departure can be traced in the cupriferous lavas of the Troodos mountain range, situated at the centre of the island **(Fig. 9.1)** (Keswani 1993; Peltenburg 1996: 30-35; Knapp 1997: 46-63). During the course of the Late Bronze Age (*ca.* 1650-1050 BC, **Table 9.1**), these regional gateway centres were gradually consolidated as the administrative centrepieces in charge of an extended periphery. Each of these regional polities must have undoubtedly encompassed copper sources, agricultural land, intermediary stations and a port-of-export (Iacovou 2007: 17-18; 2013a: 22-23). Late Cypriot settlements developed into highly urbanised and socially stratified communities (Knapp 2013a: 36-40; 2013b: 348-349). Judging by the extant archaeological remains, the island's political landscape was segmented into a series of largely autonomous

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polities, at least during the latter part of the Late Bronze Age (Keswani 1996; 2004: 154; Manning & De Mita 1997: 107-108), with idiosyncratic, region-specific mechanisms employed in the administration of the island's resources (Georgiou 2016a: 140-141). The development of an indigenous script early in the Late Bronze Age (at *ca.* 1650 BC) – termed 'Cypro-Minoan' by modern scholarship – attests to the development of a complex politico-economic basis that necessitated a bureaucratic tool (Peltenburg & Iacovou 2012: 357).

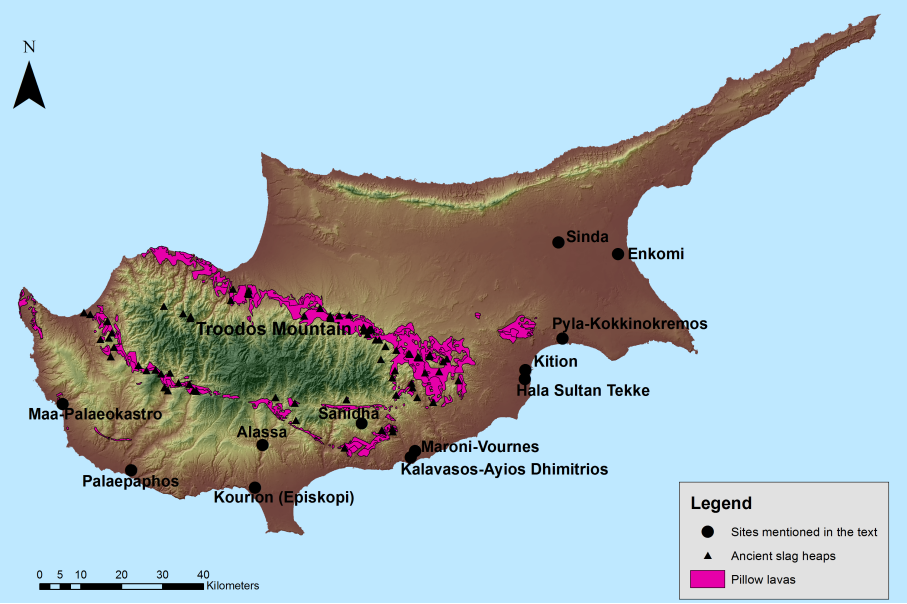

Fig. 9.1 Map of Cyprus with sites mentioned in the text (digital data courtesy of the Cyprus Geological Survey Department, map drafted by the author)

Relative chronology	**Absolute chronology**
Early and Middle Cypriot Bronze Age	*Ca.* 2500/2400-1650 BC
Late Cypriot Bronze Age IA	*Ca.* 1650-1550 BC
Late Cypriot Bronze Age IB	*Ca.* 1550-1450 BC
Late Cypriot Bronze Age IIA-B	*Ca.* 1450-1325 BC
Late Cypriot Bronze Age IIC	*Ca.* 1325-1200 BC
Late Cypriot Bronze Age IIIA	*Ca.* 1200-1100 BC
Late Cypriot Bronze Age IIIB	*Ca.* 1100-1050 BC

Tab. 9.1 Relative and absolute chronological dates for Bronze Age Cyprus (based on Knapp 2013b: 521, Table A2)

No sooner had the young Cypriot polities established their politico-economic norms, than crisis hit. The cumulative events at the close of the 13th c. BC, marked by the eradication of the palace-based authorities in the Aegean, Anatolia and most of the Syro-Palestinian coast, the succumbing of Egypt into decline (Yakar 1993; Shelmerdine 2001: 372-376; Bell 2006 with additional references) and the breakdown of the highly centralised economic trading system (Sherratt 2003: 42-44), delivered a substantial blow to the Late Cypriot polities, whose economic floruit and political endurance relied heavily on the external bulk demand for copper (Iacovou 2013a: 21-23). However, as an evident outcome of the segmentation of the island's politico-economic landscape into a series of regional polities, the turbulent events of the 12th c. BC prompted neither a devastating, nor a uniform effect on the island (Iacovou 2008: 626-627; 2013b: 593-607; Georgiou 2011). The abandonment of the primary urban centres at Maroni-*Vournes* (Cadogan 1996: 16-17) and Kalavasos-*Haghios Dhimitrios* (South 1989: 322)

by the end of the 13th c. BC, as well as at Alassa-*Paliotaverna* **(Fig. 9.1)** at the close of the 12th c. BC (Hadjisavvas 2003: 436; 2017: 472-474) epitomises the effect of the Mediterranean-wide 'systems collapse' on Cyprus. Since no substantial conflagration has been associated with the abandonment strata of these South-Central Cypriot settlements (Cadogan *et alii* 2001: 84; Hadjisavvas 2003: 434; Todd 2013: 94, 97), their desertion is interpreted as a deliberate resolution on behalf of the political entities themselves (Iacovou 2008: 630). Evidently, the curtailment of external demand for Cypriot copper, which had ensued from the Mediterranean-wide 'crisis', resulted in the disintegration of these neighbouring polities' economic fabric and brought about the abandonment of the urban, administrative centres and the dissolution of their respective economic domains (Knapp 1997: 68; Iacovou 2013a: 26).

The loss of a number of Late Cypriot urban centres notwithstanding, the 12th c. BC horizon did not bring about the collapse of the island's idiosyncratic political and economic forms. Continuity within the urban environment of the Late Cypriot polities in the 12th c. BC is evident by the uninterrupted occupation of several primary centres. The settlement of Hala Sultan Tekke continued to function as a flourishing cosmopolitan harbour-town in the 12th c. BC horizon. According to the results of recent fieldwork, it was hurriedly abandoned by the end of the 12th c. BC, following a destruction episode (Fischer & Bürge 2014: 80). Enkomi, the only Late Cypriot centre with ample stratigraphic depth and horizontal exposure, appears to have suffered a substantial destruction episode at the end of the 13th c. BC (Dikaios 1969-71: 89-92, 170-172, 451-453). However, Enkomi managed to reinstate its political authority and maintain its economic floruit, judging by the large-scale rebuilding activities in the level immediately following the conflagration (Courtois *et alii* 1986: 8-18, 37-39). By the 11th c. BC, the town was, for its most part, abandoned in favour of a proximate location that provided a better command of a harbour: the newly founded town of Salamis (Yon 1999: 17-18).

The regional polities of Kition and Palaepaphos, enhanced by the abandonment of the centres in between them and empowered by internal and external population movements, reached an unprecedented level of political power and economic flourishing, expressed by the construction of the first monumental edifices on the island at the inception of the 12th c. BC (Iacovou 2008: 638; 2012: 218). In both Kition and Palaepaphos, these monumental structures were constructed to serve religious purposes (Maier & Karageorghis 1984: 91-96; Karageorghis & Demas 1985: 92-93; Webb 1999: 61-62).

The exceptionally short-lived settlements of Pyla-*Kokkinokremos* in the Larnaca Bay and Maa-*Palaeokastro* on the west coast were founded from scratch during the transition from the 13th to the 12th c. BC. Despite their brief occupation, both sites were well-planned and betray considerable investment in communal works (Karageorghis & Demas 1984; 1988, figs 2-3; Karageorghis & Kanta 2014, plans 1-2). Pyla-*Kokkinokremos* and Maa-*Palaeokastro* accommodated a wide range of activities that include metal-processing, large-scale storage and sea-borne trade, as is attested by pyro-metallurgical implements, a plethora of storage vessels and imported artefacts (Zwicker 1988; Hadjicosti 1988; Georgiou 2014; Bretschneider *et alii* 2015: 31, 35; 2017). Before the middle of the 12th c. BC the inhabitants of Pyla-*Kokkinokremos* and Maa-*Palaeokastro* abandoned their settlements. In the case of Pyla-*Kokkinokremos*, the abundance of hoarded valuables left behind insinuates that the inhabitants left in a great hurry (Karageorghis & Demas 1984: 55-56, 60-65; Karageorghis & Kanta 2014: 30; Bretschneider *et alii* 2015: 25). On the other hand, the settlement at Maa-*Palaeokastro* suffered a severe conflagration at the beginning of the 12th c. BC, possibly as a result of an attack. The site was immediately rebuilt and was eventually abandoned by the middle of the 12th c. BC (Karageorghis & Demas 1988: 90).

The above review of the regional responses to the turbulent events arising within the wider Mediterranean context of *ca.* 1200 BC allows for several observations. First, the political segmentation of the island into a series of distinct political authorities generated the divergent settlement histories of Cyprus in the post-'crisis' era. Second, despite the island's transformed settlement pattern, the settlements of Enkomi (and later Salamis), Kition and Palaepaphos, which continued to be occupied in the Early Iron Age, fostered a remarkable level of continuity in the politico-economic environment of the island. The Cypriot centres that continued to be occupied in the 12th c. BC were vigorously involved in the decentralised commercial strategies that characterised the Mediterranean economy following the devolution of the strictly organised state-level trade (Sherratt 2003: 42-44; Bell 2006: 111-113). Indeed, the oxhide ingot – the form by which Cypriot copper was exported and through which the metal's quality and standardised weight was guaranteed – became obsolete when the economic system that had sustained the bulk transport of metals collapsed at the dawn of the 12th c. BC (Sherratt 2009: 98).

However, Cypriot merchants continued trading bronze in small weighted units as well as highly commoditised recycled metal (Sherratt 2012: 157-158, 162). These were highly valued and even considered worth dispatching in long-distance voyages (consider for example the amounts of scrap metal included in the Cape Gelidonya ship [Bass 1967: 114-117]). Third, the uninterrupted use of the indigenous syllabic script stands as an unequivocal testimony to the bridging of the *ante* and *post* 'crisis' horizons in Cyprus (Morpurgo-Davis & Olivier 2012: 114). The island's scribal tool survived the crisis because it was not confined to a palatial guild of scribes, nor was it exclusively associated with a central bureaucracy (Iacovou 2008: 632), unlike the employment of script by other political authorities of the Mediterranean. Cypro-Minoan script was used at a more widespread scale, in short inscriptions or as individual signs, to mark pottery, tools and other materials (see Ferrara 2013: 27-31). In its adapted form, designated as 'Cypro-Syllabic', the local Cypriot syllabic script continued to be employed for the most part of the 1st millennium BC, to record Greek as well as the unknown language termed 'Eteocypriot' (Masson 1983; Steele 2013: 99-168).

The critical years of *ca.* 1200 BC in Cyprus also marked a phase of both internal and external migration episodes. The closure of a number of urban centres and their associated peripheries during the transition from the 13th to the 12th c. BC created a flow of internal migrants, who were incorporated in the existing centres, even though their movement remains archaeologically invisible (Iacovou 2012: 215-218). Similar to their internal counterparts, external migrations left no tangible imprint in the archaeological material culture of the island during the 12th c. BC. The evidence provided by the material culture allows us to suspect the establishment of Aegean populations in the Late Cypriot milieu, however, the infiltration of new 'ethnic' elements cannot be substantiated on the basis of the archaeological remains alone (see Hall 1997: 129-130; Jones & Graves-Brown 1996; Burmeister 2000: 542), neither can population movements – on their own account – explicitly justify the varied phenomena that characterise the island's material culture during the 12th c. BC (Sherratt 1991: 195). While references to Aegean material culture in Cyprus increased to an unprecedented extent, for instance in terms of the ceramic production of Aegean-style finewares or the local manufacture of Aegean-style cooking pots (see Jung 2011: 69), we remain unable to indisputably attribute any distinct archaeological context – be it of secular, mortuary or religious nature – to a migrant community or to an individual from the Aegean or beyond, based on the extant archaeological remains. The migration of Greek-speaking populations in Cyprus only materialises when we consider that the island's predominant language(s) in the 1st millennium BC is not the language(s) recorded in the Cypro-Minoan texts, but rather a dialectal form of Greek. This dialect, termed, Arcado-Cypriot, recorded an antiquated form of the Greek language that displays a form of kinship to that recorded in the Linear B tablets of the Mycenaean era (Morpurgo-Davis & Olivier 2012: 117). We are still unable to precisely pinpoint the temporal introduction of Greek-speaking populations on the island, or to deduce the numbers and waves involved; however, the island's changed linguistic identity establishes a valid argument for the permanent establishment of migrant populations from the Aegean following the palatial collapse at the end of the 13th c. BC (Iacovou 2012: 209-210).

2. Morphological characteristics and technical qualities of the Late Cypriot hand-made and wheel-made finewares

Pottery assemblages from Late Bronze Age Cyprus constitute a variable corpus, classified into several different wares by modern typological studies (*e.g.* Åström 1972; Barlow *et alii* 1991; Jones & Catling 1986; Knapp & Cherry 1994), often with blurred boundaries among distinct categorisations (see the discussion in Russell 1991; Pilides 1991). Of these, White Slip and Base-ring Wares constitute the hallmark and trademark of the Late Cypriot industry of ceramic finewares **(Figs 9.2-9.3)**. Both are hand-made types, characterised by a remarkably long production, spanning from the dawn of the Late Bronze Age, at around the middle of the 17th c. BC, to approximately the end of the 12th c. BC **(Table 9.1)**. Both wares represent the culmination of earlier types of the Middle Bronze Age. They constitute the most distinctive Cypriot ceramic exports across the Mediterranean during the most part of the Late Bronze Age (see Merrillees 1968: 154-156; Artzy 2001; Yon 2001; Eriksson 2007: 155-169), evidently appreciated for their contents (Bushnell 2016), but also as tablewares, considering that non-containers also found their way to the Levant and Egypt (Merrillees 1968; Mazar 1992: 262).

Fig. 9.2 A White Slip II Ware bowl from Limassol Tomb 19 (after Karageorghis & Violaris 2012: pl. XIII: 6; courtesy of the Department of Antiquities, Cyprus)

Fig. 9.3 A Base-ring Ware Y-shaped bowl from Limassol burial feature No. 621/VI: 32 (after Karageorghis & Violaris 2012: pl. XLIII: 32; courtesy of the Department of Antiquities, Cyprus)

2.1. The White Slip Ware

Vessels in White Slip Ware are distinguished by a thick and smooth light-coloured slip of quasi-impermeable texture, applied on a darker-coloured clay, tempered with fine white and black grits. Following the formation of the vessel by hand, the *chaîne opératoire* that typifies White Slip production includes the application of a heavy slip and a painted decoration. A high level of technical expertise was required to accomplish adhesion of the thick and heavy coating onto the body. It has been suggested that the slip was attached to the vessel after it had undergone firing (Todd *et alii* 1991: 63); other studies indicate that the coating was applied to a wet body and was subsequently anchored with a tool (Gomez & Doherty 2000: 116). Potters manufacturing White Slip Ware vessels were extremely proficient, attaining temperatures ranging between 900-1100˚ C, which was essential to achieve the hard white slip with good adhesion to the body (Aloupi *et alii* 2001: 23-24). These advancements are not unrelated to parallel developments in pyro-technology, employed in the copper-working industry (Vaughan 1991: 124; Knapp & Cherry 1993: 164). A study of the distribution of regionals styles, (Popham 1972: 446-447; Russell 1989: 2-3), as well as interdisciplinary analytical work (Artzy *et alii* 1981; Knapp & Cherry 1994: 57-59; Bryan *et alii* 1997: 38-40; Gomez & Doherty 2000: 110-111; Tomlinson *et alii* 2010: 217-218; Renson *et alii* 2013) disclose the operation of multiple production centres across the island. A pottery workshop dedicated to the production of White Slip Ware pottery was unearthed in the village of Sanidha, close to the urban centre of Kalavasos-*Haghios Dhimitrios*, where significant amounts of White Slip Ware wasters and fire-bars associated with ceramic kilns were unearthed (Todd & Pilides 2001).

The production of White Slip Ware has been divided into several sub-categories that correspond to chronological or regional classifications (Popham 1972; Eriksson 2007). Proto-White Slip constitutes the ware's formative stage and dates to the Late Cypriot IA period (*ca.* 1650-1550 BC) (Popham 1972: 432-436; Eriksson 2007: 61-64). White Slip I production that typifies the Late Cypriot IB-IIB periods (*ca.* 1550-1325 BC) (**Table 9.1**) is characterised by fineness in the fabric, shape and decorative treatment. The slip is very thick, pearly white, occasionally burnished or polished, providing further lustre to the vessel's surface. Painted decoration is executed in a fine single-tipped brush to create delicate and intricate patterns (Popham 1972: 436-443). White Slip II Ware, which crystallizes in the Late

Cypriot IIC period (roughly the 13th c. BC) (**Table 9.1**), is characterised by somewhat coarser clay, with deteriorated and thinner slip (Popham 1972: 447; Artzy 1985: 98). The typical shape for White Slip II Ware is the hemispherical bowl with a rounded base and an arched wishbone handle (**Fig. 9.2**). The decoration of White Slip II bowls also befalls a less delicate and a more standardised treatment that includes thickly drawn cross-hatched ladder-pattern motifs, occasionally accompanied by a row of linked lozenges **(Fig. 9.2)** (Popham 1972: 447-454; Russell 1989: 2-3; Todd *et alii* 1991: 52-54). Turntables were possibly used for the relatively faster painting of unvarying cross-hatched patterns (Steel 2010: 112). During the ware's final stage, which dates to the end of the 13th and the beginning of the 12th c. BC, White Slip became a shadow of its former self, lacking its previous ostentatious production processes. Vessels of this phase, designated as White Slip II-Late, were clumsily formed and feature an unevenly applied slip with hastily decorated sets of horizontal and vertical bands (Popham 1972: 456).

2.2. Base-ring Ware

White Slip's ceramic counterpart, the Base-ring Ware, is characterised by vessels with extremely thin walls and dark-coloured surfaces, typified by a distinguishing metallic-like texture (Åström 1972: 137; Vaughan 1991: 122; 2001). The manufacture of Base-ring Ware vessels indicates an advanced level of technical skill attainment and knowhow. Macroscopic and scientific analyses on the ware have shown the thorough settling and refining procedures undertaken by the potters to produce the extremely fine fabric of high plasticity that as a rule characterises this ceramic class (Vaughan 1991: 121). Base-ring Ware vessels were at all times hand-made, in that both primary and secondary forming was carried out without the use of Rotative Kinetic Energy **(Fig. 9.4)**. Occasionally, traces of the potter's fingers employed to shape the vessel's form can be seen on the inside surface of a closed vessel **(Fig. 9.5)**. Explicit traces on the surfaces of Base-ring Ware vessels, however, denote a limited use of turntables for secondary forming procedures, such as scraping and smoothing, and occasionally also for the compaction of the vessels' surfaces, for reducing wall width or for the fashioning of bases and rims **(Fig. 9.6)** (Vaughan 1991: 122).

Most of the Base-ring Ware vessels were slipped and additionally burnished or polished, attaining a high degree of reflective surface lustre. Some specimens also indicate evidence for fabric vitrification (Vaughan 1991: 122; 1994: 87). A characteristic attribute of Base-ring Ware vessels is their consistent hardness; this is achieved thanks to their thin walls, very refined clay and the controlled firing atmosphere. On average, they have a hardness of about 5 on Mohs' scale, while some examples can reach up to 7 (Vaughan 1991: 122; 1994: 87). In addition to their characteristic 'metallic' texture and distinctive sound, Base-ring Ware vessels often feature morphological details that would make sense in metallic vessels but have absolutely no use in clay forms, such as the depiction of nails or rings for the attachment of the handles. This would suggest that Base-ring Ware vessels were emulating metallic prototypes, which only very rarely survive in the archaeological record (*e.g.* Catling 1964: 149, fig. 17.8, pl. 19d). Base-ring's formative stage, termed Proto-Base-ring, dates to the inception of the Late Cypriot period (*ca.* 1650-1550 BC) (Vaughan 1991: 126; Herscher 2001: 18-19). The production of Base-ring Ware vessels during the Late Cypriot IB-IIB periods (**Table 9.1**) is typified by a very fine fabric, with exceptionally lustrous surfaces. The predominant shapes of this early period are jugs and juglets, tankards, bowls and cups of varying forms (Åström 1972: 137-170). The typical decorative treatment during the early phase of Base-ring Ware production is the application of relief decoration in linear, spiral or serpent-like motifs (Åström 1972: 147-154, 170-173). Progressively, during the ware's mature phase, known as Base-ring II (Late Cypriot IIC), the range of shapes was confined to a limited number of forms, principally the jug, juglet and the so-called Y-shaped bowl with a horizontal wishbone handle and a fish-tail apex **(Fig. 9.3)** (Åström 1972: 137-197). The fabric of later Base-ring productions also deteriorates to a coarser-grained paste, with a less lustrous or matte surface, a result of the diminishing expenditure of care. The intricate decorative patterns in relief are supplanted by motifs added in white paint (Åström 1972: 153).

Chemical analyses of Base-ring Ware clays suggest a dense clustering of the samples in a compositionally tight group. The complex, but relatively homogeneous decorative and morphological attributes of Base-ring Ware vessels, as well as the intricate manufacturing sequence and firing procedures, strongly indicate that Base-ring Ware vessels were produced at a rather limited number of regional centres by specialist craftsmen, a system that was supported by an extensive distribution network (Vaughan 1991: 125; 1994: 91; Steel 2010: 108). The petrographic data from Base-ring samples indicate three possible regions which accommodated production sites: the Ovgos Valley and North-Central Mesaoria Plain, the south-central coast and the south-western coast (Vaughan 1994: 89).

