LATE NEOLITHIC POTTERY FROM MAINLAND GREECE, CA. 5,300–4,300 B.C.

A dissertation
Submitted to
the Temple University Graduate Board

In Partial Fulfillment
of the Requirements for the Degree
DOCTOR OF PHILOSOPHY

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by
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May 2013

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Abstract

The Late Neolithic (defined here as the LN I of Sampson1993 and Coleman 1992) is both the culmination and the turning point of Greek Neolithic culture from the preceding phases. It lasts some 1,000 years, from approximately 5,300 to 4,300 B.C. The ceramic repertoire of the Late Neolithic period in Greece is a tremendously diverse body of material. Alongside this diversity, other aspects of the ceramic assemblage, such as Matt-painted and Black-burnished pottery, share broad similarities throughout regions, constituting a "*koine*." The commanlities, however, are most apparent during the earlier part of the Late Neolithic (LN Ia); in the later phase (LN Ib) phase, more regional variations proliferate than before.

In the Late Neolithic, all categories of pottery—monochrome, decorated, and undecorated—are at their technological and stylistic acme in comparison with earlier periods. While some of the pottery types demonstrate unbroken continuity and development from the preceding Early and Middle Neolithic phases, new specialized shapes and painting techniques are embraced.

For the first time in the Neolithic, shapes appear that are typically thought of by archaeologists as being for food processing (strainers and "cheese-pots"), cooking (tripod cooking pots and baking pans), and storing (*pithoi*). More recent research, however, has demonstrated that these "utilitarian" vessels were more often than not used for purposes other than their hypothesized function. These new "utilitarian" vessels were to dominate the next and last phase of the Neolithic, the Final Neolithic (also called the Chalcolithic,

Eneolithic, or LN II) when painted pottery disappears from most Greek assemblages just before the beginning of the Bronze Age.

During the past two decades, there has been much research into Late Neolithic Greece, particularly in Northern Greece (Macedonia). This dissertation incorporates the most up-to-date information from these recent excavations with the older material from sites in Thessaly, Central Greece, and Southern Greece. Since this study draws solely upon published material, both old and new, there are certain limitations to the type of analysis that can be performed. The approach, then, is more of an art-historical and historiographical overview than a rigorous archaeological analysis. It provides an overview of the major classes of pottery (decorated, monochrome, and undecorated) and their primary shapes, motifs, and technological aspects. While it emphasizes commonalities, regional and chronological variations are also highlighted. The technological means of production of vessels, their use, circulation, and deposition are also considered.

The structure of this paper is that each pottery chapter is devoted to a broad class (such as Matt-painted), which is broadly defined and then more closely examined at the regional level for chronological and stylistic variations. Likewise, a sub-section then discusses the technology of a particular class and its regional and or chronological similarities and differences. When necessary, outdated scholarship is addressed and rectified.

ACKNOWLEDGEMENTS

This paper would not have been possible without the generous and continual support of my professor, Dr. Philip P. Betancourt, The Institute for Aegean Prehistory (both the Academic Press and the Study Center for East Crete) and Temple University. Both INSTAP and Temple helped fund my trips to Greece, my research, and my visits to museums. I would also like to thank my committee members, Dr. Jane Evans and Dr. George Myer for their guidance, as well as my outside reader, Professor Nicholas Kripal.

Additionally, I am indebted to numerous scholars, for allowing me to use images from their publications, conversations about Neolithic pottery, and for showing me particular collections or sites. Among them are: Zoï Tsirtsoni, Pascal Darque, Karen D. Vitelli, Chaido Koukouli-Chyrsanthaki, William W. Phelps, John C. Lavezzi, Sonia Dimaki, Nikos Efstratiou, Ivan Vajsov, Dushanka, Urem-Kostou, Hara Tzavella-Evjen, Areti Pendeka, Maria Pantelidou-Gofa, Katerina Psimogiannou, Dimitra Malamidou, Kostas Kotsakis, Adamantios Sampson, Susan Petrakis, Jerry Rutter, John DJ Bennet, Robert Bridges, Margarita Nazou, Anais Boucher, César Watruba, Dimitris Nikakis, Trisevgeni Papadakou, Anna Papaioannaou, and Niki Saridaki.

Special mention should also be made of: Nick Reynolds, Temple University Paley Library Interlibrary Loan, Elena Kourakou, The American School of Classical Studies at Athens, Susan Ferrence and INSTAP Academic Press, Charles Stanish and Astrid Virding at Cotsen Institute of Archaeology Press, Katia Pallikari at Melissa Publishing, and Dr. Susanne Biegert at Rudolf Habelt Verlag.

I would also like to thank Elizabeth Shank, Doniert Evely, Eleanor Huffman, Doug Faulman, Thomas Brogan, Theresa Miller-Sporrer, Tess Zangrilli, Beth Ann Judas,

Sofia Makri, and Jerolyn Morrison for their mental and emoitional support thought the dissertation process.

Last, but not least, this dissertation would not have been possible without the unconditional love, support, and encouragement of my family, particularly my parents Daniel and Nancy Bonga, who instilled in me at a young age the value of intellectual pursuit.

This dissertation is dedicated to the professors of my past, and the future students of Greek Neolithic pottery.

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LIST OF ABBREVIATIONS

AA	Archäologischer Anzeiger
AAA	Αρχαιολογικά Ανάλεκτα εξ Αθηνών
ΑΔ Δελτιον	Αρχαιολογικό Δελτίο
AE	Αρχαιολογική Εφημερίς
AEMΘ	Το Αρχαιολογικό Έργο στη Μακεδόνια και Θράκη
AJA	American Journal of Archaeology
ArchK	Archäologisches Korrespondenblatt Römisch-Germanisches Zentralmuseum Forschungsinstitut fuur Vor-und Fühgeschichte
AthMitt	Mitteilungen des Deutschen Archäologischen Instituts, Athenische Abteilung
BAM	Beiträge zur Ur- und Frühgeschichtlichen Archäologie des Mittelmeer-Kulturraumes
BAR-IS	British Archaeological Reports, International Series
BCH	Bulletin de correspondance hellénique, Année
BSA	British School Annuals
Epeteris A'	Διεθνές Συνέδριο Βιοωτικών Μετελών Επιτρησής της Εταιρείας Βιοωτικών Μετελών Α'
Ergon	Το Έργον της Αρχαιολογικής Εταιρείας
Hesperia	The Journal of the American School of Classical Studies at Athens
JEurA	Journal of European Archaeology
JFA	Journal of Field Archaeology
JMA	Journal of Mediterranean Archaeology
JRGZ	Jarbuch des römisch-germanischen Zentralmuseums

OJA	Oxford Journal of Archaeology
PAE	Τα Πρακτικά της Αρχαιολογικής Εταιρείας
Pharos	Journal of the Netherlands Institute at Athens
PZ	Prähistorische Zeitschrift
RÉG	Revue des études grecques
SIMA	Studies in Mediterranean Archaeology
TÜBA-AR	Turkish Academy of Sciences Journal of Archaeology

CHAPTER 1: INTRODUCTION

Aims and Limitations of This Study

This dissertation provides an overview and synthesis of the different types of Late Neolithic pottery from mainland Greece from ca. 5,300–4,300 B.C. It is a starting point for those curious about Greek Neolithic pottery, but who are not (yet) specialists to become acquainted with the material itself, the history of its study, the limitations of past research, and possibilities of future investigations.