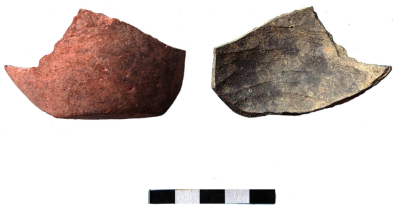

Fig. 9.4 Base fragment of a Base-ring Ware jug from Maa-*Palaeokastro* (Courtyard A/32). Flat, thin base. Visible traces of hand-made manufacture inside (by the author, courtesy of the Department of Antiquities, Cyprus)

Fig. 9.5 Shoulder fragment of a Base-ring Ware juglet from Maa-*Palaeokastro* (1954.FW3.Box1). Ridge around neckline, squat and globular body. Fingermarks visible inside (by the author, courtesy of the Department of Antiquities, Cyprus)

Fig. 9.6 Base fragment of a Base-ring Ware juglet from Maa-*Palaeokastro* (West of Building II/1). Flaring ring-base with ridge on the outside. Indications of the use of a turntable for the vessel's manufacture (by the author, courtesy of the Department of Antiquities, Cyprus)

2.3. The Aegean-style wheel-made finewares

By the end of the 13th and the beginning of the 12th c. BC the quantity and quality of Base-ring and White Slip Ware production dropped dramatically. The very hasty banded decoration of the latest crop of White Slip Ware bowls exemplifies this apparent decline in production. Base-ring Ware vessels analogously display a minimum attention to surface treatment, whether by smoothing, slipping or dipping the vessels in matte slip (Vaughan 1991: 124). At the same time, locally made decorated wheel-made finewares, which largely – though not exclusively – draw inspiration from the Mycenaean ceramic production, were gradually established as the island's principal tableware pottery **(Figs 9.7-9.9)**. This ware has been associated with an abundance of complex and arbitrary terminology (see Georgiou 2016b: 79-81; forthcoming), and most scholars nowadays opt for the term 'White Painted Wheel-made III Ware' when referring to the production of decorated wheel-made finewares in 13th and 12th c. BC Cyprus (Åström 1972: 276; Kling 1991), a terminology that – despite its flaws (Jung 2012b: 83-84) – tends to be more commonly accepted.

Aegean-style wheel-made finewares produced locally in Cyprus were primarily used for consuming food and liquids, for serving and, more rarely, for small-scale storage. Open shapes predominate, including the characteristic deep bowl **(Figs 9.7-9.9)** (or skyphos), various types of bowls, cups, kylikes and kraters (Kling 1989a). Closed vessels are much rarer and include jugs of various sizes and profiles, strainer jugs, stirrup jars and piriform jars. Painted decoration is usually plain linear, but more elaborate compositions with spirals, zigzag and wavy bands, and

other geometric motifs are not uncommon, especially on large open vessels such as deep bowls and kraters. Pictorial depictions, presenting faunal and floral motifs, are less frequent **(Fig. 9.9)**.

Aegean-style wheel-made finewares are generally distinguished by a fine, light-coloured calcareous clay, to which small and tiny, sub-angular, multi-coloured grits are added (Georgiou 2016b: 81-82). As a general rule, the slip and paint of Aegean-style wheel-made finewares is matte (Kling 2000: 82), which sets them apart from the lustrous slip and paint that, as a rule, characterises the ceramic production in the Greek mainland. Although this distinction stands true for most cases, it is certainly not unambiguous, considering that variations in the quality and lustre of the Aegean and Cypriot products are plentiful (Kling 1989a: 91; 2000: 282; Mountjoy & Mommsen 2015: 467). The vessels' texture varies from smooth to powdery or chalky (Georgiou 2016b: 82). These vessels bear salient indications for the use of a high-speed turning device, which utilises Rotative Kinetic Energy to raise the vessel's walls, and fashion its form. Aegean-style wheel-made ceramics locally produced in Cyprus present an abundance of different fabrics, and the occurrence of multiple production centres has been corroborated by extensive scientific analyses (Anson 1980; Jones & Catling 1986: 603-609; Knapp & Cherry 1994: 50, 61-62), including the recent studies conducted by Penelope Mountjoy and Hans Mommsen (Mountjoy & Mommsen 2015). Mountjoy and Mommsen have identified the chemical profile of eight different production centres in Paphos, Kourion (Episkopi), Alassa, Hala Sultan Tekke, Kition, Enkomi and Sinda (Mountjoy & Mommsen 2015: 425-427).

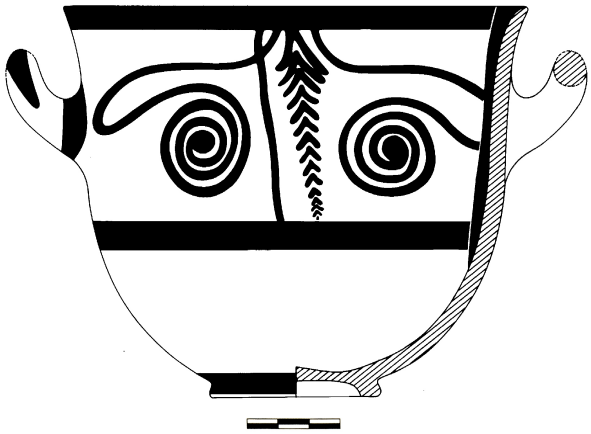

Fig. 9.7 A deep bowl from Palaepaphos-*Evreti* (after Georgiou 2016b: cat. no. 21: TE III 23)

Fig. 9.8 A deep bowl from Maa-*Palaeokastro* (by the author, courtesy of the Department of Antiquities, Cyprus)

Fig. 9.9 Fragmentary deep bowl from Maa-*Palaeokastro* with pictorial decoration of a bird (by the author, courtesy of the Department of Antiquities, Cyprus)

3. The establishment of the potter's wheel in Late Bronze Age Cyprus and the prevalence of the wheel-made wares at the close of the Late Bronze Age

The invention of the potter's wheel marks a milestone in the history of ceramic technology, considering that the efficiencies of wheel-fashioning practices far exceed those of other modes, in terms of manufacturing time and regularity of the finished vessels (Roux & de Miroschedji 2009: 155; Roux & Jeffra 2015: 165). In Cyprus, the predominance of Aegean-style finewares during the course of the 12th c. BC coincides with the increasingly widespread use and eventual establishment of wheel-made technology. However, it should be stressed that neither the potter's wheel nor the wheel-thrown technique were newly introduced on the island at this time. The introduction of the potter's wheel in Cyprus dates to the dawn of the Late Bronze Age, at around 1650 BC, *viz.* at a much later stage compared to other regions of the Eastern Mediterranean (Roux 2003; Roux & de Miroschedji 2009). The earliest wheel-thrown vessels produced locally on the island during the Late Cypriot I period were Levantine-inspired vessels of Plain White Ware that were employed in communal feasting activities and were thus elemental to the pursuits of the emerging elites for social display (Crewe 2007b: 228-229; 2015: 127-128). The introduction of the potter's wheel has thus been interpreted as a result of the island's interaction with Levantine social customs and technologies and the integration of the incipient class of social elites in the ideological networks of the Eastern Mediterranean (Crewe 2007a: 149-151).

The proficiencies required in the production of vessels on a rotational device are much more difficult and time-consuming to attain compared to apprenticeships in hand-building techniques (Roux & Coberta 1989: 67-68; Berg 2015: 21). Wheel-shaping and wheel-throwing techniques necessitate extended training to achieve stability in the forearms and motor control of the two hands to apply the right amount of pressure, analogous to the plasticity of the clay, the speed of the wheel and other factors (Roux 2003: 18). Furthermore, primary

forming, which relies on specialised gestures and shared information, is the least variable step in the *chaîne opératoire* and is thus likely to remain stable throughout a potter's lifetime (Gosselain 2000: 192-193). Thus, extensive interaction between potters is a prerequisite to acquire the *savoir faire* to become skilful in wheel-made technology (Choleva 2012: 375-376; Berg 2015: 31). In the case of Cyprus, the introduction of the potter's wheel early in the Late Bronze Age must have certainly involved some form of contacts between Cypriot and foreign potters, possibly from the Levant, whence the earliest wheel-made vessels drew their inspiration (Crewe 2007b: 225-226; 2015: 130).

Cyprus constitutes a unique case on a pan-Mediterranean level as regards to the introduction and adoption of the potter's wheel. As observed by Lindy Crewe "[t]here is […] no progression from small to larger vessels or modification of turntable techniques". At the same time "the Cypriot material shows no evidence at all for the use of a rotational device in forming or finishing the vessels prior to the first appearance of wheel-made pottery" (Crewe 2007b: 210; see also the discussion in Roux & Corbetta 1989: 40-90). Upon the introduction of the potter's wheel in Cyprus, at *ca.* 1650 BC, only a limited number of ceramic wares, such as Plain White Ware, Bichrome Ware, White Painted Ware and Red/Black Slip Wares were manufactured on the wheel (Crewe 2007b: 218-222; Åström 2001). These encompass pottery wares that either continued from earlier Middle Cypriot traditions (*i.e.* White Painted and Red/Black Slip Wares) or that were newly introduced in the Cypriot ceramic repertoire, such as Plain Ware and Bichrome Ware (Åström 1972: 112-126; Crewe 2007b: 223). Even so, during the Late Cypriot I period (*ca.* 1650-1450 BC), most of the wares for which the potter's wheel was utilised, continued to be produced using both the hand-made and the wheel-made technique (Crewe 2007a: 33-36), which means that we often encounter vessels that are identical in terms of their shape and fabric, but were formed using different technologies (Roux & Jeffra 2015: 177; *e.g.* Åström 1972: 112-126; 212-216; Crewe 2007a: 128-131). The sole exception is the Red Lustrous Wheel-made Ware (and other lustrous forms), a fineware that was possibly manufactured in Cyprus (Eriksson 1991: 93; Knappett & Kilikoglou 2007: 133), and was exclusively produced using the wheel-thrown technique.

In the following Late Cypriot IIA-B periods (*ca*. 1450-1325/1300 BC) the number of wheel-thrown wares was reduced, both in terms of quantity and diversity. This phenomenon has been interpreted as an indication that wheel-made vessels were no longer loaded with high-status connotations (Crewe 2007b: 231). Indeed, from the Late Cypriot IIA period onwards, the feasting set – that was so strongly associated to vessels of wheel-made manufacture in the previous Late Cypriot I period – was replaced by Base-ring and White Slip Ware bowls of hand-made manufacture. This period also witnessed an exponential increase in the importation of Mycenaean drinking vessels, mostly with regards to the amphoroid- and bell-kraters with pictorial depictions that were imported from the Greek mainland (Steel 1998: 291-292). However, certain wares continued to be produced on the wheel, albeit in lower quantities (*e.g.* Plain White Wheel-made Ware, White Painted Wheel-made Ware, Bichrome Wheel-made Ware, *etc*.) (Crewe 2007b: 220, 227).

In the subsequent Late Cypriot IIC period (*ca.* 1325/1300 -1200 BC), wheel-made technology was employed for the manufacture of both utilitarian (*e.g.* Plain White Ware) and fineware vessels (White Painted Wheel-made II-III). However, the numbers of vessels thrown on the wheel are minimal when compared to the proliferation of the hand-made wares, mostly of the White Slip and Base-ring type (Steel 2010: 119). It was only at the end of the 13th c. BC and throughout the 12th c. BC, with the prevalence of the Aegean-style finewares, that the Cypriot potters adopted the advantages of the wheel-thrown technique at a wholesale level for the first time. Macroscopic observations on the surfaces of locally produced Aegean-style finewares, such as rilling, parallel striations and compression ridges, denote the employment of the wheel-throwing technique, which entails throwing and then shaping an unformed lump of clay on the potter's wheel using Rotative Kinetic Energy (Roux & Courty 1998). However, these were only studied macroscopically and further research – including interdisciplinary studies – is necessary to precisely determine modes of production. For instance, a number of the larger specimens of Aegean-style finewares, such as large jugs, amphorae and hydriae, bear distinctive coil seams, which would suggest that a combination of wheel-fashioning modes, such as initial coil-building and subsequent shaping on the wheel, or a combination of techniques (see Courty & Roux 1995: 27-30; Roux & Courty 1998; Choleva 2012) was employed.

4. A macro-historic and contextual analysis of ceramic transformations

While all scholars are in agreement that the 13th-to-12th c. BC transition in Cyprus witnessed the abandonment of the centuries-old hand-made finewares and the establishment of wheel-made ceramics of Aegean inspiration, the elucidation of the series of events that brought about these transformations remains an intriguing matter[2]. In the early work of researchers dealing with the local production of Aegean-style pottery in Cyprus, the phenomenon was thought to mark a dramatic shift, equated to the presence of an Aegean migrant population on the island (Sjöqvist 1940: 208-209; Furumark 1965: 111-112; Catling 1975: 207-209). While the migration of Greek-speaking populations in Cyprus during the 12th c. BC can be corroborated by the shift in the island's language, the dynamic nature of Cyprus' material culture resists a straightforward or linear association between the establishment of Aegean populations on the island and the transformations observed in the Cypriot pottery production.

4.1. Contextualising the Mycenaean imports and locally produced Aegean-style pottery in Cyprus

In order to untangle the transformations characterising the Cypriot ceramic industry at the close of the Late Bronze Age we ought to endorse a *longue durée* approach, starting from the earlier part of the period. From as early as the 15th c. BC and mostly throughout the 14th and 13th c. BC the Cypriots were importing Mycenaean vessels by the hundreds (Steel 1998: 286; van Wijngaarden 2002: 291). The corpus of imported Mycenaean pottery in Cyprus includes closed vessels, imported as receptacles for their contents (possibly scented oils or unguents), rather than as ceramic vessels *per se* (Leonard 1981: 91-96; Bushnell 2016: 126-134). In addition, Mycenaean imported vessels in Cyprus included the drinking set, which encompassed a large variety of drinking bowls, kylikes and kraters decorated in the pictorial style (Steel 1998: 286-287). Featuring at the centre of social gatherings, the pictorial amphoroid- or bell-kraters decorated with elaborate scenes served to enhance and promote the owner's prominence (Steel 1998: 291; Keswani 2004: 139, 142-143). Certain features in the Mycenaean vessels found in Cypriot contexts allude to an export market that was specifically targeted towards an Eastern Mediterranean clientele (Steel 1998: 287). Such 'marketed' ceramics include the carinated or hemispherical bowl with a wishbone handle, a characteristic feature of the Late Cypriot production (Karageorghis 1965: 204-208, 214-216; 2002: 46-47), as well as the amphoroid krater. The latter was specifically common in the contexts of the Eastern Mediterranean, compared to its sparse presence in the Greek mainland (Mountjoy 1993: 73, 137; Immerwahr 1993; 218-219).

The widespread adoption of the Mycenaean drinking set by the Cypriot elites, particularly within the mortuary contexts, impacted severely on the production of local finewares. During the course of the 14th c. BC the array of shapes fabricated in the local hand-made Base-ring and White Slip Wares was significantly diminished and decorative schemes became more standardised and less intricate. While the Base-ring and White Slip bowls prevailed, other forms, especially those pertaining to feasting activities, such as mixing and serving utensils (kraters and tankards), were largely replaced by the imported Mycenaean finewares (Steel 1998: 292; 2016: 83; Van Wijngaarden 2002: 198).

From as early as the late 15th and early 14th c. BC ceramic forms that typified the Mycenaean sphere began to be locally produced in Cyprus, at a limited scale. The earliest Mycenaean forms reproduced by the Cypriot workshops were the small three-handled piriform jars, which were mostly used within the mortuary contexts of Enkomi (Mountjoy & Mommsen 2015: 470-471; Graziadio 2017). During the 13th c. BC, the corpus of locally produced wheel-made vessels of Aegean inspiration expands to include amphoroid- and bell-kraters in a distinguishing decorative style referred to as 'Rude style' or 'Pastoral style'. Such formulaic compositions feature pictorial scenes of animals, mostly bulls, birds and deer (Karageorghis 1965: 231-259; Anson 1980; Vermeule & Karageorghis 1982: 59-60, figs VI: 1-58; Mountjoy & Mommsen 2015: 474-475). Shallow bowls and a limited range of closed vessels of Mycenaean inspiration, such as jugs and stirrup jars, were also produced

2 For various interpretative frameworks on Aegean-style pottery locally made in Cyprus, see among others: Kling 1989a; 2000; Sherratt 1991; Karageorghis 2000: 256-257; Jung 2011; Iacovou 2013b: 607-610; Georgiou forthcoming.

during the latter half of the 13th c. BC (Mountjoy & Mommsen 2015: 471-474; Killebrew 2015: 53). The increased variation of the shallow bowls in terms of morphology (conical, carinated), depth (shallow, medium and deep) and handle type (horizontal loop, horizontal strap, wishbone, *etc.*) is noteworthy (Sherratt 1991: 187). A representative corpus of this morphological profusion is that of the Lower and Upper Burials of Tomb 9 at Kition (Karageorghis 1974: 42-94, 154-162, pls 147-148, 154-162), where the abundance of bowl variants is truly outstanding.

While the importation of Mycenaean wares from the Greek mainland decreases in the 13th c. BC and virtually ceases by the end of the century (Van Wijngaarden 2002: 261-262)[3], the production of Aegean-style wheel-made vessels on the island witnesses an exponential increase by the end of the 13th and the inception of the 12th c. BC, at the expense of the traditional White Slip and Base-ring Wares of hand-made manufacture. In the course of the 12th c. BC, the deep bowl (occasionally referred to as a *skyphos*) was established as the open shape par excellence within the repertoire of tableware pottery (**Figs 9.7-9.9**). The deep bowl, typified by a bell-shaped body with two horizontal loop handles that flank linear or more elaborate compositions, was already introduced to the local repertoire during the close of the 13th c. BC, albeit in extremely limited numbers and in rather awkward forms, featuring small-sized or badly formed examples. These early versions of the deep bowl were found at Palaepaphos-*Mantissa* (Karageorghis 1965: 161), Kition Tomb 9 Upper Burial (Karageorghis 1974: 86), Enkomi (Area I, Level IIB [Dikaios 1969-71: pl. 66.1, no. 5903/1) and Hala Sultan Tekke (Åström *et alii* 1976: 71-89). The 12th c. BC also witnessed a remarkable upsurge in the range of shapes reproduced from the Aegean repertoire. Locally produced Aegean-style vessels now included amphorae, strainer jugs, kylikes, kalathoi, or piriform jars (Kling 1989a: 171). And so, by the end of the 12th c. BC, the ceramic industry of Cyprus was entirely transformed, with the century-old production of hand-made wares completely overthrown and wheel-made finewares of Aegean inspiration predominating.

Aegean-style pottery was also produced in other areas of the Eastern Mediterranean during the 12th c. BC, and particularly in the area of the Southern Levant (see Yasur-Landau 2010: 243-255 with further references). However, there are significant differences between Cyprus and the Levant in the means of establishment and in the impact of locally produced Aegean-style pottery. While the evidence for direct and intimate contacts between the Aegean and Cyprus during the Late Bronze Age (especially during the late 14th-13th c. BC) is overwhelming (Hirschfeld 1996), conversely, much of the movement of Mycenaean vessels into the Levant was carried out via Cyprus, with very sparse direct commerce (Bell 2006: 59; Hirschfeld 2009: 288-289). The results of recent analyses have demonstrated that a significant number of Mycenaean-type vessels produced locally in Levantine and Anatolian sites hold stylistic affinities to the Cypriot production, rather than the Mycenaean sphere directly (Killebrew 2014: 598). What is more, Aegean-style pottery produced in Cyprus was traded in the Levant, Anatolia and Egypt (Mountjoy & Mommsen 2015: 487-489). In addition, much unlike the case of Cyprus, the appearance of Aegean-style pottery in Southern Levant was sudden with no precedent production (Killebrew 2015: 51, 55), and had no long-lasting impact beyond the 12th c. BC horizon (Iacovou 1998: 339).

4.2. The Cypriot finewares at the transition from the 13th to the 12th c. BC milieu: a time of experimentation and regional variation

Evidence for the dynamic transformations and experimentation that characterise the production of Late Cypriot finewares at the transition from the 13th to the 12th c. BC lie in several specimens that illustrate the osmosis of shapes, decorative patterns and techniques deriving from both Aegean and local Cypriot production. While examples illustrating these forceful processes were unearthed from a number of different contexts on various sites on the island (see Sherratt 1991: 187), the most comprehensive evidence was contained within two wells at the site of *Evreti,* situated within the urban nucleus of the Paphian polity, dating to the late 13th - early 12th c. BC (von Rüden *et alii* 2016: 420). The contents of Wells TE III and TE VIII from *Evreti* are interpreted as the residue of feasting activities as well as discards from ivory and metal workshops (von Rüden *et alii* 2016). TE III 28 from Evreti is a bowl of wheel-made manufacture that follows the fabric typifying the

3 A LH IIIC Early bowl recently found at Pyla-*Kokkinokremos* (Karageorghis & Kanta 2014: No. 60, 126, pl. VI) suggests that very sparse contacts between the Greek mainland and Cyprus continued in the late 13th-early 12th century BC.

Aegean-style vessels of this ceramic assemblage. However, the vessel follows the hemispherical shape and decorative norms of the traditional White Slip Ware bowls **(Fig. 9.10)** (Georgiou 2016b: 90, figs 30, 75). The decorative scheme for this particular bowl, characterised by sets of multiple vertical bands, closely follows the painted embellishment on White Slip II examples, specifically of the ware's latest phase of production (White Slip II-Late), during the 12th c. BC (Popham 1972: 454, fig. 57). Other examples from the corpus of the Evreti wells revealing the integration of White Slip elements in the repertoire of Aegean-style wares are the bowls TE III 69A and TE VIII 24 (Georgiou 2016b: 90, figs 115, 309). The former preserves part of a wishbone handle, which typifies bowls of White Slip Ware **(Fig. 9.11)**.

The amalgamation between the Aegean pottery traditions and the local wares is further illustrated by bowl TE III 199, which represents the wheel-made version of a typical Y-shaped bowl, in the characteristic fabric and manufacture technique of Aegean-style vessels **(Fig. 9.12)** (Georgiou 2016b: 92, fig. 197). The bowl is covered by a thick, heavily slipped, reddish/brown wash, presumably to simulate the characteristic texture of Base-ring Ware vessels (Sherratt 1991: 187). Another example from Evreti that illustrates the merging of the Aegean and Cypriot pottery tradition is bowl TE III 14. The vessel follows the typical shape of the traditional Plain White Ware bowls with a lug-handle attached on the rim and a ring-base (see Keswani 1991: 98), but it was produced in the fabric of the Aegean-style vessels and was additionally painted both inside and outside with a solid wash (Georgiou 2016b: 90, figs 31, 61). Finally, TE VIII 76A is the base of a juglet that is typical for the shape of Base-ring Ware vessels, but features the fabric and decoration that is characteristic of the Aegean-style finewares. Unlike the other examples discussed, however, this juglet is hand-made (**Fig. 9.13**).

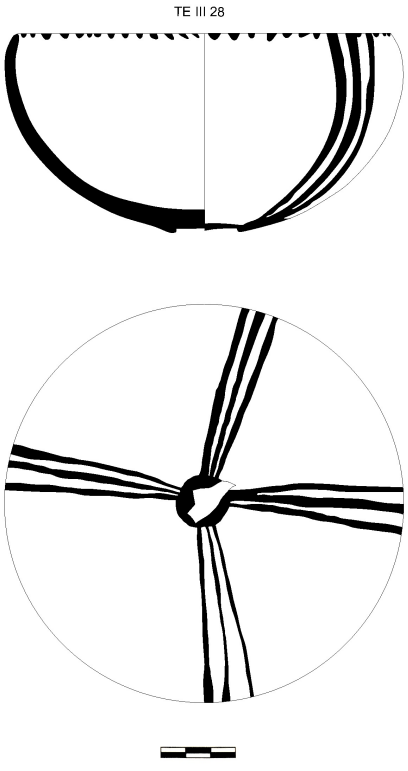

Fig. 9.10 Hemispherical bowl of wheel-made manufacture in White Slip II-Late decoration from Palaepaphos-*Evreti* (after Georgiou 2016b: cat. no. 26: TE III 28)

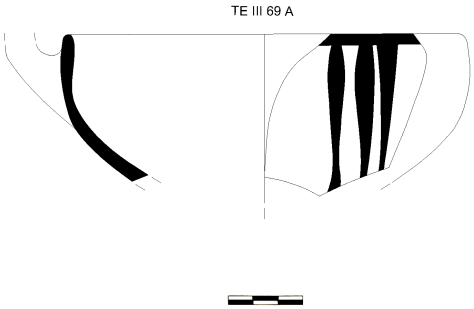

Fig. 9.11 Fragmentary hemispherical bowl with wishbone handle of wheel-made decoration and White Slip II-Late decoration from Palaepaphos-*Evreti* (after Georgiou 2016b: cat. no. 69: TE III 69A)

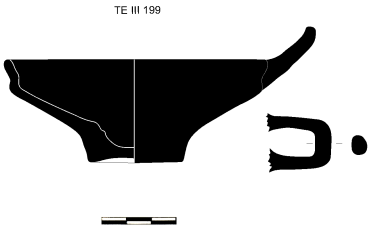

Fig. 9.12 Y-shaped bowl of wheel-made manufacture from Palaepaphos-*Evreti* (after Georgiou 2016b: cat. no. 161: TE III 199)

Fig. 9.13 Base fragment of a juglet from Palaepaphos-*Evreti*. Traces of hand-made manufacture visible inside (after Georgiou 2016b: cat. no. 77: TE VIII 76A)

In addition to its highly experimental character, the transformation of the island's ceramic industry betrays a remarkable level of regional variability. Regional idiosyncrasies identified in the production of wheel-made finewares at Enkomi and related sites, such as Sinda, include the popularity of elaborately decorated surfaces, particularly on kraters, strainer jugs and stirrup jars, with intricate spiral decorations and metopes filled with dense ornamentation (Dikaios 1969-71: 487-489). The south-eastern part of the island is home to another regional peculiarity, that of bichromy, achieved through the intentional application of black and reddish/orange-coloured paint on the same vessel. Though still quite rare, this decorative method is more commonly encountered in Kition (Karageorghis 1974: 72, 87, 94, 96-98, pls CLVIII, CLIX), Pyla-*Kokkinokremos* (Karageorghis & Kanta 2014: 63, pl. 8) and Hala Sultan Tekke (Fischer & Bürge 2013: fig. 12; Mountjoy & Mommsen 2015: fig. 11: S34). The area of Paphos presents the largest and most intriguing array of regional elements in the production of Aegean-style fineware ceramics. Monochrome interiors for deep bowls are particularly common in South-Western Cyprus, in comparison to the more widespread occurrence of interiors featuring linear decoration at other Late Cypriot sites. The use of solid paint on the interior surface of deep bowls is predominant at Palaepaphos and at Maa-*Palaeokastro* **(Figs 9.7-9.8)** (Kling 1988: 334; Maier & von Wartburg 1985: fig. 8;

Maier 2008: 115-122, fig. 273; Georgiou 2016b: 85-86). One-handled bowls are especially popular in the Paphian region (Karageorghis 1965: fig. 159; Maier 2008: 208, 210, figs 256, 258; Georgiou 2016b: 91-92), as is a certain type of bowl with a rounded base and a circular indentation on the underside (Karageorghis 1965: fig. 38; Maier 1985: 124-125; 2008: 200, figs 252:7, 265:2; Karageorghis 1990: pl. 87: 29, 42, 53; Georgiou 2016b: 89-90, 99).

5. Conclusions

Cyprus constitutes a powerful paradigm for the need to contextualise transformations in material culture within a solid social, political and economic scheme. It challenges the assumptions that wheel-made technology – rapidly or gradually – replaced hand-made production upon its introduction. The case of Late Bronze Age Cyprus serves to illustrate the idiosyncratic means by which technological achievements, such as the use of the wheel technology, were employed, and it highlights that innovative technologies are not always predictably or linearly endorsed. The Late Cypriot ceramic industry further exemplifies how hand-made production does not equate to poor quality, inadequate technological knowhow, or lack of labour division. The proficiencies entailed in the production of the long-established Late Cypriot finewares, mostly with regards to the intricate *savoir-faire* of White Slip and Base-ring Ware vessels, imply extreme technological expertise and the employment of specialised workforce.

The Cypriot case epitomises how periods of crisis do not necessarily lead to the decay and instability of crafts, considering that amidst an otherwise critical period for the entire Mediterranean, the Cypriot ceramic industry was transformed to endorse wheel-made technology to a hitherto unprecedented extent. Evidently, while the know-how of wheel-made technology was instated on the island from as early as the 17th c. BC, the production of Cypriot finewares continued to largely defy the convenience afforded by this technique for a good four-century-long period. This is in line with recent studies that indicate how communities do not endorse technological advancements, such as the potter's wheel, in an implicit and linear evolutionary paradigm (see Lemonnier 1993: 3; Loney 2000 with further references; Roux & Jeffra 2015). Technology and technological changes emerge within a social environment and, as such, they are governed by a series of meaningful choices that are both physical and social, many of which are not necessarily directed towards a more efficient or problem-solving production (Lemonnier 1986: 155-156). As Roux states: "technological features are either retained or subject to alteration depending on the previously established integration of their symbolic, social, and/or functional significance within even wider networks of meaning" (Roux 2003: 5). In the case of Cyprus, the persistence to hand-made manufacture is accounted for neither by ignorance nor conservatism on behalf of the Cypriot potters. Hand-made manufacture went hand-in-hand with local wares; for instance, the high plasticity of the clay utilised in the production of Base-ring Ware vessels suited the ware's intricate shapes and ceramic qualities that could accommodate the potters' attempts to emulate metallic prototypes (Vaughan 1991: 125). The production of Base-ring and White Slip Ware vessels was a highly successful industry that was sustained by both internal and external demand. If we consider that the remarkable uniformity in the appearance of Base-ring vessels was attained within a highly segmented politico-economic landscape, in the absence of a strong island-wide palace-based economy (Keswani 2004: 154), then this homogeneity must be vindicated by the potency of the social, religious and/or cultural traditions that were intrinsically linked with this ware on an island-wide scale, over approximately four centuries (Vaughan 1994: 214). These practices involved feasting and wine-drinking activities, sacred rituals and performing libations in honour of the dead (Merrillees 1971: 57; Webb 1999: 189-190; Crewe 2007b: 214; Steel 2010: 109).

Despite the uninterrupted demand for the traditional local Base-ring and White Slip Wares, their hand-made manufacture could not meet the requirements of mass production at the close of the Late Bronze Age, during the time when Late Cypriot urban centres became even more nucleated and centralisation was all the more apparent in pottery production (Sherratt 1991: 191-192; Steel 2010: 112). While there are evident attempts to 'industrialise' the local production of the characteristic Base-ring and White Slip pottery traditions, the two wares could not be produced on the wheel. For instance, the plasticity of the clay used in the production of Base-ring Ware vessels, made it impossible to withstand the centrifugal force of the wheel-made technique. Base-ring Ware workshops began experimenting with a less plastic and less refined type of clay to produce

plain versions of the typical carinated cup thrown on the wheel (Jones & Catling 1986: 595; Steel 2010: 112). The most prolific evidence for such plain and wheel-made bowls in the sharp carinated Y-shape that typifies Base-ring Ware production, was contained within two sacred areas excavated at Enkomi, namely the Sanctuary of the Horned God and the Sanctuary of the Ingot God (**Fig. 9.14**) (Courtois 1971: 240-250, figs 93-95; Dikaios 1969-1971: 196-197, pls 35, 35A, 36:1-3; Webb 1999: 96, 107). In the former's case, the deposition dates to the late 12th c. BC, during the final stages of the town's occupation (Dikaios 1969-1971: 210-211), while the latter context dates to the late 12th-early 11th c. BC, possibly associated with a short post-abandonment phase (see the discussion in Webb 2001: 77-80). There can be little doubt that the deposits from the two sacred contexts of Enkomi represent the remains of (public) ritual and feasting activities (Webb 2001: 101, 189-190; Papasavvas 2014: 231). The ceremonies were conducted by the use of Y-shaped bowls emulating the typical Base-ring shape, because these vessels were evidently intrinsically linked to such performances. However, unlike the centuries-old Base-ring vessels, the masses of bowls deposited at the two Enkomi Sancturies were produced by a less plastic fabric and were thrown on the wheel.

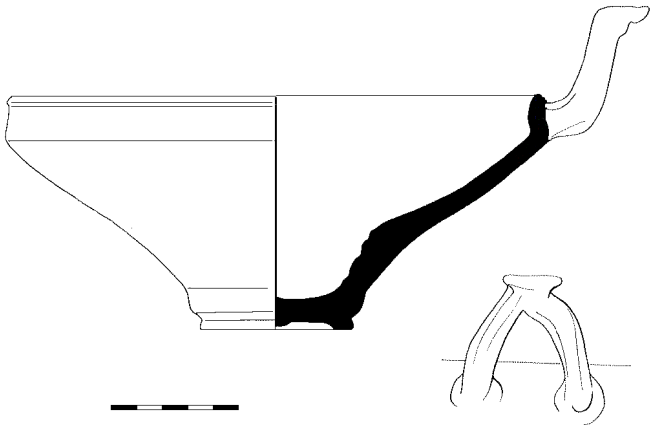

Fig. 9.14 Y-shaped bowl in Plain Wheel-made Ware from the Sanctuary of the Ingot God, Enkomi (after Courtois 1971: fig. 94:F, inv. no. 16.76; courtesy of the Department of Antiquities, Cyprus)

The macro-historic approach undertaken in this study serves to illustrate several important observations with regards to the transformed ceramic industry of Cyprus during the century-long period spanning the end of the 13th c. BC to the end of the 12th c. BC. First, it is evident that the prevalence of the wheel-made finewares locally produced in Cyprus that largely follow Aegean prototypes was by no means sudden or unprecedented, albeit they did undergo an exponential growth in production during the 13th-to-12th c. BC transition. Mycenaean vessels were imitated in Cyprus from as early as the late 15th-early 14th c. BC and from there on their production was gradually augmented in the 13th c. BC with the addition of other shapes (*i.e.* the krater, shallow conical and carinated bowls) and decorative schemes ('Pastoral-style' pictorial decoration), until the eventual establishment of the Aegean-style wheel-made pottery as the tableware of Cyprus in the 12th c. BC. Secondly, the production of hand-made finewares was not ousted overnight. At Maa-*Palaeokastro*, for instance, while Aegean-style wheel-made finewares predominate (30 % of the entire ceramic assemblage and 57 % of the corpus of finewares from the site [Georgiou 2012: Table 12]), the percentage of the hand-made wares – Base-ring Ware vessels in particular – is not negligible, amounting to 19 % of the entire assemblage and 35 % of the body of finewares (Georgiou 2012: Table 12). Considering that the site was newly founded at the end of the 13th c. BC, the large corpus of Base-ring Ware vessels cannot be considered as residual. Thirdly, the macro-historic overview demonstrates that Mycenaean pottery was very much appropriated within the Late Cypriot cultural milieu, considering that from the 15th c. BC onwards the Cypriot elites were using Mycenaean imported vessels and other Aegean paraphernalia to enhance their status and display their wealth (Steel 2010: 291-292). The large numbers of Mycenaean pottery found deposited in the tombs of the Late Bronze Age in Cyprus indicate that

the Cypriots were familiar with the Mycenaean drinking set and were employing these vessels during feasting activities (Keswani 2004: 138). Finally, the century-long period spanning the end of the 13th and the end of the 12th c. BC marks a time of experimentation. Specimens featuring the characteristic shape and/or decorative schemes of the traditional Late Cypriot Base-ring or White Slip Ware that were produced on the wheel are eloquent indications of the highly transformative ceramic industry of Cyprus.

What then instigated the transformation in the Late Cypriot ceramic industry during the 13th to the 12th c. BC transition? I believe that our attempts to disentangle the Late Cypriot ceramic industry amidst the 'Crisis Years' should consider several parameters that cumulatively dictated its re-organisation. First of all, the loss of the Mycenaean palaces signified a major loss for the procurement of Mycenaean fineware ceramics, an essential commodity in the circles of Cypriot elites (Steel 1998: 251). The need to fill the void that was generated by the collapse of the Mycenaean political authorities can be considered, at least in part, responsible for the intensification (not the introduction) of the local production of Aegean-style finewares in Cyprus (Sherratt 2003: 45). Secondly, the breakdown of the established economic order at the close of the 13th c. BC and the destruction and abandonment of several of the Levantine states which constituted a major clientele for the hand-made wares produced in Cyprus (Bell 2006: 34-60; 91-92) signalled a substantial market loss for the diffusion of the Late Cypriot hand-made ceramics eastwards, again necessitating that the ceramic industry adjust to this new era. Thirdly, the presence of people from the Greek mainland on Cyprus as is corroborated by the establishment of an antiquated Greek language on the island, must have contributed to this end. With the latter, I certainly do not evoke a 'pots equal people' paradigm, whereby Aegean-style pottery functioned as a marker of identity for migrants from the Aegean, or that Mycenaean populations imposed their own production over local traditions. It is, however, conceivable that the numerous Aegean immigrants established on the island included a specialised workforce – which again remains invisible in the material record – that would have undoubtedly stimulated and enhanced the Cypriot ceramic production of wheel-made finewares. Perhaps the most compelling factor that dictated the shift from a ceramic industry based on hand-made manufacture to the establishment of wheel technology was the ever increasing highly urban environment of the Cypriot polities in the post-crisis era during the late 13th-early 12th c. BC (Sherratt 1991: 191-192; Iacovou 2013a: 25-26). The gradual and eventual establishment of wheel-made ceramics during the course of the 12th c. BC in Cyprus corresponds to the transformed politico-economic landscape of the island, characterised by the empowerment of the urban centres by internal and external migrations (Iacovou 2012) and the nucleation of economic and political dominion in the centres that survived the 'crisis', Enkomi (Salamis), Kition and Palaepaphos. Wheel technology, often implicating full-time craft specialisation and mass production, is befitting to a highly urbanised context (Arnold 1985: 208-210), such as that of the Cypriot political authorities of the 12th c. BC.

The establishment of a wheel-made ware as the predominant fineware of Cypriot pottery production in the 12th c. BC marked an upsurge in the 'industrialisation' of the island's ceramic craftsmanship. It was, however, neither the inception nor the culmination of this process. The earliest attempts towards a more efficient production of fineware pottery in Cyprus are present early in the 13th c. BC, when the morphology of White Slip and Base-ring Wares became limited to a few standardised shapes: hemispherical bowls in the former style, carinated bowls and jugs/juglets in the latter. Simultaneously, the decorative scheme for White Slip bowls became exceedingly standardised: the intricate and miniscule painted motifs that had characterised the earlier phase of production during the Late Cypriot I-IIB periods were discarded, and a formulaic decoration consisting of the stereotypical ladder pattern was applied (Steel 2010: 112). Comparably, the Base-ring Ware workshops had abandoned the time-consuming application of relief decoration and replaced this laborious decorative treatment with the more expedient application of white paint, to create a comparable result (Artzy 1985: 96).

During the course of the 13th c. BC, the wheel-thrown technique was used more extensively to produce shallow bowls of Aegean type. The arduous task of classifying the profusion of bowl variants during this phase discloses the experimental character of the ceramic industry (see Karageorghis 1965: 158-173; Maier 1985; Mountjoy & Mommsen 2015: 475-480). Bowls are shallow or deep, carinated or conical, with a single handle or two handles, that can be strap, loop, or wishbone. The production of shallow bowls was naturally not halted in the 12th c. BC (see Jung 2012a: 112-113). However, the prevalence of the deep bowl as the ultimate open shape within the repertoire of Cypriot tablewares in the 12th c. BC is indicative of the forceful processes towards standardisation and mass production attained by the Cypriot pottery workshops.

Despite these great leaps towards an 'industrialised' pottery production, the Cypriot finewares of the 12th c. BC remained experimental, characterised by ceramic fluidity and regional variations, constituting an amalgamation of shapes, decorative patterns and techniques from the Aegean, the local Cypriot repertoire and even the neighbouring Levantine coast (Kling 1989b; 2000: 282; Sherratt 1991: 191; Iacovou 2013b: 608-610; Georgiou forthcoming). The process culminates only in the following century, with the establishment of a largely uniform production of finewares at an island-wide scale, despite the operation of regional workshops (see Georgiadou 2014). The ceramic ware that characterises the 11th c. BC, known as Proto-White Painted Ware, profoundly demonstrates the mastering of the wheel-throwing technique and comprises the first truly standardised fineware pottery class on the island (Iacovou 1988: 84-85; 1991; Steel 2010: 112).

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10. Local and imported pottery in the Southern Levant during the 13th-12th c. BC

Exploring through the 'crisis' years

David Ben-Shlomo

1. The Late Bronze Age

1.1. The Late Bronze Age local pottery

The Late Bronze Age (hereafter LBA) period (16th-13th c. BC) has been seen as an age of increasing international commerce and exchange in the Eastern Mediterranean (*e.g.* Cline 1994; Sherratt 1999). During this period the Mycenaean culture in Greece, the Hittite Empire in Anatolia, and the New Kingdom in Egypt were dominant. Generally, the Southern Levant or ancient Canaan – the area of the modern states of Israel, Lebanon, and Jordan – is a rather marginal region within this scene, with no strong local political powers. Thus, the region may have been less susceptible to the dramatic political crisis besetting its western neighbours **(Fig. 10.1)**.

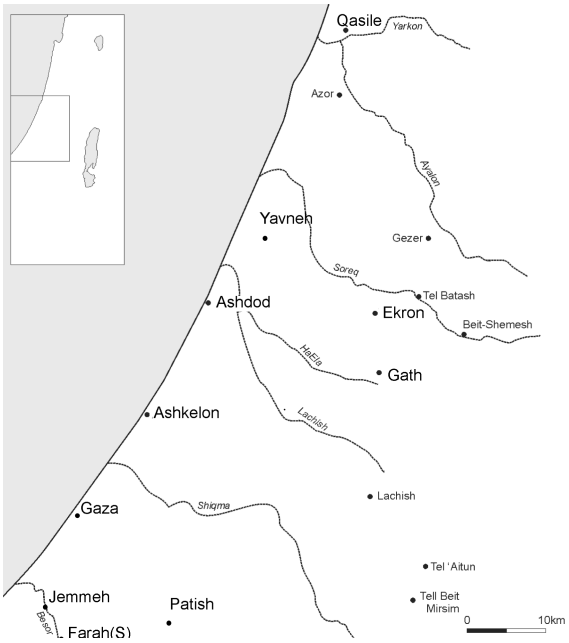

FIG. 10.1 MAP OF THE SOUTHERN LEVANT WITH SITES MENTIONED IN THE TEXT (AFTER BEN-SHLOMO 2010: FIG. 2.1)

Locally produced pottery from the main Canaanite sites (such as Azor, Megiddo, Batash, Lachish, Ashdod, Tel Miqne-Ekron, *etc*.) is characterised by a continuity in the main pottery shapes from the end of the Middle Bronze Age (hereafter MBA) (18th-17th c. BC) down to the 12th c. BC (*e.g.* Panitz-Cohen 2006: 121-132). There is a relatively *gradual* change in the profiles of various shapes, such as bowls, kraters, jars, jugs, and juglets. Cooking pot rims change somewhat more distinctively during this period (*e.g.* Panitz-Cohen 2006). Despite the overall continuity of this assemblage, certain new pottery forms appear in the LBA, particularly chalices and flasks. In terms of surface treatments, the use of painted decoration, mostly in red paint on a white slip, increases during the LBA (Choi 2014). Moreover, technologically speaking, it has been suggested that the LBA local pottery is less standardised than that of the Middle Bronze Age. Indeed, during the MBA there seems to be a more regular

use of the potter's wheel, and possibly of higher firing temperatures as well (Franken & London 1995; Franken 2005; Panitz-Cohen 2006: 129). However, this assumption has not been systematically examined throughout the different assemblages of the region. It may reflect certain sub-regional practices and not a more general pattern.