As it is based solely on published data, there are necessary limitations to how the material can be discussed, depending on how the ceramic material was originally excavated and published. When possible, I visited nearly all of the twenty or so regional museums in Greece in which significant assemblages of Late Neolithic pottery are stored and often discussed the material with the current scholars of Late Neolithic pottery, nearly all of whom are Greek. Currently there are no American universities with professors interested in Greek Neolithic pottery, but this was not always the case.

Furthermore, since many excavations classify their ceramic material differently, I created a common vocabulary of broadly defined classes of pottery (i.e., Matt-painted, Polychrome, and Black-on-red) in order to incorporate older, traditional studies that were more focused on decorated pottery with newer ones based on fabric (Vitelli 1993; 1999; 2007) or functional classification (i.e., Tsirtsoni 2000; 2001; Urem-Kotsou 2006). Even within the traditional studies, which centered upon surface treatments and stylistic analysis, the lexicon used to describe the same type of pottery varies greatly from site to site, which makes it difficult for a non-specialist to decode and relate the material from different areas. Wace and Thompson’s 1912 classification is used here as referent, since it remains an accepted as such in the literature, despite its shortcomings (incomplete since it was created for Thessaly or outdated at times).

In this paper, a succinct definition a particular class of pottery is given by outlining the main shapes, motifs, and compositions; these aspects are then considered both regionally and chronologically. For instance, Matt-painted pottery is a broad class of pottery that features matt brown painted motifs on a brown-buff surface; the Classic Dimini style and Akropotamos style are both regional and diachronic stylistic variations within the larger class of Matt-painted pottery. This approach allows for Late Neolithic pottery to be discussed as a whole, rather than absonantly on a site by site basis.

Like the terminology used in describing the pottery, the drawing conventions for Late Neolithic pottery varied widely from publication to publication and it was necessary to impose some standardization in order to present the material as a cohesive body. Thus, I redrew many sherds in a consistent fashion; the profiles are on the left, reconstructions are not included, breaks, reconstructions, and undecorated sherds are not shown, red paint is rendered as gray, and white paint on black is white (not black on white), and generally a scale of 1:3 is used.

Of course, the nature of each site and its excavation will always determine the possible approaches to the research of the material, but at the very least the establishment of a common terminology and drawing style aids in the understanding of the material in terms of site comparisons, particularly when considering different geographical areas.

For instance, most of the pottery from Central and Southern Greece comes from older excavations that used ceramic studies primarily for chronological purposes rather than considering how the pottery was produced, used, and deposited. Also in these areas, as in much of Thessaly, the ceramic material comes either from trial trenches that rarely revealed architectural features, or from caves; both cases preclude the type of contextual analysis at sites like Dikili Tash and Makryialos in Macedonia, which have large horizontally exposed areas that clearly reveal how the site was laid out. Similarly, it is impossible compare even the amount of each type of pottery between sites since not every early excavation quantified their finds numerically.

The recent contributions of scientific studies such as residue analysis and petrography have proved instrumental in understanding Late Neolithic pottery, particularly regarding the methods of production, circulation, and use; these should continue to be integrated with the contexts in which the pottery was found, as well as with the more traditional methods of stylistic, morphological, and chronological analysis. That is, each approach of study compliments the other and together they create a comprehensive and balanced study of Late Neolithic pottery.

Similarly, old (sometimes forgotten) scholarship can be revived and incorporated into new research. For example, Walker-Kosmopoulos' idea that birch-bark vessels provided inspiration for both shapes and motifs has been strengthened by the fidings of painted bark fragments and birch-bark painted pottery at Promachon-Topolnica; the residue analysis of bitumen at Makryialos also contributes the idea of the interation between perishable items and ceramics.

Historiographical Synopsis

The archaeology of Neolithic Greece began in the beginning of the 20th century. The most influential work was Christos Tsoundas' 1908 publication of his survey and trial excavations at various sites in Thessaly, including Sesklo and Dimini, which came to be the synonymous type sites for Middle and Late Neolithic, respectively. Tsoundas created the first ceramic classification, which was soon expanded by British archaeologists A.J.B. Wace and P.T. Thompson (1912). It is primarily due to these two early publications that Thessaly became the cultural and chronological referent for all of Greece and subsequently the focus of numerous archaeological investigations. Northern and Southern Greece were also investigated in the first quarter of the 20th century. W. A. Heurtley (1939) surveyed Macedonia after the First World War, from 1924–1932, similar to Wace and Thompson's work in Thessaly. In Central and Southern Greece there are no such early pioneering survey projects, but several important sites were excavated including Orchomenos (Kunze 1931) and Chaeronea (Sotiriades 1908) and Corinth (Walker-Kosmopoulos 1948; Weinberg 1937).

After World War II, numerous post-war excavations were conducted, aimed at clarifying earlier work and chronology in Thessaly, beginning in the 1950's and continuing through the 1970's at sites like Sesklo, Argissa, Otzaki, Soufli Magoula, Achilleion, Arapi Magoula, and Pefkakia, mainly by the German Archaeological School (primarily Milojčić, Hauptmann, and Weisshaar) and later by the Greek *Ephorate* (archaeological service). These excavations maintained Thessaly as the traditional focal point of Neolithic studies in Greece.

During the 1980's new excavations took place primarily in Macedonia, as a prehistoric chair was established at the Aristotle University, Thessaloniki. Many rescue excavations began and continue to take place, carried out by local archaeological *ephorates*, particularly in areas which are subject to strip mining by the national electric company, DEI. In the past two decades (1990's and 2000's) the nature of research has focused primarily on synthetic revaluations of earlier research and excavated material and on small scale rescue excavations. Much of this new examination is a result of long-awaited publication of sites, primarily in areas other than Thessaly (see above). Many of these studies reflect recent trends in archaeological and anthropological theory; they focus on particular archaeometric parameters, petrographic analysis, and construction of social meaning, spatial analysis, circulation, consumption, and post-processual theoretical interpretations rather than a simple presentation of the material for its own sake or as mere chronology.

General Overview of the Greek Neolithic

The Neolithic period in Greece conventionally begins during the Holocene around 6,400 B.C. and endures until around 3,200 B.C., which roughly corresponds to the post-glacial thermal maximum of the Atlantic period, ca. 6,000–4,000 B.C., when elm, oak, and lime forests spread throughout southeastern Europe (Anthony 2010, 35). In some places, however, it appears to end earlier, ca. 3,700 B.C. and there is a long gap of depopulation before the Bronze Age (Coleman 1992). The beginning of the Neolithic period in Greece is marked by the introduction of domesticated plants like emmer and einkorn wheat, six-row barley, chickpeas, peas, and bitter vetch, and animals including ovicaprines, bovids, equids, and suids (pig, sheep, goat and cattle; the dog was indigenously domesticated during the Mesolithic). Natural vegetation and wild game continued to be exploited, along with the new domesticates. The use of pottery, polished stone tools, and settlement in permanent villages traditionally define the Neolithic period in Greece.

This “Neolithic Package” arrived to Greece fully formed, and it was introduced to Greece from the Near East, but specifically where, when, and how remains a debate, due in part to lack of information. It seems most likely that several different Neolithic communities from both the Levant and Anatolia came to Greece through land and sea routes; thorough discussion on this topic is found in Perlès (2001). More recent synthetic reviews of the Greek Neolithic include: Theocharis 1973; Coleman 1992; Demoule and Perlès 1993; Halstead 1995; Andreou, Fotiadis, and Kotsakis 1996; Papathanassopoulos 1996; Alram-Stern 1996. Since these overviews were written, however, there is much new material to be discussed, primarily from exactions in Macedonia (i.e., Promachon-Topolnica, Makryialos, Stavropouli, Avgi, Dikili Tash, and elsewhere).

Overview of the Late Neolithic Period

The Late Neolithic period is one of gradual change, after reaching its warmest around 5,000 B.C. during the late Atlantic (Anthony 2010, 35). Afterwards, the favorable climate conditions of the Holocene that helped generate the formation of the Neolithic period began to change to drier and cooler conditions. Deforestation in favor of farmland began to take its toll. A major shift in vegetation occurred across the Balkans between 5,500 and 3,000 B.C., and significant Holocene soil erosions occurred as a result of human alteration to the landscape (Willis 1994, 783).

Neolithic farmers compensated with what Sherratt (1981) calls the "secondary products revolution," a theory that suggests that during the Late Neolithic period domesticated animals were used for purposes other than meat and milk. These include draught power of carts and ploughs and the production of wool, cheese, and yogurt that were unknown earlier in the Neolithic. They also adapted changing their herd-management practices: first by an increased practice of transhumance, or seasonal movements with their flock to take full advantage of the surrounding environments and second with an increased dependence on cattle.

Arguing for increased transhumance is the increased use of caves during the Late Neolithic period and the broad ceramic similarities found in styles such as Matt-painted pottery. Certain new pottery shapes also reflect changes in culinary practices. Examples include "rhyta" or salt pots, "cheese-pots", strainers, storage vessels or *pithoi*, cooking tripods, and dishes. Since these forms appear together, they suggest the processing, cooking, and storage, of food. The ability to preserve and store food not only enabled an insurance against crop failures, but it also allowed the Neolithic people to redistribute surplus food. Some scholars (Halstead 1984; 1998; Hayden 1995; 2001) see the accumulation of foodstuff and its conspicuous consumption in feasts as evidence of growing social stratification. Other scholars (Chapman 2000; Chapman and Gaydarska 2006) view these practices as an attempt to neutralize social tensions.

Changes in religious belief may be indicated by the reemergence of cremation burials (i.e., Plateia Magoula Zarkou, Avgi, Gonia, Alpeotrypa, Dimini, Makryialos, etc.); these were known in the Early Neolithic and absent in the Middle Neolithic. During the Late Neolithic period a "sacred script" or some form of proto-writing appears as a series of repeated signs on figurines, pottery, wood, and clay tablets, and the same signs are also found in neighboring Neolithic Balkan communities. Toward the end of the Late Neolithic, metallurgy (copper and gold) begins in Macedonia (i.e., Sitagoroi, Dikili Tash, and Promachon-Topolnica).

All spheres of Neolithic interaction are heightened and expanded during the Late Neolithic period. The people participated in a wide variety of cultural, economic, social, and technological exchanges with their fellow villagers, near-by communities as well as more remote ones. The mechanisms of these exchanges were no doubt carried on multiple levels, but their details are still poorly understood. A comprehensive distribution study of artifact exchange would surely yield some interesting patterns, rather than the traditional focus on the distribution of one class of artifact; a limited number of such studies can be found in Perlès (1992) and in Vitelli's (1993) rebuttal to Perlès.

Artifacts with long-distance circulation include ring-idols (found throughout the Balkans and Anatolia), *spondylus* shell (from the Balkans to the Baltic sea), specific pottery styles like Black-burnished (throughout the Balkans) or "rhyta" (along the Adriatic coast), obsidian (primarily from the Cycladic island of Melos, found throughout Greece, primarily from Thessaly southward), and marble (within Greece).

Primary Sites (Figures 1–2)

The primary sites for understanding the Late Neolithic period are: Corinth and the Franchthi Cave in the Peloponnese, Elateia and the Skoteini Cave in Central Greece, Dimini and Plateia Magoula Zarkou in Thessaly, Sitagroi, Makryialos, Dikili Tash, and Promachon-Topolnica in Macedonia. Each of these sites is representative of a particular region in Greece, and they contribute significantly to the understanding the Late Neolithic period as a whole. Their significance is briefly highlighted below.

Peloponnese: Franchthi Cave and Corinth

Franchthi cave is one of the most important prehistoric sites in all of Greece because it preserves continuous layers of human activity from the Mesolithic until the Early Bronze Age. The site was carefully and systematically excavated. All aspects of its occupation and use have been extensively studied, from fish and faunal remains to sediments, lithics, and burials. Most importantly, the cave yielded many radiocarbon dates from all phases of the site, providing an absolute dating to which other sites in Greece could be "checked." The Neolithic pottery from Franchthi was first reported preliminarily by Jacobsen (1969) and subsequently studied in depth by Karen D. Vitelli and published in two volumes (1993b and 1999). Tracey Cullen (1985a) and Vitelli (1974) also studied the ceramic material for their doctoral dissertations.

Although Jacobsen (1969), Vitelli (1974), and Cullen (1985a; 1985b) initially used conventional ceramic terminologies (centered on the Corinthian sequence), Vitelli later invented her own classification system for analyzing pottery. She utilized a fabric-centric approach, believing that the clay itself was of primary concern to the potters. Her method was to drop diluted hydrochloric acid on the sherds and subsequently sort them into wares based on the strength of the reaction. Her approach has not been replicated by any other Neolithic ceramicist, and for this reason her work is difficult to relate to the traditional typologies used by all other ceramicists. Vitelli replicated her method at Lerna (2007), the only other site that employs her methodology.

Vitelli's work was an important conceptual contribution to the field, and was one of the first post-processual approaches applied to material in Neolithic Greece. Her research motives were "to address questions about human behavior" (Vitelli 1993, xx); these are quite different from the more traditional examinations of chronology and typology. Due to the time and cost-consuming nature of her analysis, no one else has repeated her method, and instead ceramic analysis based on morphology, surface treatment, and petrographic analysis continue to be widely used.

For this reason, William W. Phelps did not modify his 1975 dissertation when it was published in 2004, and he refers primarily to Jacobsen's primary report (1969). Phelps found standardized traditional categories better facilitated inter-site comparisons (2004, 19). Although some of Phelp's theories are outdated, his work remains a valuable synthesis of published finds from the Peloponnese. He established the basic ceramic sequence for the southern part of Greece, primarily in the Peloponnese, but incorporating a few key sites in Central Greece, such as Elateia.

The other Late Neolithic site best represented in the Peloponnese is Corinth. Corinth's importance lies in the fact that it has been excavated and published several times. The excavations, however, occurred in small areas that were free from remains belonging to other periods. While there has not been a wide horizontal exposure or much architectural information, the pottery was abundant and essential for establishing the wares and chronology of Southern Greece long before Franchthi was excavated and published. The site was first excavated by Walker-Kosmopoulos between 1886–1931, and summarily published by her (1948) although she planned to have a second volume dedicated strictly to pottery (and in fact a comparison of pottery from Halai, Corinth, and

Choirospilo cave), but this volume was never published. Corinth was then excavated and published by Weinberg (1937) and excavated again by Lavezzi (1978; 2003).