At the Shephelah site of Tel Batash, a systematic study of the Bronze and Iron Age pottery has been achieved. Regarding the assemblages of the MBA-LBA transition (mid-16th c. BC), belonging to Stratum XI and X, Nava Panitz-Cohen has observed that this transition is "marked by a major transformation in the character of the settlement as well as a moderate change in the pottery industry, both, most likely, reflecting significant political and economic flux" (Panitz-Cohen 2006: 125). Generally speaking, the Stratum X pottery is not inferior in quality to its predecessor in Stratum XI. Conversely, at the transition between Stratum IX and VIII, dated to the mid-15th c. BC, Panitz-Cohen recognises a "clear continuity from Stratum IX, accompanied by a certain decline in the quality of pottery production: though the shapes remain basically the same, the level of finishing is somewhat less careful" (Panitz-Cohen 2006: 129). There is a lower proportion of pottery reaching 'metallic quality', presumably indicative of high firing temperatures. Petrographic analysis by Anat Cohen-Weinberger has shown, however, a relative continuity in the choice of raw material during this period of the early LBA, with the use of the Taqiye marl type clay, Group A1-A2, a calcareous soil, rich in chalk and foraminifers, found in the vicinity of Tel Batash (Cohen-Weinberger 2006: 18, Table 7).

1.2. The Late Bronze Age imported pottery

The LBA period is characterised by relatively large quantities of Cypriot and Mycenaean imports appearing throughout the Southern Levant at almost every excavated site, especially during the 15th, 14th, and 13th c. BC. Minoan and Anatolian imports appear in small quantities. It should be noted that already from the end on the MBA a distinct rise in the importation of Cypriot pottery to the Levant could be identified, mainly at coastal sites (*e.g.* Wolff & Bergoffen 2012).

The main LBA Cypriot wares found in the Levant are White Slip II and Base Ring II, as well as some White Shaved, and Bucchero Wares (*e.g.* Bergoffen 1989; 1991; 2005). The forms are highly varied, with closed vessels such as jugs, alongside open ones such as bowls, and even zoomorphic vessels. The appearance of open forms indicates that the pottery was imported as a product in and of itself and not only to carry other goods. However, as of yet, no comprehensive technological assessment or provenance study on these Cypriot pottery groups have been published.

Pottery vessels of various forms manufactured in the Mycenaean centres on the Greek mainland during the 15th-13th c. BC were found in substantial quantities throughout the Eastern Mediterranean, including the Southern Levant (*e.g.* Hankey 1993; Leonard 1994; Wijngaarden 2002; Zuckerman *et alii* 2010). The most common imported forms are closed ones such as stirrup jars, amphoroid kraters, and pyxides, though open forms such as kraters and bowls also appear. The existence of specialised ports of trade (*emporia*) along the Levantine coast, serving as preferred destinations for these items and as central gateway distribution sites within a 'down the line' trade system, has been put forward as evidenced by the geographic distribution of some Mycenaean types in the Canaanite sites (Yon *et alii* 2000; Artzy 2005; Bell 2005; Zuckerman *et alii* 2010). Due to the fineness of the Mycenaean fabrics, technological study on this group of imports relies on chemical methods. Neutron Activation Analysis (henceforth NAA) has indicated the dominance of a few suppliers located in the Argolid. According to the chemical profile these were associated with the 'Mycenae-Berbati Group' (MYBE). Indeed, the results of provenance studies undertaken for LH IIIA2-IIIB1 Mycenaean pottery (14th-early 13th c. BC) from Southern Levantine contexts, including a recent synthetic study directed by the late Sharon Zuckerman (*et alii* 2010), indicate that a single chemical profile characterises the greater part of these imports in the Levant, at least until the 13th c. BC. This profile has been assigned to a workshop or possibly a group of workshops near Mycenae, such as Berbati, producing the MYBE group. Imported vessels from other workshops in the Argolid, such as the Tiryns/Asine workshop, or other regions in Greece, are rare. The coastal site of Tell Abu Hawam near modern Haifa yielded the largest quantity and variability of imports. This suggests that Tell Abu Hawam served as a primary Mycenaean 'port of trade' and an 'emporium', in particular to the region of Northern Israel, while coastal sites like Tel Akko and Tel Nami probably constituted smaller distribution centres. Moreover, the chemical analysis of the Mycenaean pottery does not provide evidence for direct trade relations between major

Canaanite inland sites such as Azor, or Megiddo and Dan (Northern Israel), and specific Mycenaean centres, as the source of most Mycenaean pottery found at Canaanite inland sites is the Argolid, the NAA MYBE group, like for the coastal sites. Land trading routes linked the coastal entry points and the inland consumption centres, as was the case for Tell Abu Hawam and the Jezreel Valley sites, as well as the northern port of Akko and the Upper Galilee.

As regards imports from Crete, which are few, a similar phenomenon is recognised for the transport of stirrup jars. These large coarse vessels arriving in the Levant during the late 15th to early 13th c. BC were probably used to transport olive oil from Crete. They are suitable for petrographic analysis (Ben-Shlomo *et alii* 2011). All known examples come from coastal sites and most were found at Tell Abu Hawam. The majority of these containers found in the Levant were produced in South-central Crete or the Kommos area (Ben-Shlomo *et alii* 2011).

The Cypriot and Mycenaean pottery are macroscopically very different to local Canaanite pottery not only in terms of fabrics, but also surface treatments, as the imported pots are usually decorated. During the same period, a limited local production of imitations of the imported vessels also thrived. It should be noted that archaeological evidence does not generally show any restriction of the imported wares, or their imitations, to wealthy or elite contexts in the Levant (*e.g*. Steel 1998; 2002; Sherratt 1999).

During the latter part of the 13th and the early 12th c. BC, a much more diverse array of origins can be traced for the Mycenaean pottery, represented by a variety of chemical groups – such as Groups TIR, Ul 15, and CypI (see Zuckerman *et alii* 2010: 415). This indicates that much of the Mycenaean-style pottery was imported from Cyprus, as well as from Asia Minor and the Aegean Islands (Mommsen *et alii* 2005; Zuckerman *et alii* 2010). This shift could be attributed to the already changing historical and cultural circumstances in the Eastern Mediterranean during this period, with a decline in the importance of the mainland Mycenaean centres, especially in regard to contacts with the Levant. These changes may have also anticipated the Cypriot influence on local pottery along the southern coast of the Levant during the 12th c. BC. A new study employing NAA on over 250 vessels mostly excavated in the Levant and Cyprus, also aided in showing that LH IIIC style vessels were produced in various centres in Cyprus and reached the Levant during the late 13th and early 12th c. BC (Mountjoy & Mommsen 2015).

2. The early Iron Age

At the beginning of the Iron Age, in the early 12th c. BC, a near complete cessation of Cypriot and Mycenaean imports is evident across all Levantine sites. In fact, the pottery horizon dated to this period is often characterised by a lack of imports rather than by substantial and specific changes in the local forms. It should be noted that while several large and important sites are destroyed in this transitional phase, such as Ugarit and Azor, other sites show certain continuity, such as Megiddo, Beth Shean, and Lachish. Egyptian dominance is assumed to have continued in several parts of the region well into the 12th c. BC. Furthermore, in the southern coastal plain, in particular at the five settlements of Ashdod, Ashkelon, Gaza, Ekron, and Gath, a new archaeological phenomenon appears with the emergence of Philistine material culture. This culture introduces new ceramic traditions that, as will be seen below, appear together with the local early Iron Age pottery traditions in this period.

Generally, the local or 'Canaanite' pottery of the 12th c. BC is typologically similar to that of the 13th c. BC (**Fig. 10.4**). Plain pottery, including rounded and carinated bowls, carinated kraters, chalices, cooking pots, storage jars, jugs, flasks, and lamps, among other types, are of similar forms in the late 13th and early 12th c. BC (*e.g*. Panitz-Cohen 2006: 134-138; Gadot 2009: 243-249). In addition, bi-conical kraters, as well as jugs and small jars decorated in the Canaanite style also seem to continue. This is evident in most regions of the Southern Levant (*e.g*. Choi 2014).

In other sites of the region, such as Deir el Balah, Tel Mor, Tel Haror, Aphek, and Beth Shean that were probably Egyptian strongholds or garrisons, locally made Egyptian pottery assemblages including some bowls, bottles, and jar types, were found alongside Canaanite pottery in both 13th and 12th c. BC contexts (Martin & Barako 2007; Martin 2009; Martin *et alii* 2009). Conversely, in the hill country – Judea, Samaria, and the Galilee – of Israel, to the north and east of the southern coastal plain, it was suggested that a new type of pithos, the collared-rim pithos, marks the beginning of the early Iron Age and relates to the Israelite culture (*e.g*. Albright

1935; Amiran 1969: pl. 77; Esse 1992). Recent research has shown, however, that this type was already in use before the 12th c. and is not restricted to the hills, although it is much more common there (Killebrew 2001).

Regarding the technological aspect, the picture is more complex. At Batash there is a distinct shift in the choice of raw materials between Stratum VI, representing the late 13th-early 12th c. BC, and Stratum V, representing mainly the 11th c. BC (Cohen-Weinberger 2006: table 7). The change concerns the replacement of calcareous Taqiye marl fabrics with loess-type fabrics. The use of loess type clays rises from 33 % to 90 % of the vessels sampled between the two phases. In addition to this, all vessels from Stratum V are wheel-made and hard-fired, sometimes reaching metallic quality. Therefore, they seem superior to those of the previous phase in terms of technology (Panitz-Cohen 2006: 134-137). However, there is an occupation gap between the strata, so that this shift does not exactly represent the 13th-12th c. BC transition period between the Bronze and Iron Age, but happened later, within the 11th c. BC. This change of raw material used for pottery at Batash may be linked to Philistine Bichrome pottery (see below), which is mostly made of the loess type fabrics at the site in Stratum V, reaching 34 % of the pottery assemblage.

2.1. Philistine pottery

A distinguished phenomenon of the Southern Levant in the early Iron Age is the appearance of decorated Philistine pottery, which is probably the most well-known and common element of Philistine material culture. The Philistine culture represents a new population from the Aegean and Cyprus who settled in the southern coastal plains of Israel ('Philistia'; *e.g.* Dothan 1982; Ben-Shlomo 2006; Yasur-Landau 2010). This pottery is also one of the most significant examples of the 'foreign' nature of this culture and its connections to the West. The Philistine pottery illustrates several chronological and typological stages that can be denoted as Philistine 1, 2, and 3 (Dothan *et alii* 2006). For the period of the 13th and 12th c. BC, the Philistine 1 and 2 wares are relevant and discussed in detail as a case study for pottery production during this period.

The earliest of these stages, ***Philistine 1 or Philistine Monochrome pottery*** is very rare outside the main Philistine sites. It is represented mostly by tablewares that appear in significant quantities in the earliest Iron I strata in the main Philistine cities. The common forms are bell-shaped bowls such as skyphoi or deep bowls, carinated bowls and bell-shaped kraters (**Fig. 10.2**) (*e.g.* Dothan & Zukerman 2004). A distinctive detail is the use of horizontal handles, not appearing in local Canaanite pottery. Closed forms include stirrup jars, strainer-spouted jugs, 'feeding bottles', and globular jugs; other forms appear rarely. Thus, the Philistine assemblage includes only selected pottery forms compared to the contemporary LH IIIC Early assemblages in the Aegean. Forms that are very common in these Aegean assemblages, such as the spouted bowls, high handled cups, and kylikes, are rare in Philistia (*e.g.* Dothan & Zukerman 2004; Ben-Shlomo 2006: 23-43).

The painted decorative motifs, appearing in only one colour – red or brown – include mostly geometric designs, but also rare depictions of humans, birds, fish and plant motifs. There is a distinctive interest for the motifs that are related to the sea, such as fish, and 'tongues', spirals, and undulating patterns that may depict waves in the sea (Ben-Shlomo 2010: 160-162). Stylistically, the Philistine 1 assemblage illustrates strong similarities with the locally-produced Aegeanising pottery on LC IIIA Cyprus, especially at Enkomi; yet many parallels also exist with pottery from the Argolid, the Cyclades, the Dodecanese and even Crete (Dothan & Zukerman 2004; Mountjoy 1999; 2010). The Philistine Monochrome style may be perceived as another regional version of the general LH IIIC Early-Middle style, which is in itself on the Mainland an array of many local styles.

Beyond shapes and decorative motifs, this pottery often shows strong resemblances to Mycenaean pottery in terms of fabric appearance and finishing qualities. For example, some vessels have a distinctive light-brown clay colour and a well-executed brown thin slip or a 'self-wash' (Ben-Shlomo 2006: 23-24). In certain cases, although not always, the vessels show a different choice of raw materials and are made of finer clay (Ben-Shlomo 2006: 171-173). These technical aspects are not common in local Canaanite pottery. The pottery may have been also fired in a more oxidising environment than local wares. In most examples, however, the vessels are made from similar raw materials and show a similar clay treatment in terms of levigation and tempering as the contemporary Canaanite tradition pottery (Ben-Shlomo 2006: 205-207).

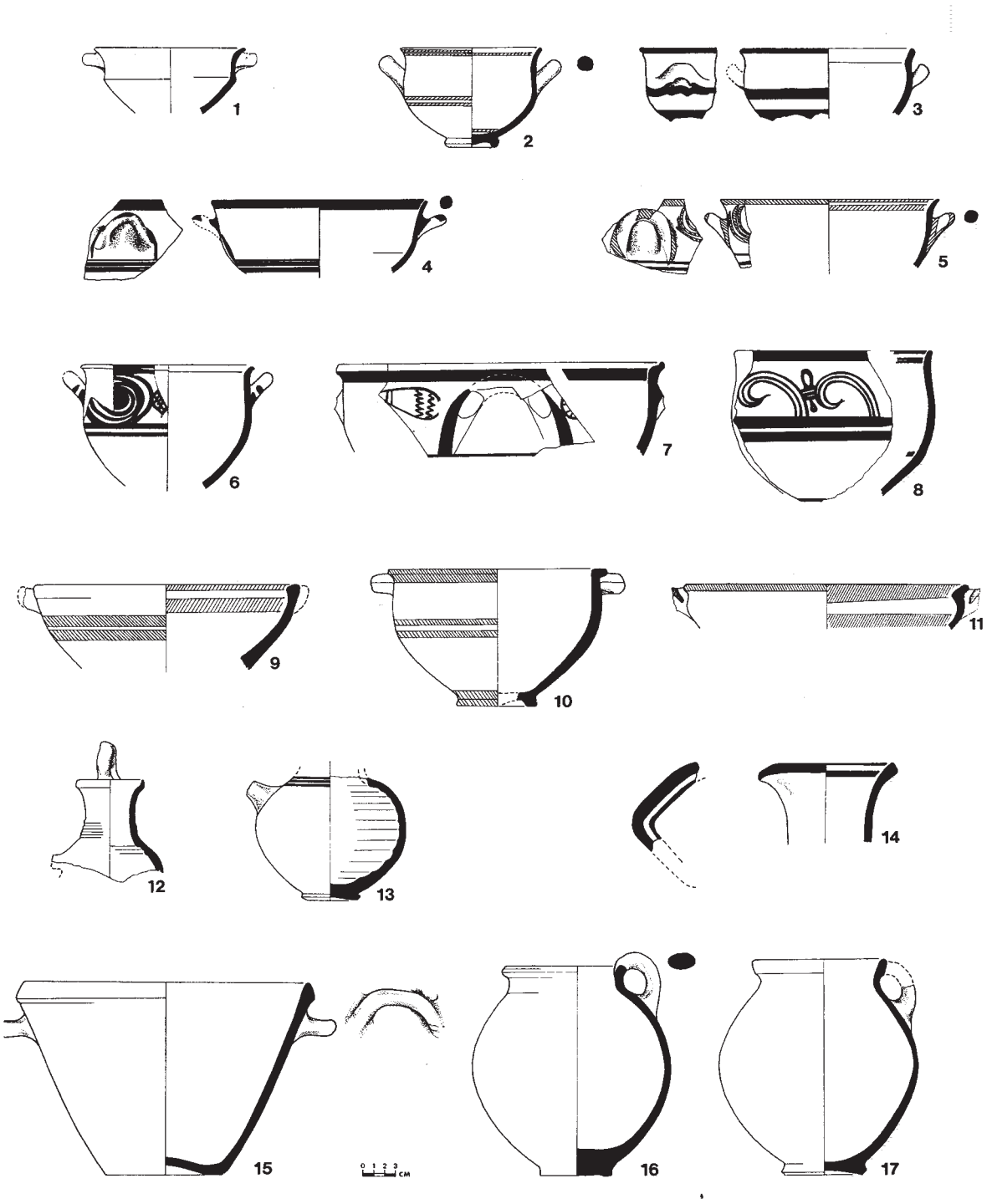

Fig. 10.2 Main types of Philistine 1 pottery from Tel Ashdod and Tel Miqne-Ekron (courtesy of T. Dothan; ©Israel Exploration Society)

Chemical and petrographic analysis has shown that virtually all this pottery was locally made in the Levant, with production most likely focussed in the different Philistine city sites (Perlman *et alii* 1971; Gunneweg *et alii* 1986; Ben-Shlomo 2006). Moreover, several pottery kilns are associated with Philistine pottery, as at Ekron (Killebrew 1998) and Tell Jemmeh (**Fig. 10.3**) (Ben-Shlomo & Van Beek 2014). The well-preserved kiln at Tell Jemmeh shows a highly sophisticated structure and technology with a series of inner brick arches and outer flues. It is worth noting that the assumption that the Philistine pottery constitutes a continuation of the Mycenaean pottery imitations of the Late Bronze Age based on the halt in imports from this region (Sherratt 1998) is not convincing since imports stopped everywhere in the Levant while the Philistine 1 pottery is limited to Philistia.

Fig. 10.3 The pottery kiln from Tell Jemmeh (Victor Krantz; ©Smithsonian Institution)

As this pottery was locally made, it cannot constitute evidence of trade connections with the Aegean region or Cyprus, but instead indicates that people from these regions were moving to the Levant and producing pottery. It is likely that this population also included specialised potters, who may have produced the Philistine wares. However, it cannot be ruled out that this pottery, or at least some of it, was produced by traditional local Canaanite potters. These potters may have started to produce pottery in the Philistine style in response to regional demands emerging from new immigrant communities within Philistia.

The ***Philistine 2 or Philistine Bichrome pottery*** appearing in the late 12th and 11th c. BC illustrates a number

of changes in relation to the Philistine 1 pottery. The relative quantities of this ware increase and constitute up to 50 % of the pottery in the main Philistine city sites (*e.g.* Dothan & Ben-Shlomo 2005: 132). The appearance of this pottery expands to other sites in Philistia and its borders, such as Tel Qasile, Tel Batash, Beth Shemesh, Gezer, Azor, Tell Jemmeh, and Qubur Walaydeh, as well as to Levantine sites outside Philistia such as Megiddo, Dan, and Dor to the north (*e.g.* Dothan 1982; Ben-Shlomo 2006). According to provenance studies, outside Philistia, this ware was both locally produced and imported (*e.g.* Gilboa *et alii* 2006; Martin 2017). This ware combines the basic Aegean-style shapes, although in less variety than in Philistine 1, and decorative motifs with Canaanite, Cypriot, and Egyptian influences. Common shapes are again the bell-shaped bowls (skyphoi) and kraters, strainer-spouted jugs, as well as other types of bowls and closed vessels. The decoration technique changes and most vessels are decorated with a chalky thick white slip underlying red and black painted motifs. This technique is primarily considered a Levantine decoration tradition, as attested in the previous periods of the Middle and Late Bronze Ages (*e.g.* Panitz-Cohen 2006: 102-108; Choi 2014). The clay choice and treatment, as well as the forming and finishing of the vessels, are also similar in most cases to those related to the contemporary Canaanite-style vessels from the same sites. This is strong evidence for suggesting that local Canaanite potters were also producing this pottery. For example, according to a petrographic study of Philistine pottery from Northern Israel, two-thirds of the vessels were imported from Philistia while a third was produced elsewhere in the country (Martin 2017); thus, this latter pottery was possibly made by Canaanite potters. The repertoire of decorative motifs is rich and diversified and includes many geometric and linear designs as well as birds, fish, and occasionally depictions of humans (Dothan 1982; Ben-Shlomo 2010).

In addition to the decorated Philistine pottery, both Philistine 1 and 2, a new form of cooking vessels appears in Philistia during this period, the cooking jug **(Fig. 10.2:16-17)**. Similar vessels were also found in 12th c. BC contexts in the Aegean and Cyprus (Killebrew 1999; Yasur-Landau 2005; Ben-Shlomo *et alii* 2008). This vessel type was probably used for slow cooking, or heating liquids or stews. It appears together with the local-type open cooking pot, and may have partially replaced the demand for local forms in the initial occupation phase of the Philistine sites (*Philistine 1* stage). While traditional cooking pots in the Levant are made of a clay tempered with crushed calcareous inclusions, cooking jugs were usually made out of a naturally or manually quartz-tempered clay or out of non-tempered clay (Ben-Shlomo *et alii* 2008). Cooking jugs were probably not used in strong open fires and thus not exposed to very sudden heat shocks; they were probably placed on hearths, common across Philistine sites. Alongside this new cooking vessel, the Philistine culture is characterised by new dietary traditions including for example a rise in the consumption of pork (*e.g.* Ben-Shlomo *et alii* 2008 for references and discussion).