Excavated Late Neolithic sites in the Peloponnese include:

Corinth	(Weinberg 1937; Walker-Kosmopoulos 1948; Lavezzi 1978; 2003)
Franchthi Cave	(Jacobsen 1969; Vitelli 1974; 1993; 1999)
Lerna	(Caskey 1958; Vitelli 1974; 1977; 2008)
Ayioryitika	(Blegen 1928; Petrakis 1999; 2002)
Alepotrypa Cave	(Hauptmann 1971; Lambert 1972; Papathanasopoulos 2011)
Asea	(Holmberg 1944)
Prosymna	(Blegen 1937)
Kouphovono	(Renard 1989; von Vacano 1942; Mee 2007)
Aria Argolidos	(Douzougli 1998)
small sherd assemblages published from:	
Gonia	(Blegen 1930–1931)
Thespiai	(Caskey 1951)
Nemea	(Caskey and Blegen 1975)
Korakou	(Blegen 1921)
Klenia Cave (of Pan)	(Beguignon 1930; Syriopoulos 1964)

Central Greece: Skoteini Cave and Elateia

Central Greece is a large geographic region that is here defined as the modern prefectures of Boeotia, Evrytania, Phocis, Phthiotidos, Attica, and Euboea. The prefectures of Central Greece have received uneven archaeological attention, and the region is the least understood part of Greece for the Neolithic period as a whole. Until the publication of the Sarakenos Cave (Sampson 2008a) Elateia remained the only site on the mainland of Central Greece that had been systematically excavated and possessed radiocarbon dates.

Elateia was first explored by Sotiriades (1908), but it was Weinberg's 1959 controlled excavations (1962) that made it the site of reference for Central Greece.

Weinberg's findings proved the existence of Early, Middle, and Late phases of Neolithic pottery (1962, 167). Weinberg also suggested that the appearance of Matt-painted pottery signaled the beginning of the Late Neolithic period in Greece. Both of these assertions are still valid today. He was the first scholar to correctly identify the existence of four-legged ceremonial vessels called "rhyta" in Neolithic Greece (Weinberg 1962, 190).

Additionally, Weinberg (1962, 167) proposed an intermediate phase between the Middle and Late Neolithic, and this transitional phase has since been widely recognized (see Chapter 10). Since he had first excavated at Corinth (1937), Weinberg was also able to draw parallels between Central Greece and the Peloponnese based on first-hand knowledge. Lastly, Weinberg (1962; 1965c) generated controversy over the ceramic sequence of the "*bothros*" deposit, which he dated to the Middle Neolithic but really belongs to the early Late Neolithic.

The ceramic sequence for Central Greece was considered by D.H. French (1972) in an unpublished manuscript that was privately circulated. Although French's focus was on Central Greece, he included material from the Peloponnese, just as Phelps later included Central Greece in his dissertation on the Peloponnese. Also like French, some of his observations are useful, such as recognizing "Brown Wash" as a late Urfirnis variety of Central Greece, while others are out of date, like placing the Larisa phase at the Final Neolithic- Early Helladic transition).

The Skoteini cave at Tharounia on the island of Euboea is significant for the identification of the subdivision of the Late Neolithic into earlier and later phases, Late Neolithic Ia and Ib. The ceramic sequence expands or supplements that of Elateia in that it details certain classes of vessels like scoops and considers wares in depth, particularly Matt-painted pottery.

Excavated Late Neolithic sites in Central Greece include the following:

Elateia	(Weinberg 1962)
Chaeronea	(Sotiriadis 1908; Evjen-Tzavella 1986; 2012)
Nea Makri	(Theocharis 1956; Pantelidou-Gofa 1995)
Sarakenos Cave	(Sampson 2008b)
Varka	(Sampson 1975; 1977)
Skoteini Cave	(Sampson 1993)
Cave of the Cyclops	(Sampson 2008a)
Eutresis	(Goldman 1931; Caskey and Caskey 1960)
Thespai	(Caskey 1951)
Orchomenos	(Kunze 1931)
Corycian Cave	(Touchais 1981)
Halai	(Coleman et al.1992; 1996)
Ayios Petros	(Efstratiou 1985)
Karystos	(Keller 1985; Mavridis & Tankosić 2009; Tankosić and Chidiroglou 2010)
Kitsos Cave	(Lambert 1969, 1981)
Choirospilia, Lefkada	(Dörpfeld 1912; 1913)
Athens Acropolis	(Levi 1930-31)
Athenian Agora	(Immerhwar 1971)
Cave of Pan	(Orlanos 1955; Daux 1960; Zervos 1962–63; Schachermeyr 1962)

Thessaly: Dimini and Plateia Magoula Zarkou

The significant of Dimini and Plateia Magoula Zarkou has already been mentioned in above. Dimini is one of two sites in Greece to have its acropolis completely excavated (the other is Middle Neolithic site of Sesklo). Tsoundas' early excavation and publication of the site made it nearly synonymous with the Late Neolithic period as a whole, although this is not the case; Dimini represents only on phase of it (see Chapter 3). The finds from Dimini have also been the subject of several specialist studies which has lead to insight and theories of craft production, specialization and long-distance trade.

The distinctiveness and high quality of Dimini style Matt-painted pottery made the ware a chronological marker. The historiography of the study of Dimini is revealing of not just the excavator's bias, but also the influence of shifting approaches to archaeological theory over the century.

One example of the changing interpretations of Dimini is its architectural meaning. Tsoundas (1908) saw the enclosure walls as massive fortification walls crowned by a "*megaron*" (or ruler's house, a term borrowed from the Bronze Age). Dimini was thus placed at the center of development of social stratification, such as in Halstead's theory of "central megaron elites" (1984; 1995; 1999). Chourmouziadis (1979) refuted Tsoundas' claims of defense and hierarchy in favor of spatial organization and envisioned a socialist society, and it has since been shown (Souvatsi 2008) that the "*megaron*" was created by Bronze Age modifications to an ordinary Neolithic building. Since Dimini's original excavation, many such enclosure walls, ditches, and palisades have been found at Neolithic sites, and they were both symbolic and functional. At Dimini, the enclosure or "*peribolos"* walls which enclosure the site acted as the foundations for the houses and functioned both to keep wild animals out of the settlement and domesticated ones in (Souvatsi 2008).

The site of Plateia Magoula Zarkou consists of an extramural cremation cemetery (Gallis 1982) and the habitation site (Gallis 1996). It is the only known site during the entire Neolithic period where a settlement and separate cemetery have been discovered. The settlement was made famous by a terracotta "house model" that was interpreted as a foundation offering (Gallis 1985). The finds at the cemetery were important because the ceramics revealed a smooth transition from the Middle to the Late Neolithic and correctly established the stratigraphic position of Black-burnished “Larisa” ware (Gallis 1982; 1987). These two contributions significantly revised the chronology of Late Neolithic Greece from what was previously believed. They revealed a continuous evolution of painted pottery styles and morphology.

Excavated Late Neolithic sites in Thessaly include the following:

Dimini	(Tsoundas 1908; Chourmouziadis 1979; Otto 1985; Souvatsi 2008)
Sesklo	(Tsoundas 1908; Kotsakis 1983)
Arapi	(Hauptmann and Milojčić 1969)
Tsangli	(Dawkins 1910; Wace and Thompson 1912; Milojčić 1976; Milojčić et al. 1976)
Rachmani	(Dawkins 1910; Wace and Thompson 1912; Weisshaar 1991; Parzinger 1991)
Theopetra Cave	(Kyparissi-Apostolika 2000; Katsarou 2000)
Plateia Magoula Zarkou	(Gallis 1982; 1996)
Ayia Sophia	(Milojčić et al. 1976)
Makrychori 2	(Gallis 1982; 1987; 1993)
Otzaki	(Milojčić 1955a; 1955b; 1983; Milojčić and Zumbusch 1976; Weisshaar 1979; Hauptmann 1981)
Larisa	(Gallis 1987)
Tsani	(Wace and Thompson 1912)
Sidari Cave	(Sordinas 1969)
Pevkakia	(Weisshaar 1981)

Northern Greece (Macedonia and Thrace): Sitagroi, Promachon-Topolnica, Dikili Tash, and Makryialos

Northern Greece was for a long time understudied because it was considered a backwater to the refined cultures found in the more southerly regions of Greece (Kotsakis 2007, 1). While early excavations (i.e., Olynthus 1929) and pioneering surveys like Heurtely’s (1939) took place, studies of Macedonia lay dormant until the 1961 excavations at Nea Nikomedia (1996). Since then there have been numerous prehistoric excavations. Sites in this area are of particular interest for their connections both with the Greek Neolithic and with other Balkan Neolithic cultures like Vinča in Serbia and Karanovo III-Veselinovo in Bulgaria.

Until the excavations of Sitagroi in 1968–1970, there remained a division between archaeologists who embraced the new radiocarbon dating method and those who maintained traditional *ex oriente lux* theories. Those who opposed radiocarbon dating did so primarily because they did not accept the reality that European cultures could predate those of the Near East. Sitagroi closed the chronological debate; it proved great antiquity of European and Balkan prehistoric cultures.

Excavations at Promachon-Topolnica on the Greek and Bulgarian border have since clarified the ceramic sequence from Sitagroi and in doing so showed that Graphite Painted pottery developed indigenously in Greece and was not a technology borrowed from Balkan cultures to the north, as previously thought. It also clarified the distribution, evolution, and influence of Akropotamos style Matt-painted pottery on Strumsko style Black-on-red and Graphite-painted pottery (discussed in Chapters 3, 4, and 8). It established a common cultural horizon from the Drama basin, up the Strymon River into Bulgaria known as the Promachon-Topolnica culture.

An unusual feature at the site is a large subterranean pit that preserved massive amounts of pottery, figurines, tools, jewelry, and animal bones; it is believed that this area held some ritual significance (Koukouli-Chrysanthaki et al. 2007). It also contained a bull's skull (*bucrania*) that had been modeled over in clay, paralleled in Greece only to a similar find from Dikili Tash. The *bucrania* would have been placed on a wall, as indicated by the two house-models also recovered from the pit (Koukouli-Chrysanthaki et al. 2007, 259-261). These models also depicted *bucrania* hanging on the exterior walls, which helps to interpret the existence of actual *bucrania* found on site (Trantalidou and Gkioni 2006). Lastly, it has early evidence of copper smelting.

Dikili Tash was first identified by Blegen and Welsch, probed by French soldiers who were stationed there during World War I, and subsequently excavated in four campaigns (Renaudin 1920–1922; Deshayes and Theocharis 1961–1975, Koukouli-Chryssanthaki and Treuil 1986–1996, and currently by Darcque, Koukouli-Chryssanthaki, Malamidou, and Tsirtsoni). Dikili Tash has the earliest evidence in Europe of grape-pressing, presumably for wine production (Valamoti et al.2007). The plastered *bucrania* recovered is noteworthy since it has recently been paralleled at Promachon-Topolnica (Darcque and Treuil 1998).

The excavations at Dikili Tash revealed some unexpected surprises concerning ceramics. First, it proved that unfired pots were used for storage (these were accidentally fired when the house that contained them burned down violently). Clay bins with internal divisions were also found in the corner of the house. Second, what was stored in pots was not always expected. For instance, a carinated pot containing black residue turned out to have contained a pure iron oxide (probably hematite), which would have been used as a paint pigment (Maniatis and Tsirtsoni 2002; Maniatis, Treuil, and Tsirtsoni 2001); see chapter 13 for more details. Even the other vessels surrounding this pot contained surprises; they were used for storing bone and stone tools rather than food. Of course pottery could be used for storing anything, not just food, but it was the first time that this obvious idea was proved by artifacts *in situ*.

The ceramic typology devised by Tsirstoni (2000; 2001) for Macedonia differs from the conventional ones based on the primacy of surface treatment and shape. Her new typology is a combination of technological, morphological, and aesthetic criteria. Her hypothesis is that a direct relationship exists between the conception, fabrication, and function of the vessels, which she deduces by an analytical process of evaluation and elimination to reach the most likely use of a pot (Tsirtsoni 2001). Her methodology is discussed in detail in chapter 13.

The rescent rescue excavations at Makryialos in Western Macedonia were also important for several reasons. First, because a large horizontal area was excavated (fortuitously Makryialos is a "flat-extended" site rather than a tell) it is one of the few sites for which we can have a clear idea of how the site was laid out and changed over time.

In the Late Neolithic Ia, a double-ditch system enclosed an area of approximately 28 ha., which unexpectedly contained numerous human skeletons (Pappa and Besios 1999a; 1999b). It has been suggested that the secondary deposition of human bones was intended to protect the site (Triantaphyllou 1999, 131). An additional feature of interest in this phase was a large pit (Pit Pi/Pit 212) 30 m in diameter, which is interpreted by the excavators (Pappa et al. 2004) as the remains of a ritual feasting event (or possisbly several such occasions held over a short period of time). Over 600 individual domesticated animals were slaughtered for the occasion (Urem-Kotsou and Kotsakis 2007, 241).

The Late Neolithic Ib phase (Makryialos II) at the site is notable for vast amount of Classic Dimini style pottery, both imported and locally imitated, much of which was, incidentally, found in another pit (Pit 24) although with less overt “ritual” connotations (see chapter 12). Early copper objects were also recovered from the site.

Lastly, similar to Tsirtsoni's new ceramic typology for Dikili Tash, Urem-Kotsou approached the material at Makryialos (Urem-Kotsou 2002a; 2006; Urem-Kotsou and Kotsakis 2007; Urem-Kotsou, Kotsakis, and Stern 2002b), utilizing a morphological-functional approach and through residue analysis (see also Mitkidou et al. 2008 and Dimitrakoudi 2009). It is discussed in more detail in chapter 13.