2.2. Canaanite style pottery

As noted, alongside the new Philistine pottery the traditional local Canaanite pottery forms typical of the 13th c. BC continue to appear, comprising at least 50 % of the ceramic assemblages, even in the main Philistine sites (*e.g.* Dothan & Ben-Shlomo 2005: 70, 120; Dothan *et alii* 2006). These include all storage jar types, certain bowl and krater types, as well as chalices, juglets, flasks, and some jug types. The common shapes, as exemplified from an assemblage from Tel Miqne-Ekron Field III (**Fig. 10.4**), are simple rounded and carinated bowls (**Fig. 10.4:1-2**), kraters (**Fig. 10.4:3**), chalices, pithoi (**Fig. 10.4:4**), cooking pots (**Fig. 10.4:5**), jars (**Fig. 10.4:6**), jugs, and flasks (**Fig. 10.4:8**). It should be noted that decorated kraters, jars, jugs, and flasks prominent in the Late Bronze Age also continue during the 12th c. BC (**Fig. 10.4:7-8**) and appear alongside the Philistine 1 decorated pottery. As mentioned above, the morphology, paste recipes, shaping methods, and surface treatments of this pottery continue the traditions of the Canaanite pottery produced during the 13th c. BC.

Imported pottery is very rare in the Southern Levant during the 12th c. BC and was identified only in small quantities at a few sites, such as Beth Shean (D'Agata *et alii* 2005). Imports appear again from the late 11th c. BC onwards, including Cypriot and Phoenician wares, mostly found on the coast and in the northern part of Israel (Maeir *et alii* 2009).

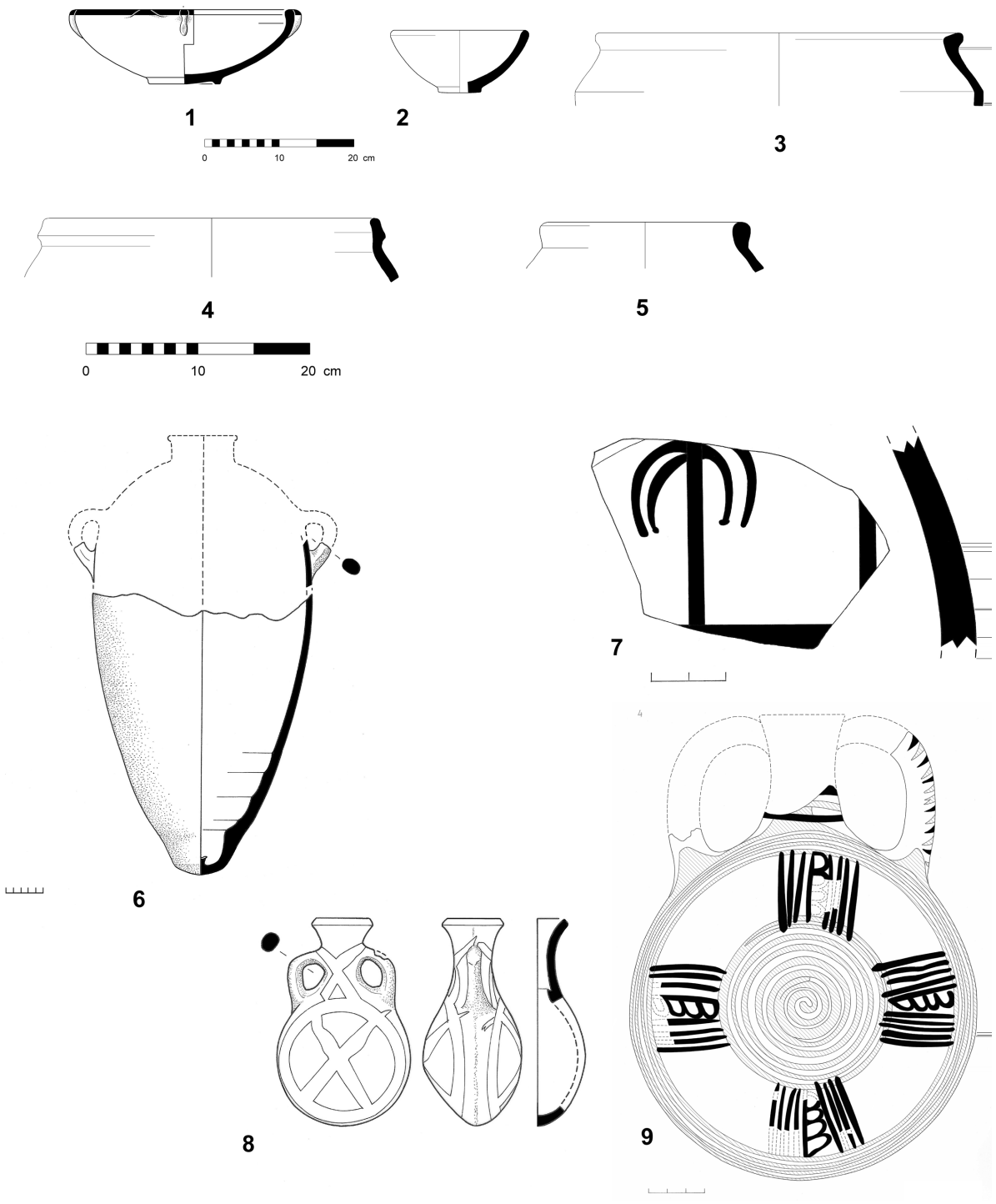

Fig. 10.4 Local Canaanite pottery types from Tell Miqne-Ekron Field III, Strata VII-VI (12th-early 11th c. BC) (S. Gitin; ©Tel Miqne Excavation)

3. Technological studies of pottery: Tell es-Safi as a case study

A technological study of Bronze and Iron Age pottery from Tell es-Safi/Gath, one of the main Philistine sites, is here discussed as another case study (Ben-Shlomo *et alii* 2009) **(Fig. 10.5)**. The pottery has been macroscopically examined in terms of the forming techniques, as well as microscopically studied by thin section petrography, Instrumental Neutron Activation Analysis (hereafter INAA), and Inductively Coupled Plasma Analysis (ICP-MS & ICP-AES). This study mainly deals with locally-produced types of pottery, identified as such by the naked eye. The samples derive from well-stratified and well-defined contexts and belong to clearly diagnostic pottery types from the Early Bronze (EB) Age III, Middle Bronze (MB) Age I-II, Late Bronze (LB) Age II and Iron Age (Iron I-II), up to the end of the 8th c. BC. It should be noted, however, that no pottery kilns or workshops have been found at the site yet.

It seems that the forming techniques used by the Bronze and Iron Age potters at Tell es-Safi/Gath did not change over time, despite the possible arrival of new cultures and ethnic groups in the region, such as the Philistines. Forming techniques consist of a rough-out built through coiling, mostly with a series of coils placed one on top of the other and mended, although there is evidence for the use of a single coil stretched diagonally (**Fig. 10.5:9**) (Ben-Shlomo *et alii* 2009: 2264, fig. 4). The vessels were then smoothed and finished on a *tournette*; the degree of finishing varies between periods, with the potters of the MB IIB and Iron Age IIA showing more care in finishing (Ben-Shlomo *et alii* 2009: 2265, fig. 5).

Most of the fabric analysis was based on petrography (Ben-Shlomo *et alii* 2009: 2267-2272). Three main petrographic groups were discerned: Group 1 representing a brown and grumusol clay type, which is not calcareous and is rich in quartz, Group 2 representing loess type clay, a calcareous clay with quartz, and Group 3 representing calcareous rendzina type clay (**Fig. 10.6**). All three clay types can be found in the vicinity of the site or with a day's walking distance. The analysis of this pottery, spanning the EB III through the Iron II, indicates a diachronic trend of changes in terms of the selection of raw materials and tempering (**Fig. 10.6**), parallel to more conservative, unchanged forming techniques. During the EB III, Group 3 clay is the most popular group, with Group 2 somewhat less common, and Group 1 not in use. During the 2nd millennium BC (the MB IIB, LB II, and Iron I), the use of Group 3 decreases, while Group 2 becomes the most popular clay; Group 1 clay gradually becomes more common in the 2nd millennium BC onwards (**Fig. 10.6**). During the early 1st millennium BC (the Iron IIA) there is a shift towards the use of Group 1 clay, while Group 3 almost completely disappears. This may also coincide with a rise in the firing temperatures used in the production of pottery, since calcareous clays, such as Group 3, may be less suitable for higher firing temperatures.

While tempering shifts from grog to calcareous inclusions to quartz, the latter most probably present naturally, it seems that calcareous tempering is more strongly related to vessel function, particularly to cooking vessels, rather than to diachronic changes. If a breakdown of functional groups is examined (**Fig. 10.7**) it seems that for the production of cooking vessels, and possibly certain storage vessels as well, there was a somewhat different preference of raw materials, with a dominance of Group 2. It should be noted that while the addition of crushed calcite to cooking vessels is probably related to their function, improving their thermal shock resistance (Shoval *et alii* 1993: 272-273), this function may not have influenced the selection of the clay itself. The other functional groups exhibit a distribution between the clay groups which is similar to the norm of the entire sample (**Fig. 10.7**). There also does not seem to be a preference for a specific clay group for specific vessel types during the various periods, and both decorated and undecorated pottery vessels were made of the same clays.

If the cultural affinity of the pottery is examined, we can determine that during the Iron Age I, in most cases, Canaanite and Philistine pottery were made equally of Group 1 and Group 2 clays, while during the Iron IIA there is a rise of Group 1 clay in the Late Philistine Decorated Pottery, consistent with the rest of the Iron Age IIA sample that represented local traditions. It should be noted, however, that the Group 3 calcareous clay was used for fine Philistine 1 pottery, probably because of its whitish colour (Ben-Shlomo *et alii* 2009: 2271), otherwise, this paste is rarely used in the Iron Age.

FIG. 10.5 SHAPING TECHNIQUES OF BRONZE AND IRON AGE POTTERY FROM TELL ES-SAFI: 1) COILS ON AN EB III PLATTER; 2) FAINT COILS ON AN MB IIB BOWL; 3) DISTINCT COILS ON AN LB II BICONICAL KRATER; 4) COILS AND SCRAPING ON AN LB II LAMP; 5) COILS ON AN IRON I HEMISPHERICAL BOWL; 6) DISTINCT COILS ON AN IRON I PHILISTINE 'FEEDING BOTTLE' JUG; 7) PARALLELS COILS ON AN IRON IIA JUG; 8) PARALLEL COILS ON AN IRON IIA STAND; 9) SINGLE COIL ON AN IRON IIA CHALICE (BY THE AUTHOR)

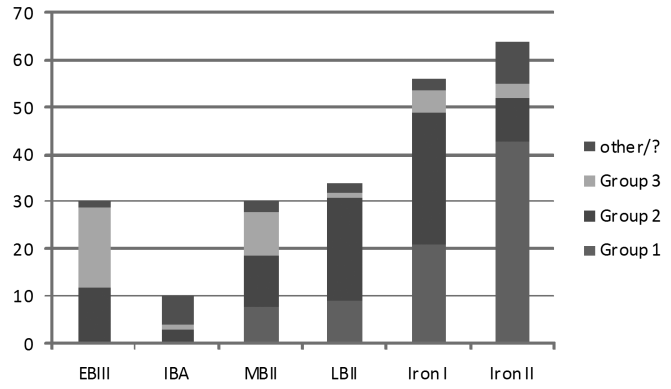

Fig. 10.6 Petrographic groups of the EB III-Iron II pottery from Tell es-Safi (by the author)

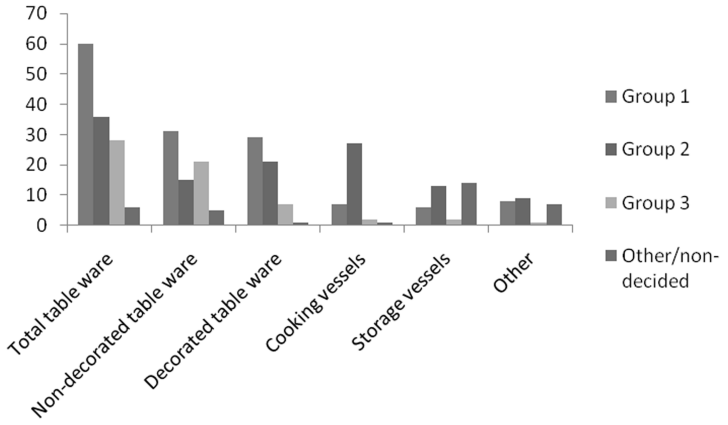

Fig. 10.7 Breakdown of Tell es-Safi functional classes of pottery according to petrographic groups (by the author)

Somewhat similar trends can be seen at other sites in the Levant. As noted above, the petrographic study of MB II-Iron I pottery from Tel Batash, a site only a few kilometres away from Tell es-Safi/Gath, indicates a certain change in the choice of raw materials between the MB-LB and the Iron Age I, coinciding with an increase in firing temperatures (see above, also Cohen-Weinberger 2006: 2021; Panitz-Cohen 2006: 134). While there is a shift from the Taqiye type clay to loess clay during the Iron Age IIA (1000-800 BC), and especially in the Iron Age IIB-C around 800-600 BC, there is another change, when non-calcareous, quartz-rich terra rossa and hamra soil clays become more popular (Cohen-Weinberger 2006: 20, see above). As at Tell es-Safi, the Iron Age witnesses a decrease in the use of highly calcareous clays.

A study by London and Shuster (2009) utilised both INAA (99 samples) and petrography (230 samples) on pottery assemblages from Hesban, Jordan. The general results of this study of pottery from the EB, MB, LB, Iron Age, Persian, Hellenistic, Byzantine and Islamic periods, indicate that during the Bronze Age limestone is the main temper, while during the Iron Age grog temper was most commonly used. Cooking pots were grouped separately by INAA, possibly indicating different potters or clay recipes; these vessels had calcite, grog, and quartz inclusions. The post-Iron Age pottery indicates a shift to quartz-rich and highly fired pottery, probably wheel-thrown. This picture is somewhat different from Tell es-Safi, where grog temper is not used after the EB, yet the general trend of shifting to non-calcareous clays during the 1st millennium BC is still present. London and Shuster (2009) suggest that during the Iron I, grog temper was used to better absorb the slip and paint applied on the vessels. Note that, generally, calcareous clay cannot be fired at high temperatures without misfiring or defects.

Thus, the choice of clay and temper was possibly a result of a desire to produce painted pottery. Later, when quartz-rich pottery is more highly fired during the Iron II the percentage of decorated pottery decreases.

Chemical and petrographic analysis was also conducted on 82 EB IV (also termed IB) to Iron IIA vessels from Tell Mishrifeh/Qatna, Syria (Maritan *et alii* 2005), and included analysis of raw clay taken from a pottery workshop context. This study seems to indicate similar results: there is a rise in the use of naturally quartz-rich, non-calcareous clays as well as a rise in the firing temperature of the pottery during the LB and Iron Age in comparison to the EB and MB.

These studies show how the development of pottery production and the changes in clay selection and treatment can be site-specific, but if we compare the general trends, there seem to be certain similarities as well. Indeed, we observe a more intensive use of calcareous clays in the late third and first half of the 2nd millennium BC (EB III-MB-LB I), a gradual change to less calcareous clays during the LB II and Iron I, and another shift to non-calcareous, quartz-rich clays during the Iron II.

4. Conclusions

While examining the patterns of change between the 13th and 12th c. BC pottery of the Southern Levant we have seen that the locally made pottery and the imported pottery behave differently. The imported pottery and its imitations disappear during the 12th c. BC, while the locally made pottery shows continuity in its morphology and in certain aspects of production techniques.

The work of the potter seems to have remained quite the same, indicating a very traditional potter's technique. Based on macroscopic examination, the forming and finishing techniques do not change considerably throughout the periods, *i.e.* most vessels are coil-built and finished by wheel-smoothing. Changes in forms and techniques are very gradual and do not coincide with the 13th-12th c. BC transition. Even the locally-made Philistine pottery that introduces new forms and decoration to the local tradition does not show any significant changes in production techniques. Therefore, the 13th-12th c. BC or LB-Iron Age transition, commonly understood as the 'troubled period', shows a minimal impact on the pottery technology at the sites studied in the Southern Levant. Certain evidence indicates, however, that choices of raw materials for the local pottery production in the Levant changed over time, as did the pyro-technological abilities – particularly the use of higher firing temperatures – but the change does *not* coincide with the 13th-12th c. BC transition, instead it is a gradual one.

As noted, the distribution and quantity of imported pottery, mostly from the Aegean and Cyprus, to the Levant changed considerably between the 13th and 12th c. BC, with imports almost disappearing during the later period. This cannot be seen as a local technology-related change but should be seen as a phenomenon related to events outside the Levant. In particular, the lack of imports during the 12th and 11th c. BC should be linked to the breakdown of the maritime trade system in the Eastern Mediterranean. This breakdown came about either due to a lack of supply related to the fall of Mycenaean centres, or a lack of demand related to the fall of Canaanite centres, such as Ugarit, or both.

The evidence for a distinct political crisis at an advanced stage of the 13th c. BC in the entire area of the Levant is still ambiguous, and a crisis, if one occurred, was probably more localised. Evidence for an economic or climatic crisis in this period is also unclear. Moreover, during the Late Bronze Age, there were no strong local political powers within the Levant as were the Mycenaeans in Greece, the Hittites in Anatolia or the 19th dynasty in Egypt. Therefore, in order to evaluate the influence of an actual crisis on pottery technology and style, we may want to mention other possible periods of crisis in the history of the Levant.

For example, a political and economic crisis was suggested during the Early Bronze Age III (*ca*. 2500-2200 BC), possibly causing an important decline. The Early Bronze Age is considered a period of increased urbanisation, and it is to this period that the first clear excavated remains of pottery kilns belong, such as those uncovered at Tel Beit Yerah and Tell Farah North (*e.g.* Greenberg 2002). During this period a specific ware with a metallic aspect showing a rather high degree of pottery technology also appears, especially in Northern Israel (Greenberg & Porat 1996). Towards the end of the Early Bronze Age, we also witness the appearance of the Khirbet Kerak ware. This ware probably brought to the region by immigrants from the Caucasus, also illustrates special technological characteristics, such as black lustrous slip created by reduced atmosphere firing (*e.g.* Sukenik 1947).

The Intermediate Bronze Age (2200-2000 BC), a relatively obscure period coming after the decline of the Early

Bronze Age urban stage, can also be seen as a period of crisis. During this period there seems to be a return to hand-made pottery with a partial abandonment of the potter's wheel. Moreover, this period also witnesses the appearance of the black burnished so-called 'Megiddo Ware' in Northern Israel (*e.g.* Amiran 1969: 81-82; Bechar 2015). The shapes made in this ware are influenced by Syrian traditions, yet this highly fired rather sophisticated pottery ware was probably locally made in the Hula Valley region.

Two more potentially troubled periods are the end of the Middle Bronze Age II, around 1750 BC, as well as the end of the Iron Age II, with the Babylonian conquest of the early 6th c. BC. Both these periods show, at least in part, a decline in urbanisation coupled to fortification in major settlements. However, without going into detail, in the cases of these two periods there is no attestation of any distinct breaks, innovations or otherwise distinct changes in pottery production modes and technologies.

While we have seen that several 'troubled' periods in the Levant are *not* characterised by distinct changes in the modes or techniques of pottery production, we must ask the question: can we only identify distinct diachronic changes in pottery technology across relatively short time periods? This possibly happens around the mid-1st millennium BC and is related to cooking ware production. It seems that towards the late Iron Age cooking pots become thinner-walled, are produced from a distinct quartz-tempered clay, and are possibly fired at a higher temperature (London & Shuster 2009). This production becomes dominant in the Hellenistic and Roman periods when we also have good evidence for specific regional production centres for cooking vessels (*e.g.* Adan-Bayewitz 1993; Shames 2015). Yet, this process is gradual, and cannot be linked to a specific troubled period.

In sum, we see that so far it has been difficult to define a clear positive or negative connection between periods of crisis or trouble and distinct changes in pottery production technology in the Levant. A simple reason for this lack of correlation between political and economic change and pottery production may be the very traditional character of this craft, throughout ages. In turn, the traditional and conservative nature of pottery production may be largely related to the low socio-economic status of the potters and to the low prices of pottery vessels in ancient times. The only vessels having somewhat higher value were cooking pots, which show a more specialised production. In some cases and periods these vessels were possibly imported from central or specialised production centres, rather than being produced in the settlement, as was the case with the majority of the pottery repertoire. In addition, since the region of the Southern Levant had no real centralised palace economies during the Bronze Age, and possibly during most of the Iron Age, the pottery production remained traditional in its methods and rather stable. Such production modes are potentially much less susceptible to change in the context of an economic or political crisis.

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11. Crisis years and pottery systems

An overview of the Italian Late Bronze Age

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1. Historical Background

In the relative chronology of Bronze Age Italy, the 13th c. BC corresponds to an early part of the Late Bronze Age (1350/1300-950 BC). This places it firmly in the Recent Bronze Age (RBA), which precedes the Final Bronze Age (FBA) and covers several decades, beginning somewhere in the late 14th c. BC and continuing well into the first half of the 12th c. BC, corresponding both to Late Helladic (LH) IIIB and part of LH IIIC in the Aegean (Jung 2006; Bettelli & Alberti 2014). Over such a long period, cultural development and change are easy to detect; so much so that two sub-phases can be recognised, in large part on the basis of typo-chronological ceramic sequences: RBA 1 and RBA 2, the latter running well into the 12th c. BC (Carancini & Peroni 1999: 17-18, pl. 29; Jung 2006: fig. 24; Cardarelli 2009: 450, n. 3; Damiani 2010: 375-421; Bettelli & Alberti 2014).