Excavated Late Neolithic sites in Macedonia include the following:

Eastern Macedonia	
Promachon-Topolnica	(Vajsov 2007; Darcque et al. 2007)
Dimitra	(Grammenos 1984; 1997a; 1997b)
Kryoneri	(Malmidou 1997; 2007)
Galepsos	(Garašanin and Deshayes 1964; Čohadziev 1992)
Akropotamos	(Mylonas 1939)
Limenaria	(Malamidou and Papadopoulos 1999; Papadopoulos and Malamidou 1997l Papadopoulos 2000)
Sitagroi	(Renfrew, Gimbutas and Elster, eds. 1986; 2003)
Dikili Tash	(Sériadès 1983; Treuil 1992; 2004; Tsirtsoni 2000; 2001; Koukouli-Chryssanthaki et al. 2008)
Paradimi	(Bakalakis and Sakellariou 1981)
Central Macedonia	
Stravropouli	(Grammenos and Kotsakis 2002; 2004)
Olynthos	(Mylonas 1929)
Polyplatanos	(Merousis 2002; Merousis and Liana 2004; Papadopoulou et al. 2006)
Makryialos	(Pappa and Besios 1999a; 1999b; Urem-Kotsou 2006; Hitsiou 2003; Vlachos 2009; Aulonitou 2010; Urem-Kotsou, Kotstakis, and Stern 2002a; 2002b)
Vasilika	(Grammenos 1984; 1994a)
Thermi B	(Urem-Kotsou and Dimitriadis 1999; Urem-Kotsou 2002)
Western Macedonia	
Megalo Nissi Galani	(Kalogirou 1994; 1997; Fotiadi, Chronfroginni-Metoki , Kalogirou, and Ziota. 2000)
Dispilio, Kastoria	(Chourmouziadis 2002)
Avgi, Kastoria	(Stratouli 2004; Stratouli, Triantafillou, Bekiaris, and Katsikaridis 2009)

Servia	(Wijnen et al. 1979; Ridley, Wardle and Mould 2000)
Yannitsa	(Grammenos 1984; 1997a; Chryssotomou 1996)
Nea Nikomedia	(Heurtely 1939 for Late Neolithic material)
Mandalo	(Pilali-Papasteriou and Papaefthimiou-Papanthimou 1989; Nikolaïdou 2003); is more Final Neolithic
Thrace	
Paradiesos	(Hellström 1987); is Final Neolithic
Makri	(Efstratiou et al. 1998)
Paradimi	(Bakalakis and Sakellariou 1981)

CHAPTER 2: APPROACHES OF STUDY

Previous Scholarship of Late Neolithic Pottery

Ceramic analysis has long been an indispensible part of archaeological research for several reasons. First, the durable nature of the material has left an enormous body of material to be considered. Second, pottery analysis reveals many aspects of culture, including attitudes toward food preparation, storage, trade, religion, and technology. Last, pottery studies are instrumental in establishing relative chronologies and relationships between prehistoric sites. The relative chronology of the ceramics is in turn supplemented by scientific methods such as radiocarbon dating.

Although Neolithic pottery of Greece has been extensively studied, there are still many gaps in basic information such as proportion of wares, the relationships between wares, chronology, and how the vessels were actually used. These lacunae are due to discrepancies in the quality of excavations and their published reports, the ceramic variables traditionally studied (namely the privileged status of painted wares), and the number of unpublished assemblages.

Neolithic ceramic analysis in Greece has until relatively recently focused primarily on fine painted wares that tend to circulate and are obvious indicators of ceramic changes that are much more subtle in monochrome wares. Decorated pottery, however, often makes up a very small percentage (almost always less than 10%) of the total amount of pottery found at a given site during any period. It was not uncommon for many early excavations to discard much of the undecorated pottery. For example, at the site of Lerna in the Peloponnese, an estimated 90% of the material (Vitelli 2007, 3) was discarded. Other material, such as that from Ayioryitika, was ransacked during World

War II, and much of its contextual information was destroyed except for 19 small bags (Petrakis 2002, 2). Thus, the resulting reports have been rather biased in their presentation of material from a particular site.

Additionally, delays in publishing have rendered some publications obsolete by the time they appeared. A few notable examples of delays in publication of manuscripts include Kouphovouno 1942 ready, published 1989; Nemea ready 1926, published 1975, Franchthi pottery preliminary report in 1968, final repots in 1993 and 1999, Ayioryitikia excavated in 1928 and not published until 2002, final excavations at Lerna in 1958, published 2007, Phelp's dissertation submitted 1975, published 2004, Servia preliminary report 1979, first final report in 2000, but it does not include pottery, Paradimi excavated 1959, published 1981, and Nea Nikomedia excavated 1961 published 1996. Walker-Kosmopoulos' pottery volumes on Corinth, Choirospilia Cave, and Halai never appeared, although they were promised in her 1948 general volume on Corinth, which was also published with some delay.

Aside from the pottery presentations in preliminary report, final publications of particular sites and special pottery investigations (mainly scientific analysis), there are few updated overviews of Greek Neolithic pottery available for the non-specialist. The only survey that focuses strictly on Neolithic pottery is Holmberg's (1964b) brief account, but it is now outdated. Regional studies on Macedonia (French 1964; Rodden 1964; Tataki 1968; Aslanis 1992), Thessaly (Schachermeyr 1964; 1991 posthumously published by Alram-Stern; Rondiri), Central Greece (Syriopoulos 1964; French 1972) and Southern Greece (Syriopoulos 1968; Phelps 2004; a publication of his 1975 thesis without much updating) are also in need of corrections given the amount of work in recent decades. These works address Neolithic pottery from a diachronic perspective. There is no work that focuses solely on Late Neolithic pottery throughout mainland Greece, and this paper is intended to fill this void.

A final obstacle in correlating Greek Neolithic pottery from site to site is that the terminology used to describe morphology, motifs, and techniques not only differs from site to site, but also in how these terms are used. For example, pottery types of the same name such as Black-on-red of Macedonia has a completely different chronology, technology, morphology, and repertoire of motifs than the Black-on-red that occurs earlier during at the Middle to Late Neolithic transition in Thessaly, and in Central and Southern Greece. Consistency in terminology and drawing conventions is imposed in this paper (see above).

Late Neolithic Greece Chronology

In the last thirty years, there have been many advances in understanding the chronology of the Late Neolithic period in Greece. First, primarily new excavations have greatly clarified major chronological debates, three of which deserve special attention: Sitagroi, Plateia Magoula Zarkou, and Promachon-Topolnica. Radiocarbon dating at Sitagroi near Drama in Eastern Macedonia (Renfrew, Gimbutas and Elster 1986) settled an ongoing debate in Old World Archaeology about the antiquity of the Balkan Neolithic, contra the traditional *ex oriente lux* theories.

Subsequently, the stratigraphy and early radiocarbon dates from Promachon-Topolnica on the Greek-Bulgarian border rectified some aspects of the pottery sequence from Sitagroi and additionally demonstrated that Graphite Painted pottery was also an indigenous development rather than a technology borrowed from Balkan cultures to the north. The excellent stratigraphy at Plateia Magoula Zarkou in Thessaly (Gallis 1987) revealed the proper location of “Larisa” Black-burnished pottery, which had previously been incorrectly assigned (due to incomplete and confusing stratigraphy at several sites in Thessaly) to the Final Neolithic-Early Helladic transition (Milojčić 1959b). It belongs at the end of the Tsangli phase, now called the Tsangl-Larisa (Gallis 1987, Demoule, Gallis, and Manolakakis 1988).

The correct positioning of the Larisa phase of Black-burnished pottery in the early Late Neolithic revealed a smooth development of painted Late Neolithic pottery from the Tsangli-Larisa to the Arapi and then the Classic Dimini phase. Milojčić (1950–1951) had incorrectly placed two chronological phases between Arapi and Classical Dimini. He equated Otzaki A/Ayia Sofia with Dimini I, Otzaki B with Dimini II and Dimini III as Classic Dimini; this system was later modified after the finds at Otzaki to include four Dimini periods, with Dimini IV as Classic Dimini (Hauptmann 1981, 141–144; Weisshaar 1979).

Similarly, Milojčić’s (1950/51; Hauptmann 1981; Otto 1985) Otzaki Groups A, B, and C—which corresponded more or less to Wace and Thompson’s categories (B3α (White on red polished ware), B3α2 (Black-on-red Polished, Classic Dimini style), and B3β Polychrome (Black and White Paint on a Red Ground or Black and Red Paint on a Cream Ground) have more of a geographic distribution in North-eastern Thessaly (Holmberg 1964b, 31) rather than a chronological meaning, especially since the pottery came from distributed pits and ditches rather than closed contexts (Andreou et al. 1996, 552; Gallis 1994, 58).

In any case, the division of Dimini into sub-phases probably does not have a chronological value (also contra Otto's 1985 chronological scheme) and instead represents "increased stylistic differentiation within more or less contemporary pottery" (Gallis 1987, 59; 1993). The correct ceramic sequence reveals also clearer ceramic continuity. For instance, Tsangli Black-on-red Polychrome pottery evolves into Arapi style Polychrome (black, red and white on a buff ground) and then into the Classic Dimini style of Matt-painted pottery (brown-on-buff ground or "chocolate-on-cream").

Furthermore, Milojčić defined the Final Neolithic as "Rachmani," which he subsequently subdivided into Rachmani I, II, III at Pevkakia, although it is now understood that only Rachmani I is Final Neolithic, with the other two periods belonging to the Early Helladic period (Milojčić 1959, 19; Hauptmann 1986, 25–26). As a result of the rearranging of Neolithic subphases, it turns out that tripartite chronology for Neolithic Greece yields three periods of unequal length, rather than equal duration as Weinberg asserted (1947) and had generally been assumed. In fact, the Middle Neolithic is the shortest period, and the Late Neolithic the longest (Gallis 1994, 58; Coleman 1992a, 251).

Additionally at Plateia Magoula Zarkou, unequivocal evidence was found in the ceramic forms and wares that suggested a smooth evolution from the Middle Neolithic to the Late Neolithic period (Demoule, Gallis and Manolakakis 1988). This transition had been indicated at other sites, such as Franchthi and Corinth but was not particularly well documented. It also disproved the misconception of the Late Neolithic period as marking a new era, one marked by destructions, new pottery types, and new people (i.e., Weinberg 1962, Schachermeyr 1955, Holmberg 1964b, etc.). The earlier Late Neolithic dating for the Larisa Culture has since been confirmed by findings outside of Thessaly, for instance in Macedonia, at Servia (Ridley, Wardle, and Mould 2001).

While it is true that many sites are abandoned or destroyed at the end of the Middle Neolithic, many new ones are founded, and there is an increased use in caves. The destruction levels are by no means simultaneous as to represent roving bands of intruders, and they may instead be either accidental or intentional since the deliberate burning of houses (and entire villages) is a well documented practice in several Balkan Neolithic cultures (Vinča, Cucuteni, Boian, etc.). Similarly, the occurrence of ditches and walls around sites has proven to be much more common than once thought. They are now understood to be symbolic boundaries or possibly practical enclosures to prevent wild animals from entering the village, rather than defensive structures as previously interpreted.

The traditional beginning of the Late Neolithic period begins with the appearance of Matt-painted pottery (Weinberg 1962), but it remains to be determined if Matt-painted pottery appeared simultaneously throughout Greece of whether it began in a particular area and arrived at various places at different times, and Classic Dimini style Matt-painted pottery represents only a small phase of this Late Neolithic phenomenon (Chapter 3).

Lastly, Aslanis (1992; 2004) argued that the end of the Neolithic should be placed after the first phase of Late Neolithic Ib, the pre-Dimini “Arapi” phase and that the later phases of what is conventionally known as Late Neolithic Ib (Otzaki and Dimini phases) should be termed “Chalcolithic,” which lasts until the Early Bronze Age.

Radiocarbon Dates

Milojčić's chronology failed because of two main factors. First, the sites which he chose to excavate for chronological investigations had been bombed during the Balkan Wars and did not preserve complete stratigraphy. Secondly, he rarely took radiocarbon samples and adamantly opposed radiocarbon dating. In terms radiocarbon dates the Late Neolithic spans some 1, 000 years from ca. 5,300–4,300 B.C. (Coleman 1992; Sampson 1993). It has been divided by Sampson (1993) into two phases, Late Neolithic Ia and Ib, which correspond to the earlier (pre-Dimini) and later (Classic Dimini) phase. The Late Neolithic Ia period dates to ca. 5,300– 4,800 B.C. and includes the Tsangli and Larisa phases. Late Neolithic Ib dates to ca. 4,800–4,300/4,200 B.C. and includes the Arapi, Otzaki, and Classic Dimini Phases.

Scholars in Macedonia date the Late Neolithic period differently, from 5,400–4,700 B.C. (Andreou, Fotiadis, and Kotsakis 1996, 538). This dating is to accommodate the Final Neolithic, which begins much earlier in Macedonia in part due to its relationship with other Balkan cultures. The Late Neolithic to Final Neolithic transition in Greece deserves similar reevaluation as the Middle to Late Neolithic transition. Although this topic is beyond the scope of this paper, based on present evidence, the transition from Late to Final Neolithic in Macedonia is much smoother than in other areas of Greece. Regarding the ceramic record, there is continuity in Macedonia with Black-on-red and Graphite painted pottery, whereas in Thessaly, Central, and Southern Greece, painted pottery disappears except for post-firing Crusted paint.

Late Greek Neolithic Chronological Terminology

By chance, the sites first surveyed by Tsoundas and Wace and Thompson were Middle and Late Neolithic sites, so they simply divided the Neolithic into an early and later period, as clearer divisions could not be made. A tripartite division of the Neolithic into Early, Middle and Late Neolithic was first formally proposed by Weinberg (1942, 121; 1947, 165–182). Weinberg based his division on the Neolithic material from his excavations at Corinth where he realized the "Early" Neolithic could be divided into two phase: Early Neolithic and Middle Neolithic (1942, 121). He reserved the "Chalcolithic" as a transitional phase to the Bronze Age until new information could clarify it better than the material he had found at Corinth. Weinberg's controlled excavations at Elateia in Boeotia (1962) appeared to confirm his tripartite chronology.

While some scholars, such as Schachermeyr (1955), agreed with Weinberg's tripartite division, other scholars, such as Milojčić (1950/51; 1959; 1971) divided the Neolithic into four main periods based what he identified as "cultural groups." Milojčić was the first to introduce the concept of cultural groups in Greece, although their use was popular in other parts of Europe, including the Balkans. This practice was briefly made popular in Aegean Archaeology when such terms were proposed by Colin Renfrew in 1972. Milojčić's chronology was partly typological and part chronological. French (1972) and Phelps (2004) used "phase names" to characterize a period, based on a site where that particular phase is best represented. French had five Neolithic phases, while Phelps maintained four main divisions of Early, Middle, Late, and Final Neolithic divisions (plus subphases).