Our understanding of North Italian RBA cultural systems is based on a rich set of sources that contribute to the creation of an articulated archaeological framework of flourishing cultural growth across the region[1]. Population increase, colonisation of land, formation of complex settlement systems, and technological and economic investment in resource management in the sphere of subsistence (as well as for key crafts such as metallurgy) are all features relevant to Italian communities of this period, particularly in the Po Plain and in the Southern Alpine regions. However, neither large-scale political organisation nor autonomous political economy emerge during the RBA, not even for the control of interregional exchange. Common patterns in material culture and social practices constitute the core of this cultural *koinè*, which spread well beyond the Italian Peninsula. Substantial cultural expansion and technological development seem to have been fuelled by a common ideology that underlined collective identity, expressed through communal participation on social and economic activities, thus favouring interaction. This prompted a form of social inclusion that was based in social values such as the sharing of resources and technological knowledge. These mechanisms suit societies that invest in public facilities and collective labour, as suggested in the case of the Italian Peninsula by the widespread diffusion of ramparts, ditches, roads, and water management systems (Bernabò Brea *et alii* 1997; Cardarelli 2009). It is worth observing, however, that some of the data, in particular from recent in-depth analyses of funerary contexts, point to emerging competition and social contrast. These features suggest that the hypotheses of profound social asymmetries and even coercive strategies should not be ruled out. For example, emerging centralised political authority and definite socio-economic hierarchies may be predictable in the Veronese area and the coastal part of the Po Plain (where Frattesina will emerge) towards the end of the period, *i.e.* at the 13th-12th c. BC transition (Salzani 2005; Bietti Sestieri 2008; Salzani & Colonna 2010; Cardarelli 2014: 841-855; Cardarelli *et alii* 2015).

In Southern Italy, the general framework is slightly different, in part because our knowledge of the population dynamics and settlement patterns is based on a smaller amount of data, except for some specific areas such as the Plain of Sybaris, Tyrrhenian Calabria or some zones of Apulia (Peroni & Trucco 1994; Cinquepalmi & Radina 1998; Pacciarelli 2001; Pagliara *et alii* 2007; 2008; Radina & Recchia 2010; Cazzella *et alii* 2012)[2]. Among the most important phenomena in this area is the well-known diffusion of highly specialised practices in the realm of pottery production, a consequence of technological knowledge transfer from the Aegean (Jones & Vagnetti 1991; Bettelli & Levi 2003; Jones *et alii* 2005; Jones *et alii* 2014**)**. The large number of imported Aegean ceramics and the even more substantial amount of locally produced Italo-Aegean pottery seem to point to the mobilisation of skilled crafts and the control of social modes of production as well as of long-distance exchange, such that most

1 For a recent synthesis with references, see Fokkens & Harding 2013: chapter 38.
2 For recent syntheses with references, see Fokkens & Harding 2013: chapters 35-36; Knapp & van Dommelen 2014: chapter 5.

scholars postulate a high degree of complexity in the social organisation of several of these coastal communities (Peroni 1994; 1996: 288-292; Vanzetti 2000; Bietti Sestieri 2008; Cazzella 2010; Jones *et alii* 2014).

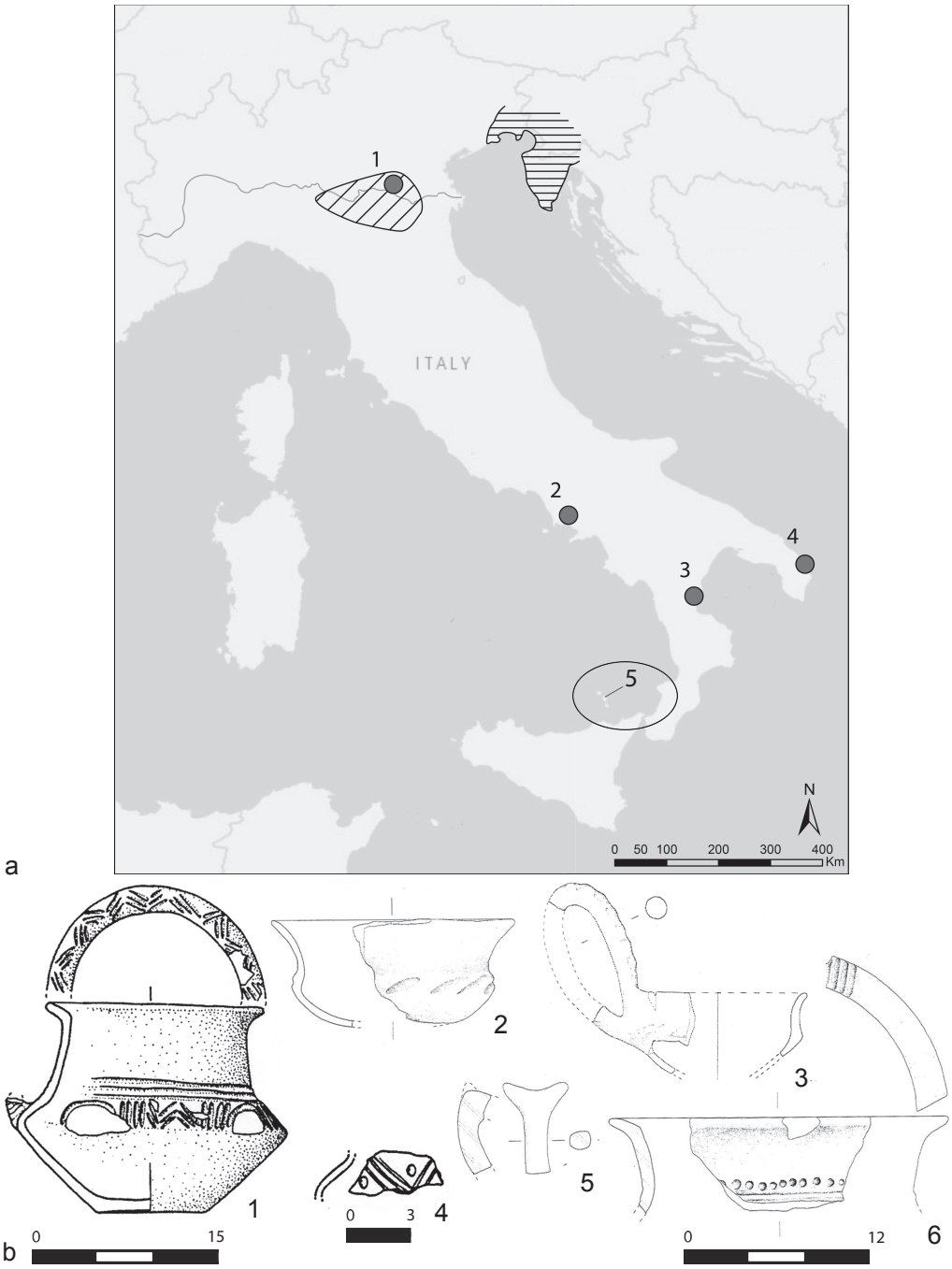

Fig. 11.1 a. Italy and the Central Mediterranean with the zones and sites mentioned in the text: Castellieri (horizontal strokes); Terramare (oblique strokes); Southern Tyrrhenian and Aeolian Islands (circle). 1. Fondo Paviani; 2. Afragola; 3. Broglio di Trebisacce; 4. Rocavecchia; 5. Lipari; b. Terramare and Terramare-like pottery from the Po Plain and peninsular Italy (1. Casinalbo, after Cardarelli 2014: fig. 217, T. 40; 2-3, 5-6. Rocavecchia, after Pagliara *et alii* 2007: fig. 12:IV.12; 2008: respectively figs 12:11; 13C:26; 11:9; 4. Gricignano, after Albore Livadie *et alii* 2004: fig. 3A:9)

As is well-known, the end of the RBA in several Italian regions is marked by discontinuity and cultural change, which in some areas – in particular that of the Terramare – may be called a *collapse*. Evidence for the abandonment of sites and a drastic population decrease has allowed scholars to date this phenomenon to around 1150 BC (Cardarelli 2009). The nature and details of the dramatic cultural changes and transformations of human landscapes during the RBA/FBA transition cannot be definitively explained, though several, at times contrasting, hypotheses have been put forward. The integration of the evidence for regional and local 'crises' affecting (perhaps not simultaneously) the various Italian cultural systems within a general reliable framework is particularly challenging.

1.1. Northern Italy

1.1.1. The Terramare

One of the most distinct characteristics of the decades between the late 13th and the early 12th c. BC in Italy is the crisis of the settlement system that developed in the Eastern Po Valley to the south of the Po River for approximately 500 years – from the 17th c. BC onwards (Bernabò Brea *et alii* 1997; Cardarelli 2009; 2015) **(Fig. 11.1a)**. After the progressive disappearance of the inhabitants of these settlements and the abandonment of the entire region at the beginning of the 12th c. BC, the area would not be re-settled until the first centuries of the 1st millennium BC. Rapid environmental depletion has been proposed as one of the principal causes of this crisis, provoked by the excessive and centuries-long exploitation of natural resources in order to meet the needs of a constantly growing population. This would have triggered an alimentary crisis further aggravated over the course of the 13th c. BC by the development of an arid climate phase (**Figs 11.2-11.4**).

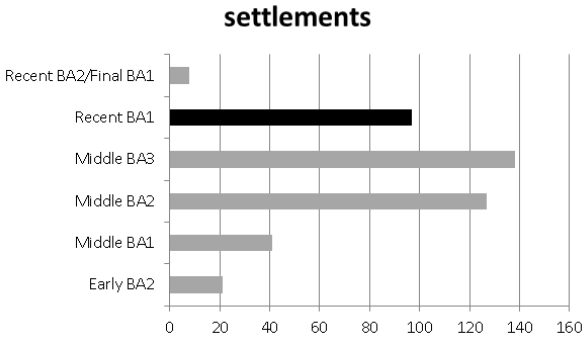

Fig. 11.2 Number of settlements in Terramare area according to different phases of the Bronze Age (based on Bettelli *et alii* 2004; Cardarelli 2009)

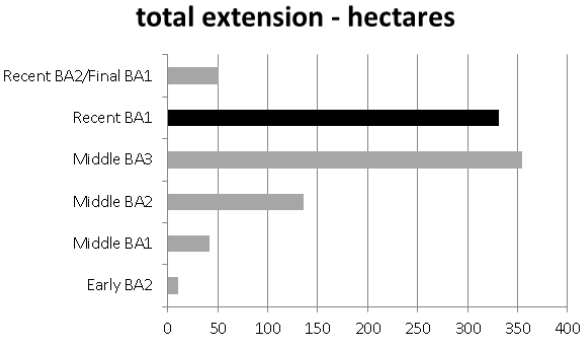

Fig. 11.3 Total extension of settlements in Terramare area according to different phases of the Bronze Age (based on Bettelli *et alii* 2004; Cardarelli 2009)

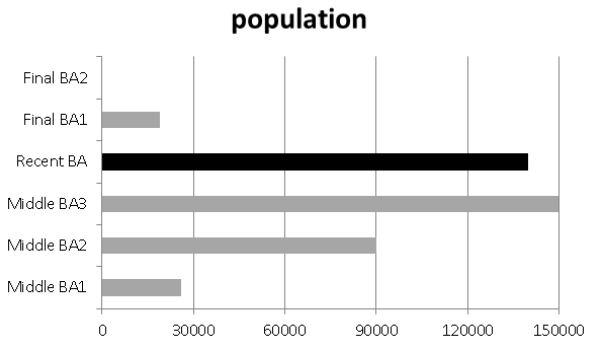

Fig. 11.4 Estimated population in Terramare area according to different phases of the Bronze Age (based on Bettelli *et alii* 2004; Cardarelli 2009)

Today we know that the collapse of the Terramare world in the late RBA was not absolute. Continuity in occupation has been attested north of the Po, in the area south of Verona and in the Polesine region (Balista & De Guio 1997; Cupitò & Leonardi 2015; De Guio *et alii* 2015). Recent studies have demonstrated how these communities managed to cope with the crisis, through the implementation of differentiated economic strategies and a more rational organisation of the usage of resources and raw materials, adapted in part to their strategic geographic position (Angelini *et alii* 2015; Bellintani *et alii* 2015; De Guio *et alii* 2015). The strongly hierarchical organisation of the settlements, with the existence of central places linked to local polities, *e.g.* Fondo Paviani, and the development of prestige crafts suggest a complex political organisation in these communities (Cupitò *et alii* 2015).

1.1.2. The Castellieri of North-Eastern Italy

The final centuries of the Bronze Age were also characterised by large-scale cultural discontinuities and gaps in settlement dynamics in the 'Castellieri' or hill-forts of NE Adriatic, including Friuli, Trieste Karst and Istria[3] **(Fig. 11.1a)**. Although very near to the Terramare, these regions maintained their local cultural identity during the Middle Bronze Age (MBA) and early RBA (Cassola Guida & Vitri 1997; Cassola Guida *et alii* 2004; see also Bietti Sestieri 2010: 60-63). In Friuli, this period is characterised not only by fortified settlements but also by a group of large villages located in the wet environment of the low plain and the coastal area and intensively involved in industrial activities such as metallurgy. These settlements seem to have represented a very important link between the Terramare and the Adriatic area on the one hand, and the transalpine and Danubian regions on the other.

While connected to the more impressive collapse of the Terramare, the nature and details of the cultural change in NE Italy are still unclear and various contrasting explanations have been put forward. A few geological surveys have drawn attention to the possibility of environmental stress of an opposite nature to what was apparently taking place in the Po Plain. Hydrological instability and changes in the shoreline with substantial marine ingression have been verified locally (see recently Vitri *et alii* 2013: 36, 42-43). This may have contributed to the abandonment of lowland sites[4]. The situation at these sites could be even more complicated, as recent data have prompted us to infer the occurrence of a 'double crisis' (Borgna & Corazza in press), namely two separate, albeit interconnected,

3 *Castelliere* and *gradina* are the Italian and Croatian names given to the numerous fortified sites characterising the landscape of Northern Adriatic in the Bronze and Iron Age. These sites were mainly located on hill-tops as true hill-forts, in particular in Istria and the Trieste Karst, where they were provided with dry-stone fortifications. In Friuli, where different building techniques were used, primarily consisting of earthworks, these settlements were also founded in the lowland area and looked very similar as the Terramare in plan and morphology (Cassola Guida & Corazza 2009; 2011; Simeoni & Corazza 2011, with further references; Vinci 2015; Borgna *et alii* in press (a) and (b); for the eastern part of the region or Karst, see Caput Adriae 1983; Karouškova Soper 1983; Čović 1983; Bandelli & Montagnari Kokelj 2005; see also, with references, Borgna & Corazza in press; for Istria, see Čović 1983; Buršić Matijašić 2007; Mihovilić 2013 with references).

4 For an analytical survey of sites occupied in the MBA and RBA in the low plain or sub-coastal area, see Tasca 2011; Borgna *et alii* in press (a); *cf*. Vitri *et alii* 2013 with references, esp. 38-42.

cultural discontinuities over a short span of time. Indeed, it seems possible to suggest that after the first part of RBA or Recent Bronze 1, *ca.* late 13th c. BC, a major discontinuity affected industrial lowland settlements as they seem to have been simultaneously abandoned, while a new pattern of dispersed occupation emerged[5]. A short time later, possibly towards the mid-12th c. BC, significant evidence – population decrease, reduction and nucleation of some long-lasting settlements, selection of defended sites, renewal of fortifications, deposition of metal hoards – together with several novelties in the material culture, in particular new bronze weapons and the appearance of cremation, may point to a further discontinuity, perceivable in particular in the upper plain and hilly area of Friuli[6].

1.1.3. Southern Italy

In the Tyrrhenian area **(Fig. 11.1a)**, between the end of MBA and the beginning of the RBA (late 14th and early 13th c. BC), the settlement pattern in Southern Calabria exhibits a radical transformation, leaving only a few of previous sites located on easily defended plateaux. In the Aeolian Islands the settlements of Salina, Panarea and Filicudi are abandoned, while in Lipari the village from the same period suffers complete destruction (Bernabò Brea & Cavalier 1980: 705-707; Peroni 1989: 260-261; 1996: 268; Bietti Sestieri 1997; Pacciarelli 2001: 71-85; Cavalier 2004; Pacciarelli & Varricchio 2004: 374-377, fig. 9) **(Fig. 11.5a-b)**. These events are indicative of a period of great instability and conflict that characterised the communities of the lower Tyrrhenian area, forcing them to move their cultural centre of gravity, and apparently their interests, from Sicily to the peninsula. This phenomenon is evidenced by the spread of a pottery assemblage of Subapennine style, radically different from the previous Calabrian Thapsos cultural *facies*, which had many affinities with Sicily, as we discuss below.

On the contrary, on the Ionian Arch and the Southern Adriatic coast, from the MBA to the early Iron Age, indigenous communities experienced a prolonged stability of settlement (D'Andria 1990; Peroni & Trucco 1994; Cinquepalmi & Radina 1998; Vanzetti 2000; Bettelli 2002: 19-42; Gorgoglione 2002; Pagliara 2003; 2005; Radina & Recchia 2010). This continuity is indicative of a firm control of the territory, as well as efficient strategies for the exploitation of environmental resources and the existence of a social organisation able to handle international relations at different levels of complexity.

2. Ceramic systems in Late Bronze Age Italy

In this extremely complex framework of environmental and cultural transformations, the analysis of pottery assemblages does not appear to be very helpful. The typical Bronze Age Italian production is the so-called *impasto*, which is similar to the Aegean Hand-made Burnished Ware (HBW) (*cf.* **Lis, this volume**). The main characteristics of this production group are (Levi 2010; Borgna & Levi 2015):

- raw materials: coarse; a mixture of non-calcareous clay, silt and intentionally added temper
- manufacturing technique: hand-made (with the use of moulds or coils)
- handles: sometimes very complex in shape
- surface treatments: smoothed or burnished
- decorations: mainly geometric, impressed or incised
- firing: performed in single chamber kilns.

There was a limited circulation of *impasto* pots, and those exported were medium to large closed vessels that were used as containers. The circulation of raw materials is rarely attested for this period and mainly included specific tempers or high-quality clays. The social organisation of the *impasto* production ranges from household to workshop level (van der Leeuw 1984; Levi *et alii* 2006; Levi 2010; Levi & Muntoni 2014).

5 *Cf.* Vitri *et alii* 2013: 36-38 for the presence of several small sites dating from late RBA or BR 2 onwards in the low plain of Friuli.

6 For evidence of an abrupt change in settlement dynamics with population displacement towards the inner regions and highland positions, see Vitri 1983. For population decrease and restriction of the occupied area in some main settlements, see Cassola Guida 1999: 53-54; 2006: 26-27. For metalwork and the deposition of hoards at the beginning of the FBA, see Borgna 2000-2001; 2004. For an updated general perspective, see Borgna *et alii* in press (a) and (b), with references.

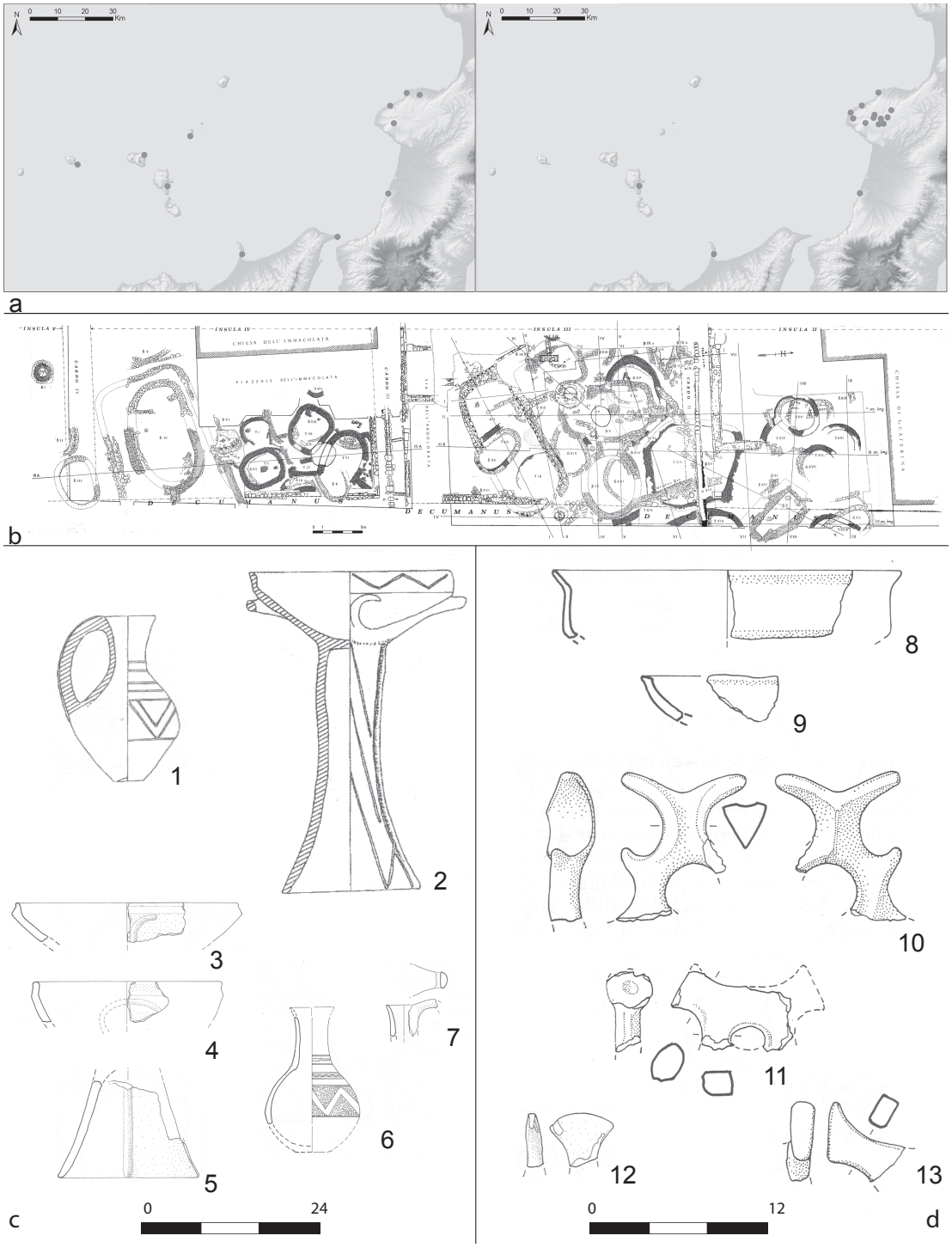

Fig. 11.5 a. The lower Tyrrhenian and the Aeolian Islands during MBA3, Thapsos-Milazzese period (left) and RBA, Ausonian I period (right) (A. Di Renzoni); b. The acropolis of Lipari during Milazzese (dark grey) and Ausonian I (light grey) periods (after Bernabò Brea & Cavalier 1980; drawing by A. Di Renzoni); c. Thapsos-Milazzese pottery from the Aeolian Islands and Tropea promontory (after Adamo *et alii* 1999: fig. 9: 179, 187; Pacciarelli 2001: fig. 13:3, 6-7, 10); d. Ausonian I pottery from the Tropea promontory (after Pacciarelli 2001: fig. 17:1-2, 4, 6, 9, 11)

2.1. Theoretical and methodological considerations

Taking into account the topic discussed in this volume, it should be noted that the ceramics of 13th c. BC Italy do not seem to be an ideal diagnostic indicator of crisis and traumatic change. The analytical study of ceramic assemblages from different areas of Italy between the late 13th and the first half of the 12th c. BC presents no clear indicators for the implementation of strategies and technological choices in response to crisis situations. However, there is evidence of major crises and discontinuity in various other parts of the material culture and in settlement patterns.

Despite these challenges we can try to distinguish a number of characteristics and trends in ceramic production during the 13th and the first half of the 12th c. BC that suggest different hypotheses regarding the *kind* of discontinuity attested. These primarily concern the ceramic style and, in part, the technology used. Some specific, extensively-studied cases (*e.g*. Coppa Nevigata and Broglio di Trebisacce) have shown that 13th c. BC *impasto* is characterised by an even greater standardisation of fabrics and manufacturing techniques when compared to previous periods (Levi *et alii* 1995; 1998; Levi 1999; Cannavò & Levi 2018):

- fabrics: preferential choice of selected tempers, with the increase of grog temper, and the decrease of calcite temper (with the result of a higher level of standardisation and functional efficiency)
- manufacturing techniques: spread of the coiling method in comparison to the moulding method
- shapes: increasing variety of functional shapes and decreasing number of specific types (with the result of a higher specialisation and standardisation)

3. Pottery traditions and cultural dynamics

3.1. The end of the Terramare and its aftermaths as shown by specific ceramic indicators

The archaeological characteristics of the final phase of the Terramare culture, datable to the RBA 2, are well-defined within a high number of contexts (Cardarelli 2009: 487; Bettelli *et alii* in press). In this phase, a series of ceramic types appears, predominantly featuring elaborate handles and grooved or ribbed decorations, which together present an easily recognisable style (Cardarelli 2009: figs 9-14) **(Fig. 11.1b)**. On a technological level, these pottery groups fit perfectly within the Italian Bronze Age tradition: hand-made *impasto* fired in kilns that do not reach extremely high temperatures. However, an experimental replication of Terramare pottery, which quantified the time as well as the difficulty of production, suggests that for the execution of the handles and more elaborate decorations, the amount of time necessary is at least double that which is required for other simple pieces. This in addition to the decidedly superior technical ability that was also necessary. These experiments suggest the existence of different levels of craft specialisation for the pottery production at the final phase of the Terramarre culture, which was mostly lacking in the *impasto* pottery systems of other Italian regions (Brodà *et alii* 2009).

One of the most puzzling phenomena at the end of the Terramare life-cycle from a ceramic viewpoint is the widespread diffusion of the Terramare pottery style, including vessel shapes and decorative patterns (Damiani 2004: figs 2, 4, 6; Cardarelli 2009: figs 15-21; Bettelli *et alii* in press). Indeed, in the early 12th c. BC, a portion of the Campanian Plain, not far from Naples, witnessed the appearance of a series of newly founded settlements of brief duration, the pottery traditions of which are stylistically akin to those of the Terramare (Albore Livadie *et alii* 2004: fig. 3A; Albore Livadie 2007: fig. 1; Nava *et alii* 2007; Cardarelli 2009: fig. 19: 1-3, 6-9; Bettelli *et alii* in press) **(Fig. 11.1b)**. Among these Campanian settlements, *Afragola* appears to be the most important and the richest in evidence **(Fig. 11.1a)**, the latter in part due to the recent, extensive excavation of this site (Laforgia *et alii* 2007; Nava *et alii* 2007; Cardarelli 2009: fig. 19: 4-5; Bettelli *et alii* in press).

A similar phenomenon occurs at *Rocavecchia*, near Lecce in Apulia **(Fig. 11.1a)**. In this case, the settlement survived for a considerable length of time, its life-cycle beginning around the late 17th-16th c. BC and continuing until the Early Iron Age, with discontinuity highlighted by at least two episodes of destruction of the walls defending the settlement's inhabited area. After the first destruction, which occurred at the end of the MBA (14th c. BC), recognisable RBA levels appear to be characterised by *impasto* ceramics similar to those found in Afragola and in other sites on the Campanian Plain that are, in turn, stylistically akin to the Terramare pottery of the RBA 2. This phase, as we have already stated,

marks the end of the Terramare in the South-Eastern Po Valley (Pagliara *et alii* 2007: figs 9-13; 2008: figs 11-13). This is not a case of a few foreign elements within a stylistically homogenous local ceramic tradition but is rather the presence of a stylistically coherent ceramic repertoire, which is in no way related to cultural precedents developed in those regions, nor to coeval cultural features from adjacent regions (Bettelli *et alii* in press).

It is clear that the indicators on which these observations are based are solely typological/morphological and stylistic. A further, necessary validation would entail the recognition of specific technological traits within the shared tradition of hand-made *impasto*. Further investigations should assess whether, and to what degree, a difference also exists in the procedures of selection and treatment of raw material, in pottery shaping techniques and surface treatment, in techniques and instruments involved in decoration, and in the methods and temperatures used in firing. This information is partially available for pottery from the Terramare area (Levi 1997; Levi & Loschi Ghittoni 1997; Saracino *et alii* 2006; Brodà *et alii* 2009; Cannavò *et alii* 2012; Cannavò & Levi 2015; 2018) but is lacking for Terramare-like pottery from sites in other Italian regions such as Afragola and Rocavecchia. A comparison between Subapennine-type ceramics and those produced in the Terramare area – the latter being much richer both in their complex decorative repertoire and in the execution techniques – would allow us to assess whether a technological transfer can be properly identified. This would corroborate a diffusion of cultural traits which, at present, is mainly visible on the decorative level, with the large-scale introduction of ribbed and grooved ornamentation on vase handles and bodies.

How can we explain the phenomenon described above? Andrea Cardarelli (2009: 500-508) has recently taken up and further developed the existing model describing the movement of people from the north to the south of the peninsula linked to the collapse of the Terramare world. In light of the available data and their more recent reassessment, the possibility of a movement of Terramare groups travelling from the Eastern Po Valley to occupy several specific locations in distant regions of the Italian Peninsula is highly conceivable (Cardarelli 2009: 507-508; Bettelli *et alii* in press).

A different, not completely contrasting explanation for this phenomenon prompts us to take into consideration exchange networks (Damiani 2004; Bettelli *et alii* in press). This view considers the fact that the typology and technology of bronzes, widespread throughout Southern Italy in the RBA, is essentially of a Padanian or, at most, Northern Adriatic type, referable to the so-called Peschiera horizon, as testified by the outstanding findings at Rocavecchia and Scoglio del Tonno (Carancini & Peroni 1997; Maggiulli 2009; Bietti Sestieri *et alii* 2010). This would suggest that the spread of pottery types with a North Italian legacy to Southern Italy may also be connected to the mobility of metallurgists and/or the circulation of raw material (copper) from the Alpine ores to the South.

The Terramare culture in the area south of the Po did not survive the dramatic crisis of the 12th c. BC. However, it may have transmitted its legacy to distant communities of the Southern Peninsula through a kind of 'diaspora' of cultural and specifically technological elements. By contrast, the Veneto Terramare culture in the Valli Grandi Veronesi to the north of the Po Valley overcame the crisis and strengthened its position in Northern Italy by mobilising prestige crafts, especially the polished and painted Italo-Mycenaean pottery. This ceramic ware seems to have been produced primarily in the context of tableware, likely functioning as social representations (Jones *et alii* 2002; Jones & Levi 2014: 212-221, 263-264, 274-275; Jones *et alii* 2014; Bettelli *et alii* 2015; in press b). It may be of some interest to note that Italo-Mycenaean pottery is absent in the nearby and culturally similar Terramare settlements located south of the Po. Could this be an indicator of a different type of social organisation within those groups, which were, or which strove to represent themselves as, more egalitarian?

3.2. Friulian Castellieri *Facies*

If we consider the modes of pottery production and use in the Castellieri cultural environment of the Friuli region in North-Eastern Italy within a diachronic perspective, from the MBA to the FBA, we are able to note a few well-defined trajectories of development of the pottery system **(Fig. 11.6)**. These trajectories may also have a counterpart in the dynamics of social transformation. From the MBA well into the RBA, we can trace the appearance and the progressive strengthening of the following features[7]:

7 For contributions on MBA and RBA pottery in Friuli and Karst (North-Eastern Italy), see Cardarelli 1983; Tasca 2011; with references; for single contexts, see Cassola Guida & Vitri 1988; Borgna 1994 (Pozzuolo, Braida Roggia); Vitri *et alii* 1994 (Porpetto); Vitri *et alii*

- an apparent increase in the scale and volume of pottery production involving open shapes useful for the manipulation, preparation and consumption of liquids and solids, such as bowls and cups (Borgna 2011: 214-215);
- a lowering of standards and an apparent decline in manufacturing techniques. An examination of details related to the shaping and finishing techniques prompts us to note such features as increasing inaccuracy, carelessness and roughness of morphological and decorative aspects. Even firing technology seems to show the absence of skill as judging by archaeometric data kiln temperatures seem to have been very low (less than 600°C) (Boschian 1994: 237). Meanwhile, evidence for technological variability and specialisation as far as selection of fabrics, manufacturing, techniques of surface treatment and firing are concerned, is missing;
- an increasing adaptation/adoption of shared patterns for shapes, decorative and functional components together with decreasing formal variability in the ceramic repertoire;
- a decrease in stylistic elaboration; this phenomenon is detectable in the reduction of the decorative repertoire, which in the RBA only consisted of a few plain or digitally impressed relief rope decoration. Undecorated vessels are prevalent and surface treatment is limited to smoothing or burnishing, though most surfaces are left rough and irregular (Borgna 1994: 177, with further references);
- conservatism and no trend towards innovation in the long-term. There is evidence for a low chronological variability in morphological and decorative styles (Borgna 1994: 180; Tasca 2011: 278-279)[8], while more variability emerges concerning functional aspects (*e.g.* the appearance of articulated elements useful for fitting lids; various types of handles and grips for handling and moving the vessels) (*e.g.* Botti & Tasca 2006; Tasca 2011: 279-280).

During a much shorter time-span, from the RBA well into the FBA (*ca.* 12th c. BC), new trends and some innovative features can be identified in the pottery system of the Friulian Castellieri *facies* of North-Eastern Italy, possibly indicating substantial change. There was a decrease in the average size of several ceramic vessel shapes **(Fig. 11.6)**[9]. Furthermore, within a general framework marked by a substantial continuity of cultural aspects, it is possible to identify a marked innovative trend in pottery styles. This consisted of the acceptance of new stylistic patterns – including several Urnfield elements from further north (Lower Austria, Moravia, Slovakia, Western Hungary) – as well as the inception of technological variability in the choices of fabrics, parallel to a general improvement in the level of pottery manufacturing (Corazza 1999; Tasca 2011: 255-270, 281; Tasca *et alii* 2015; Borgna *et alii* in press b; Borgna & Corazza in press).

In contrast to this later period, the increase in the volume of pottery production, technological decline and inaccuracy, decrease of stylistic elaboration and variability identified from the MBA to the RBA can be attributed to a general phenomenon of standardisation, connected with a social organisation of labour which, though dependent on household workshops, was affected by an increased demand. This was due to demographic growth and to the intervention of new social practices and consumption patterns, possibly including the sharing of domestic activities at both a community and an inter-community level. The reduction of decorative variability and the prevailing of undecorated vessels might point to an emerging ideology favouring social cohesion and communal participation (Borgna 2011: 214-215). The pottery style seems to highlight a collective identity rather than individual assertions[10]. Energy expenditure in the production of standard shapes for storing, manipulating and consuming food serves to enhance social values essential for communities' survival and reproduction, such as sharing and interacting, as suggested by a greater emphasis on communal food manipulation and consumption rather than on drinking practices (*cf.* Recchia 1997; 2004; 2010; Skibo 2013).

1991 (Udine); Cassola Guida *et alii* 2004; Maselli Scotti 1997 (Elleri and other Karst hill-forts); for Istrian hillforts, Čović 1983; Buršić Matjašić 1997; 1998; Bandelli & Montagnari Kokelj 2005; Sakara-Sučević 2004; 2008; Hellmuth 2013; Hellmuth Kramberger 2017.

8 Evidence of some innovative elements in early RBA production can be identified in Western and Southern Friuli, evidenced by some Subappennine components coming from peninsular Italy (*e.g.* Botti & Tasca 2006). In addition to this, some precocious Urnfield Ware is found in Karst and Eastern Friuli (Borgna & Corazza in press).

9 This can be observed when examining the evolution of single vessel shapes attested in both earlier and later contexts: for MBA-RBA extremely large carinated cups and bowls at Udine, Castions, Porpetto, Canale Anfora (Vitri *et alii* 1991; Cassola Guida *et alii* 2004: esp. 84; figs 4-5A; Borgna *et alii* in press c; Tasca 2011, *passim*); for RBA-FBA smaller products at Pozzuolo and Variano near Udine (Borgna 1994; Cassola Guida & Corazza 2000; Cassola Guida & Corazza in press). In RBA-FBA some ceramics sets suitable for preparing and cooking food may point to reduced consumption units in some sites such as Variano and Pozzuolo (Cassola *et alii* 2004: 79; fig. 1B, so-called 'piano a vasi'; Borgna & Levi 2017). For a visual reference of the proposed trend, we may compare vessels belonging to similar functional categories throughout the successive phases of the Bronze Age **(Fig. 11.6)**.

10 On the symbolic value and social role of decorative styles, see Rice 1987: 266 ff.; Borgna 2003: 21-28 with references.

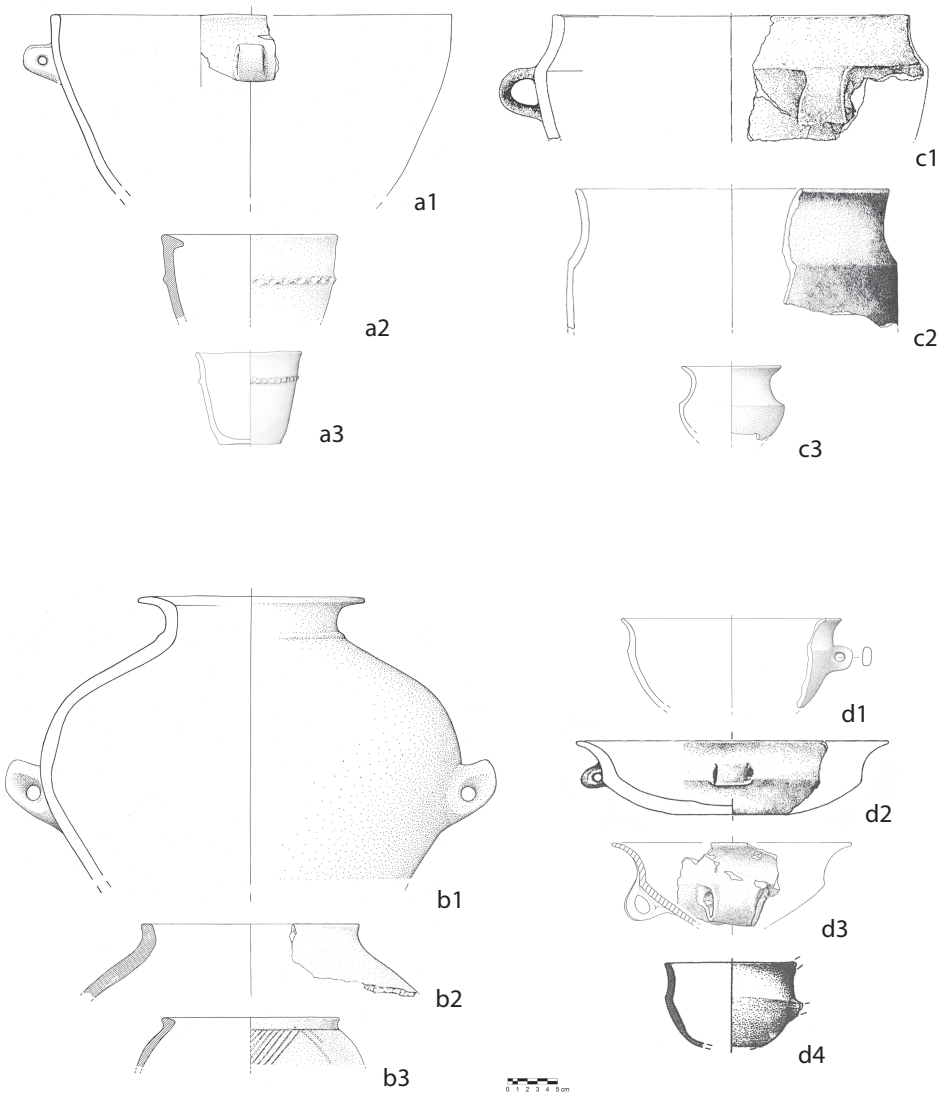

Fig. 11.6 a. Large bowls from different Bronze Age sites of the Friuli region (North-Eastern Italy). a1: Canale Anfora, next to Aquileia (Udine), MBA (©Laboratorio di Preistoria e Protostoria, University of Udine; G. Merlatti); a2: Pozzuolo-Braida Roggia (Udine), RBA 2 (after Borgna 1994: 121 no. 144; fig. 47); a3: Variano (Udine), FBA (©Laboratorio di Preistoria e Protostoria, University of Udine; G. Merlatti). b. Necked globular jars from different Bronze Age sites of the Friuli region and Venezia Giulia. b1: Canale Anfora, MBA/RBA 1 (©Laboratorio di Preistoria e Protostoria, University of Udine; G. Merlatti); b2: Monte Grisa (Trieste), RBA (after Moretti *et alii* 1978: fig. 1.3); b3: Pozzuolo-Braida Roggia (Udine), RBA 2 (after Borgna 1994: 102, no. 98, fig. 38). c. Carinated vessels from different Bronze Age sites of Friuli. c1: Porpetto (Udine), MBA (after Vitri 1991b: 149, fig. 32, 2); c2: Udine, RBA 1(?) (after Vitri *et alii* 1991: fig. 3.13); c3: Pozzuolo (Udine), RBA 2 /FBA (after Cassola Guida *et alii* 2004: 79, fig. 1B 2). d. Carinated cups/bowls from different Bronze Age sites of Friuli: d1: Canale Anfora, MBA/RBA (©Laboratorio di Preistoria e Protostoria, University of Udine; G. Merlatti); d2: Udine, RBA (after Vitri *et alii* 1991: fig. 3.4); d3: Rividischia (Udine), RBA 2 (after Lambertini & Tasca 2006: 133, fig. 21); d4: Castions di Strada (Udine), FBA 1 (after Cassola Guida *et alii* 2004: fig. 5A 1)

While emphasising conservatism and tradition, this lack of stylistic variability, together with the lack of change in pottery style in the long-term, may also indicate a kind of isolation in terms of social interaction, concerning both long-distance communication and internal vertical competition (*cf*. Wiessner 1984; 1985; 1989; Longacre 1991; Borgna 2003: 23-27). It has been observed that stylistic diversity and increasing variability and elaboration may be directly connected to critical and transitional phases, characterised by competition and/or intense social communication among individuals and groups that are negotiating their status. On the contrary, stability and continuity in pottery production might indicate a cohesive social organisation and a fixed and well-established social order, not punctuated by social stress and competition.

We may therefore suggest that during the MBA-RBA, and particularly in the late period or 13th c. BC, the substantial uniformity and conservatism of the ceramic style in North-Eastern Italian communities, together with the low rate of diachronic change and stylistic variability, were somehow related to the economic and social organisation at a regional level. In other words, potters seem to have invested most of their energy in the functional realm and ceramic products do not seem to have served the purpose of social display nor do they appear to have enhanced individual roles. Standardisation and the progressive decrease of both technological quality and stylistic elaboration seem to have been caused by to an increased volume and scale in the production and distribution of pottery, which met the needs of social organisations encouraging cohesion and enhancing anonymous collective participation. This fits well with a settlement framework consisting of independent nucleated villages, possibly connected by tribal relationships, located along nodal communication routes and playing a central role in both subsistence and craft economy of the surrounding territory, thus attracting people for collective activities such as the construction of ramparts or mounds and other communal practices such as the sharing of food.

The subsequent evidence for the reduction of the size and dimensions of vessels, which we are able to observe in several contexts dating from the late RBA, may be related to a change in the settlement pattern *ca*. 1200-1150 BC. At that time, several smaller sites seem to emerge throughout the landscape[11]. Minor changes affecting the functional domain, such as the average size of single vessels and whole ceramic sets, might be consistent with a reduction and fragmentation of consumption units and even of residential units. The pottery system does not actually show any evidence of social stress or competition and points instead to changes in the social basis of subsistence production and consumption and even in the modes and practices of commensality. Much less emphasis on large-scale participation in domestic practices and consumption of food is now detectable and this fits well with the perception of disruption and partial abandonment of the major central sites.

The evidence for reduction and fragmentation at the end of a long period characterised by intra- and inter-community cohesion and cooperation prompts us to infer that previous efforts towards cooperation, solidarity and cohesion finally failed under the pressure of new environmental and economic conditions. Stress in the relationships between human communities and their environment including the modes and intensity of long-distance relationships and access to basic resources might have played a role in the crisis of the village way of life during the RBA.

Substantial changes coinciding with the introduction of innovations in the morphological repertoire and decorative styles as well as in production technologies appear towards the end of the period, or late RBA-early FBA. Potters began to invest more energy in strengthening the role of ceramics in social display; this seems to have been consistent with a major social and cultural gap implying the restructuring of some settlements and the development of a new social order. The role played by stylistic and technological elaboration must be considered alongside other evidence: hoarding, weapons, renewal of ramparts and fortification, use of cremation (Vitri 1991a; Zendron 2011) and possibly even the inception of a new settlement nucleation within a hierarchical settlement system towards the mid-12th c. BC. This characterises a new era that included the emergence of hierarchy, one founded on cultural confrontation among different actors, as well as on social competition, and even moments of social conflict and war.

Overall, by observing exclusively the pottery record of Bronze Age North-Eastern Italy, we are not able to identify the adoption of precise strategies or any univocal response to social stress in the field of ceramic

11 See above, n. 9. An interesting case of an isolated house of small size dating to the RBA-FBA has been recently explored at Coderno, Udine (Persichetti *et alii* in press).

production, which basically remains at the level of household production. Nevertheless, pulling together the evidence from several domains, including morphological and decorative choices, technology, functional purposes, and social organisation of work, we consider it plausible to hypothesise a certain degree of correspondence between the trends observable in the pottery system and the nature of the discontinuities attested in the evolution of the settlement systems. Changes in the pottery system after the early RBA or RBA 1 (*ca.* mid- to the end of the 13th c. BC) fit well with the end of a settlement cycle characterised by conservatism and a sense of tradition, both fuelled by strategies of cohesion and collaboration among large social groups and communities. The general reduction of the dimensions of single pots and ceramic sets, together with a general decrease in the rate of production could be symptoms of the inception of a sparser occupation pattern – caused by some pressure affecting the economic resources and the social organisation of labour. The remarkable human mobility affecting the occupation pattern of the intervening period may also imply the arrival of new groups. The role of these groups in the re-organisation of the communities and in the start of a new cultural phase are shown by the stylistic and technological novelties of FBA pottery, suitable for expressing new cultural and social identities.

3.3. The Southern Tyrrhenian and Aeolian Islands

As already mentioned, a radical change in ceramic style and raw materials (and probably also in some of the technological aspects such as shaping and surface treatment) occurs in the far South of the Italian mainland and in the Aeolian Islands. These regions shared the stylistic and technological aspects of Sicilian-type ceramics of the Thapsos style until the end of the 14th c. BC (MBA 3), characterised by the use of pedestaled bowls of different sizes, decorated mainly with ridges and specific incised motifs (Bernabò Brea & Cavalier 1980: 545-558, 699-704, pls CLXIV-CLXXXVII; Peroni 1989: 258-260; Bietti Sestieri 1997: 473-479; Pacciarelli 2001: 32-33, 82, fig. 13; Pacciarelli & Varricchio 2004: 369-374, figs 6-8) **(Fig. 11.5c)**. Certain technological aspects underline the close link with Sicily. For instance, in the Aeolian Islands, Thapsos-Milazzese style ceramics are the only ones in the whole cultural sequence to be characterised by the abundant use of grog, a tradition predominant in Sicily during the Bronze Age (Williams 1980; 1991; Levi & Williams 2003). It is difficult to establish whether this corresponds to phenomena of cultural identity or to forms of more intense sharing of cultural traits or social interaction. During the 14th-13th c. BC transition, the dramatic destruction and abandonment of sites coincided with the appearance of a new pottery *facies*, well-represented by the Subappennine style (RBA), which scholars call Ausonian I (Bernabò Brea & Cavalier 1980: 559-586, 705-709, pls CXCV-CCXVIII) **(Fig. 11.5d)**. From a technological point of view, the biggest change at Lipari is the adoption and spread of a new fabric: vessels are locally produced using better quality imported clays (probably from North-Eastern Sicily; Fabric C in Williams 1980). This is a remarkable and extremely rare production behaviour in the Central Mediterranean Bronze Age. Productions using imported clay (Fabric C) in Ausonian I were fine *impasto* vessels, while in the subsequent Ausonian II (FBA), this practice also involves coarse *impasto* and more specialised productions, such as the Southern Italian Protogeometric and *piumata*[12] wares (Bernabò Brea & Cavalier 1980: 597-612, pls CCL-CCLIII; Williams & Levi 2008).

The traditional interpretation of this radical transformation – one might say a complete replacement of shapes, decorations and fabrics – is that of an actual 'invasion' by groups of people coming from the Italian mainland territories of Southern Calabria (Bernabò Brea & Cavalier 1980: 705-709; Peroni 1989: 260-261; 355-360; Bietti Sestieri 1997: 479-485; Pacciarelli 2001: 82-83; Pacciarelli & Varricchio 2004: 374-377; Cardarelli 2009: 485-486). Such territorial occupation – which some scholars interpret as a political submission of the local communities – would be the same as that mentioned by ancient sources and attributed to the mythical Ausoni population, also corroborated by a surprising chronological matching. The occupation of the Aeolian Islands by peninsular groups would be a reaction to the previous control of the Southern Tyrrhenian by groups of Sicilian culture and/or provenance.

12 This is a coarser ware painted with a series of curvilinear motifs belonging to the Sicilian tradition.

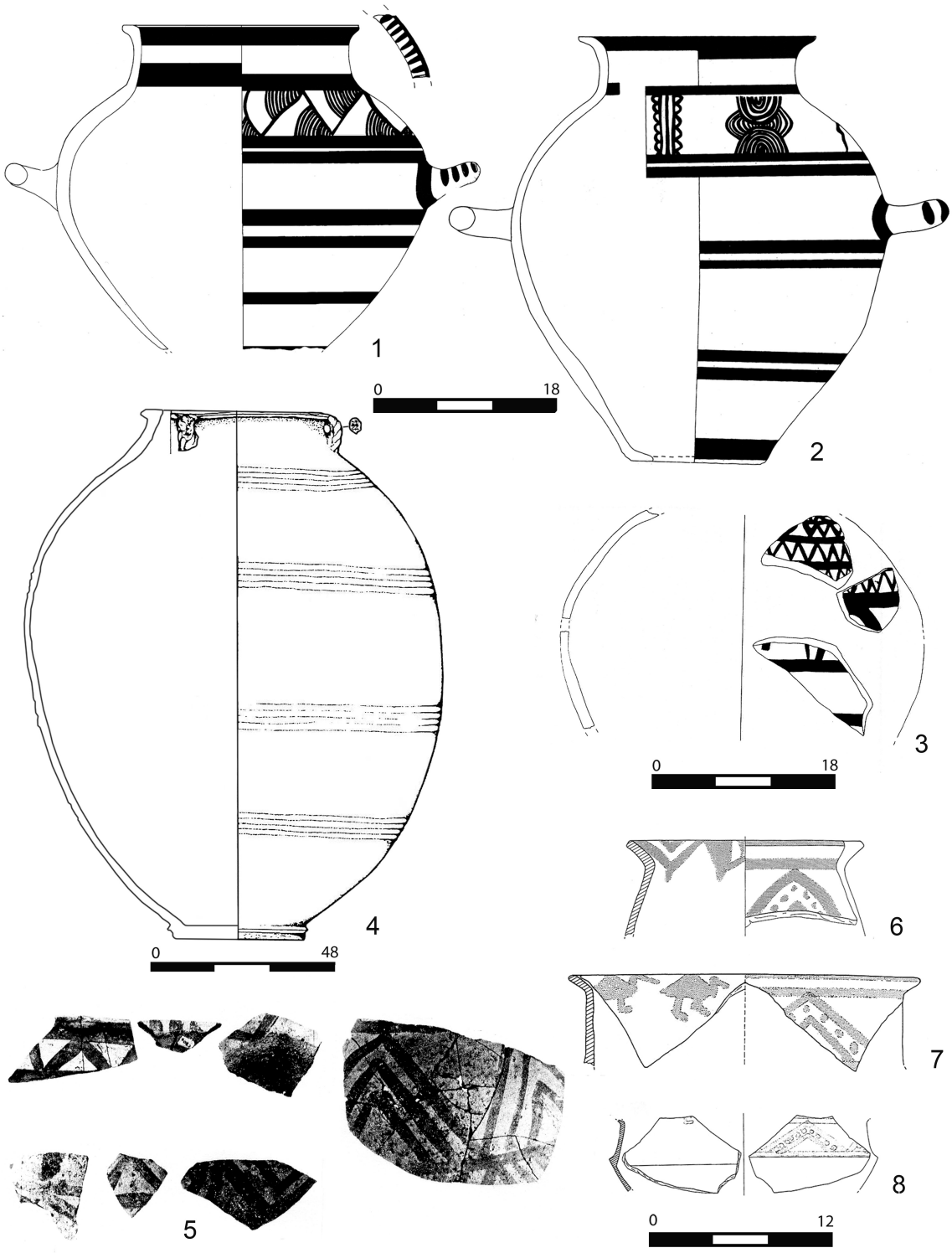

Fig. 11.7 1-2. Italo-Mycenaean pottery from Broglio di Trebisacce (after Vagnetti 1984: pls 46.3, 49.3); 3. Italo-Myceanean or 'early Protogeometric' vessel from Broglio di Trebisacce (after Vagnetti & Panichelli 1994: pl. 77.1); 4. *Dolio* from Rocavecchia (after Guglielmino 1999: fig. 3); 5. Protogeometric pottery from Lipari-Ausonian I (after Bernabò Brea & Cavalier 1980: pl. CXCIV:2, 4, not to scale), 6-8. Santa Maria di Leuca (after Orlando 1990: figs 30-32)

In the Ausonian I layers at Lipari, together with vessel shapes and morphological features (esp. handles) belonging to the Subapennine-peninsular *impasto* tradition, we find for the first time a type of pottery decorated with painted geometric motifs (zig-zags, angles and inscribed triangles, series of points, and horizontal lines) with a fine fabric and carefully selected raw materials, usually hand-made and with well-refined surfaces (Bernabò Brea & Cavalier 1980: 566-567, pl. CXCIV) **(Figs 11.5, 11.7)**. This ware, mostly locally produced but also found using imported clays (at least according to the subsequent Ausonio II specimens analysed), appears to have been partially influenced by the technological know-how of Aegean painted pottery. Mycenaean pottery imported from the Aegean was found abundantly in the Aeolian archipelago and at Lipari (Taylour 1958: 9-53, pls 1-8; 1980; Vagnetti 1991), but evidence of a local production is currently still lacking. The production of Italo-Mycenaean pottery is, on the contrary, well-attested in Southern Italy during the RBA (Jones & Levi 2014) **(Fig. 11.7:1-2)**. Aegean pottery is still circulating in Lipari at this stage, and it is precisely coeval with these early Protogeometric productions mentioned above (Bernabò Brea & Cavalier 1980: 109-161; Taylour 1980: 812-815). As already mentioned, some Ausonian II samples show that Protogeometric productions found at Lipari are either imported from the Italian Peninsula (Fabric B) or locally produced with imported clay (Fabric C). Local production with imported clay characterises the *piumata* ware, a class of pottery of Sicilian legacy spread in the Aeolian Islands in this period (Bernabò Brea & Cavalier 1980: 610, pl. CCLIII; Williams & Levi 2008).

3.4. Is Protogeometric pottery an indicator of 'crisis' and decline in pottery technology?

Protogeometric pottery is known to be widely represented in Italy in the Adriatic and Ionian areas, not just in the South, but also as far North as Abruzzo (Yntema 1990: 19-30, 320; Di Fraia 1995: fig. 12) **(Fig. 11.7: 6-8)**. This ware is especially widespread in the FBA, from approximately the middle of the 12th c. BC, although some rare cases suggest a possible beginning in the late RBA[13] **(Fig. 11.7: 3)**. Protogeometric ware at Lipari found in Ausonian I layers is, at the current state of knowledge, the oldest painted pottery in the Protogeometric style produced in the Central Mediterranean (Bernabò Brea & Cavalier 1980: 566-567, pl. CXIV; Yntema 1990: 23).

Although the first Protogeometric production is contemporary with that of Italo-Mycenaean ware, the latter decreases drastically during the FBA (second half 12th-11th c. BC) until it disappears completely (Orlando 1990: 12-18; Yntema 1990: 26, fig. 8, 320; Pagliara & Guglielmino 2005: 309, fig. II.196). It should be emphasised that the end of the Italo-Mycenaean production does not mean that local communities abandon the technological know-how that was transferred to the Central Mediterranean from Mycenaean Greece. Instead, in some regions of Southern Italy, there was no interruption in the use of levigated calcareous clay (*figulina*), wheels, painted decoration, and firing in double-chambered kilns (Yntema 1990: 25; Peroni 1994: 857-859; Vanzetti 2000; Bettelli & Levi 2003; Vanzetti *et alii* 2014). In fact, the wheel, although not always used in Protogeometric production (Yntema 1990: 320; Levi 1999), was used for other Italian mixed products during the FBA: *dolii* and grey wares (Levi & Odoguardi 1991; Peroni 1994: 857-859; Vanzetti 2000; Jones *et alii* 2014: 17-18, tab. I.2). These technologies had now been fully acquired by local communities, who used them in different measures and with different methods depending on the value (economic-functional or symbolic) of a specific category of ceramics (Jones *et alii* 2014). The use of the wheel (in both wheel-thrown and wheel-fashioned modes) for large *dolii* during the FBA suggests that this specialised technique was more common for the production of utilitarian/functional wares **(Fig. 11.7: 4)**. These large containers, inspired by Aegean models, were able to more efficiently meet the needs of a new, incipient, productive economy based on specialised arboriculture (Peroni 1983: 250-251; 1994: 845-846, 852, 855-856; Guglielmino 1999; Levi 1999; Vanzetti 2000: 147-149, 154-156; Levi & Schiappelli 2004; Terral *et alii* 2004; Schiappelli 2006; 2015; Bettelli 2011: 115; Jones *et alii* 2014; Primavera & Fiorentino in press). Moreover, the Italo-Mycenaean ceramics could, to a certain extent, have been produced by local craftsmen who had been previously trained as apprentices in local workshops established by Aegean craftsmen (Levi & Jones 2014; Jones *et alii* 2014).

The limited use of the wheel, the matte slipping and painting – both technological traits typical of Protogeometric

13 At Coppa Nevigata, and possibly Broglio (Cazzella *et alii* 2004: 151-153; Vagnetti & Panichelli 1994: 396, pl. 77: 1; Bettelli 2008: 26-29, fig. 5).

pottery – cannot be attributed to a technological regression in the context of a more general economic crisis. They should rather be considered as part of a series of momentous changes that involved various systems, social structures and values, and more generally the multiple patterns of relationships between Italy and the Aegean. The weakening and subsequent interruption of these links, the cause of which is mainly to be found in the historical processes and phenomena that took place in Greece at the end of Bronze Age, did not promote further circulation of formal and decorative styles prevalent in the Aegean. The situation instead favoured the development of a ceramic style that had already been formed in general terms (see Lipari Ausonian I), characterised by the presence, both in form and decorations, of various indigenous elements, such as specific types of cups and bowls, necked jars and the widespread use of painted geometric decorations similar to the incised ones attested on impasto pottery (Yntema 1990: 320; Peroni 1994: 857-860; Vanzetti 2000; Bettelli 2008).

This marked a period of great creativity in local communities, starting in the second half of the 12th c. BC, especially in South-Eastern Italy, with the development of autonomous ceramic styles for tableware, transport-, and storage vessels (basins, painted *dolii*) (Yntema 1990: figs 4-5, 9-15; Buffa 1994; 2001; Levi 1999). The production of *dolii* and Protogeometric wares does not seem to be attributable to the household but, as with Italo-Mycenaean ceramics, to a workshop level of production (Levi & Jones 2014; Jones *et alii* 2014: Table 1.2). It is important to note that the consumers of this tableware, probably members of the elite, no longer emphasised their social distinction with the use of 'exotic' (in terms of both shape and ornate painting) ceramics **(Fig. 11.7: 1-2)**. On the contrary, as mentioned above, the shape and decoration of vessels aligned itself to a local visual repertory, which above all included *impasto* ware (Yntema 1990: 320; Peroni 1994: 857-860) **(Fig. 11.7: 6-8)**. Moreover, unlike Italo-Mycenaean pottery, Protogeometric productions are almost impossible to identify in terms of regional provenance and have a greater stylistic homogeneity over large distances (Yntema 1990: 320; Vanzetti 2000). Some compositional analyses indicate multiple production centres – as is the case of the Italo-Mycenaean and Grey Ware production. Thus it seems that this stylistic consistency should be attributed to a broader sharing of models, rather than to the circulation of products.

We can therefore imagine that in the FBA, unlike in the previous period, fine, painted, specialised ceramics assumed a new social function, more strongly linked to expressions of cultural identity and probably involving broad geographical areas (Peroni 1994: 860). This as opposed to the focus on pure and simple social representation, which had previously been manifested through the production and consumption of technologically and stylistically sophisticated and exotic pottery as in the case of Italo-Mycenaean ware.

4. Conclusions

Transformations, changes, and reactions in the ceramic system cannot, in any case, be considered univocal markers of specific phenomena of crisis. They can only be used as reliable indicators when evaluated together with a broader range of data.

If a major environmental crisis – including both climate change and difficulties in maintaining long-distance communication and supply networks – may be inferred in Northern Italy towards the end of the RBA (the first half of the 12th c. BC), the continuing major role played by the Terramare in the Veneto region could be explained by taking into consideration the efficacious strategies the communities of this area were able to set up. The exclusive mobilisation of new pottery technologies – as attested by locally produced Italo-Mycenaean pottery in the main Veneto polities (Jones & Levi 2014: 212-221, 274-275; Bettelli *et alii* 2015) – may be a part of these strategies, together with the management of key raw materials such as metals from Trentino and Baltic amber (Bellintani *et alii* 2015; Cupitò & Leonardi 2015; De Guio *et alii* 2015; Bettelli *et alii* 2017).

In the 'Castellieri area' of North-Eastern Italy, the ability to survive and overcome the crisis is also marked by the adoption of foreign stylistic and technological components in the pottery system, this time of Northern Urnfield origin. This cannot, however, be adequately explained without a thorough consideration of a complete set of multifarious data at a regional level, including the position of the area at the crossroads of many cultural systems. We have to take into account that the responses of the different pottery systems to the same or comparable critical phenomena may be multifarious, differing and even contrasting, and that these responses are dependent on a complex set of socio-economic, political, environmental and geographical variables and conditions that should be explored at a regional level.

In Southern Italy, excluding the case of the Lower Tyrrhenian and the Aeolian archipelago, we note a centuries-long continuity of settlement and cultural systems, starting at least from 17th c. BC, most markedly in the Adriatic and Ionian areas. Over the course of the 13th and 12th c. BC, the technological range of ceramics produced in these communities broadened from the traditional hand-made *impasto* to include specialised fine clay pottery, wheel-thrown or wheel-fashioned, painted and fired in double-chambered kilns. The production of such specialised forms was possible thanks to intense and enduring relations with the Aegean, which in turn required a type of social organisation able to manage such relationships and to develop a client base for this type of ceramic production. This observation urges a certain amount of caution in automatically correlating transformations in ceramic technology to phases of a more general cultural discontinuity. Instead, we could surmise that important and permanent technological innovations in the field of ceramic production were mainly and more successfully adopted within those communities that had a more stable and well-rooted relationship with their territory, in some cases for almost a millennium, overcoming the crisis years that typify other regions of the Mediterranean and remaining essentially unharmed.

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The book

This volume comprises the proceedings of a workshop with the same title which took place in February 2016 at UCLouvain (Louvain-la-Neuve, Belgium). It was organised within the framework of the ARC13/18-049 (concerted research action) "A World in Crisis?". This workshop questioned the reliability of pottery as crisis indicator within the archaeological data set. More particularly, following the perspective of archaeological and anthropological research that assesses pottery technology as a social product, there is an interest in addressing the social and cultural aspects of *technological change* in pottery production in the specific context of *crisis and period of trouble*. The main goal of our examination was to detect *whether* and *how* technological choices or changes observed in the archaeological ceramic record may reflect periods of transition, disruption, crisis or change pertaining to social, political, economic and environmental conditions. We proposed to address these questions by bringing together experts in charge of the study of pottery at different Bronze Age Mediterranean sites in order to discuss, confront and contextualise their respective assemblages and associated contexts. This two-day workshop emphasised that the majority of our case studies allow the identification of *continuous* changes in pottery production systems, i.e. changes that do not evidence any clear cessation of transmission in potting practices. These are interpreted as indicators of periods of transition, of socio-political and economic transformation, rather than moments of crisis or disruption. On the contrary, *discontinuous* changes in pottery production systems have been observed in those contexts where new paste recipes and/or innovative forming techniques were introduced by *foreigners* and adopted by local people. Finally, the contributions also highlighted that our observations needed to be replaced in a broader contextual framework, especially in the case of the Late Bronze Age (13th-12th c. BC) Mediterranean systems' collapse. Indeed, several archaeological contexts here examined have demonstrated a relative continuity of ceramic traditions at the 13th-12th c. BC transition, while other forms of transmitted technological knowledge had abruptly stopped.

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