More recently, the use of cultural and phase names has been abandoned in favor, once again, of the broad headings of Early, Middle, and Late Neolithic. Many scholars (i.e., Coleman 1992, 247, Sampson 1981, Phelps 2004, etc.) find the profusion of cultural phase names cumbersome. Additionally, as French points out, that “the use of site names for cultures or pottery phases implies a geographic unity of style which is rarely found in practice, at least in the Neolithic Age; it masks important local variations and its validity diminishes proportionally as one moves away from the type center” (French 1972, 6). Furthermore, Sampson (1993) and Coleman (1992) argue in favor of including the Final Neolithic or Chalcolithic as a subdivision of the Late Neolithic because, according to their chronologies, the Final Neolithic spans some 600 years (and 1,400 in Northern Greek chronology), a period they consider far too long to be considered “Final.” Thus, they divide the Late Neolithic into Late Neolithic I and Late Neolithic II. Late Neolithic I has been divided by Sampson (1993) into two phases, Late Neolithic Ia and Ib, which corresponds to earlier (Tsangli and Larisa) and later (Arapi and Classic Dimini) phases. Phelps (2004, 101) also supports this division.

Sampson and Coleman’s terminology has not been embraced by all contemporary scholars and many, including the present author, prefer to use the term Final Neolithic both because this period and the transition to the Early Bronze Age remains poorly defined and because the general nature of the material culture appears substantially different from the preceding Neolithic phases. The term Final Neolithic has been used by Phelps (1975, 2004, 7) and Refrew (1972, 68–80). Other equivalent terms for this period include Chalcolithic (Diamant 1974), kupferzeitlich (Weisshaar 1979), Subneolithic

(Pantelidou-Gofa 2000), Rachmani (Hauptmann and Milojčić 1969), and Eneolithic (Vajsov 2007).

These names, however, have different meanings in neighboring regions like the Balkans and Anatolia, which implies cultural uniformity where it may not exist (Coleman 1992, 251–252, 256). Most importantly, it should be noted that the Greek Neolithic periods of Early, Middle, and Late correspond to these adjacent areas; however the contemporaneous period of Late Neolithic Greece is called Middle Neolithic in the Balkans.

Late Neolithic Pottery: A Clarification of Basic Motifs, Morphology, Terminology, and Technology

The technology of different types of vessels is described in separate sections following the main discussion of each type of pottery. Since specific cases are examined in those sections, and because the technology of Late Neolithic pottery is extensively studied elsewhere for Greece (i.e., Gardner 1978; Maniatis and Tite 1981; Letsch 1982; Letsch and Noll 1983; Kalogirou 1994; Hitsiou 2003; Malamidou 2005; Pentedeka 2008; Schneider et al. 1991a and 1994; Maniatis and Kilikoglou 1993; Mavridis 2008), this section is intended to provide only the briefest synopsis of the different techniques utilized to create the pottery and to clarify some of the terminology used by scholars to describe and categorize the styles.

Morphology and Terminology

In the most basic sense, there are only two types of vessels: open and closed. However, even open vessels like bowls may have restricted openings; for instance, a potter could still reach his or her hand inside in order to scrape and finish the vessel, but other morphological features may exist, such as incurving sides beyond the maximum diameter of the vessel; this is how a "hole-mouth" jar is created. In the literature, the terms "neck" and "collar" are often used in various ways, but this is in error. Rice (1987, 212) defines a neck as a restriction of the opening of a vessel, whereas a collar begins at the point of maximum diameter and does not significantly reduce the opening like a neck; a neck usually joins at an angle. Applied to the Late Neolithic repertoire, bowls have collars and jars or jugs have necks.

The main types of Late Neolithic vessel shapes are: bowls, fruit-stands, jars or jugs, askoi, "rhyta," scoops, tumblers, cups, basins, tripod-cooking pots, and plates or pans. Further divisions can be made based on additional morphological features such as the presence of carinations, and where they are located. For instance, a carination below the belly creates a keeled or piriform shape, while a carination at the belly may create either a collared bowl or a biconical bowl, and a carination above the belly, at the shoulder, creates a carinated-shoulder bowl. Basins are conical and have handles. "Cheese-pots" are similar to basins but lack handles and have a row of perforations around them, located under the rim. "Fruit-stands" are bowls on high pedestals. "Rhyta" are four-legged zoopomorhphic and anthropomorphic vessels with side openings and a basket handle. The terms "fruit-stand," "cheese-pot," and "rhyta" are retained here since they have been accepted in the literature although their names do not reflect their uses.

A shallow bowl is also known as a convex bowl, in order to distinguish it from a conical bowl; the difference is, of course, the shape of the vessel walls. The term piriform denotes an ellipsoidal form rather than an ovoid one. A deep bowl is a hemispherical bowl in which the sides have been extended upward. Round shoulder bowls have sharply inward turning walls at the shoulder, which is located high up on the vessel. Tumblers are straight-sided cups, sometimes with flaring walls. A “Dikili Tash” bowl is a carinated bowl in which the collar/rim flares outward (sometimes refered to as an “S” profile). A “Kritsana” bowl is a shoulder-carinated bowl in which the rim sharply turns inward. A “Dimini” bowl is a conical bowl around 15 cm high, with sets of two or four small string-hole lugs placed symmetrically just under the rim.

The shapes of Late Neolithic pottery show a fascinating range of influences from non-ceramic vessels, including metal, stone, wood or bark vessels, basketry, gourds, leather containers, and anthro-and-zoopomorphic shapes. These are discussed throughout the paper (see for instance, chapter 6).

Technology

Late Neolithic potters exploited local clay sources and subsequently processed the clay in various wares. Their clay may have been used as found, refined through levigatation, have mineral or organic temper added to it, or even be mixed with another clay. In any case, there are three important mineral inclusions that affect the nature of the clay: feldspar, quartz, and calcite. Although these minerals naturally occur in clay, they may also be added to it. Particular clays may or may not have been sought out by Neolithic potters; this is a relatively recent avenue of inquiry.

Feldspar (a silicate mineral), unlike quartz, does not undergo inversions, but instead melts; it is used as a flux (Rice 1987, 96-97). Quartz (silica, sand, or flint) is important because when heated it undergoes three different chemical inversions that have implications in reducing firing shrinkage and porosity of the vessel while increasing strength (Rice 1987, 95–96). Calcium carbonate (i.e., limestone, calcite, shell, quartz, animal bone, or ash) has a distinctive property in that it decomposes into lime (CaO) at ca. 870°C (although this temperature is disputed as anywhere from 650°C up to 900°C; Rice 1987, 97–98). The temperature of the fire is, therefore, a concern because when the pottery is fired at or above this temperature, the calcite decomposes into lime. The lime in turn absorbs moisture from the atmosphere and forms quicklime ($Ca[OH]_2$) and in doing so, it releases heat and causes stress in the vessel body to expand in destructive ways such as cracking and spalling or creating lime-pops (Rice 1987, 97–98). The easiest way to compensate is either to fire in reduced atmosphere at less than 700°C or at over 1,000°C so that the calcium sinters and vitrifies-which it does if the lime particles are fine (Rice 1987, 97–98; Maniatis and Tite 1981; Schneider et al. 1991).

All Late Neolithic vessels were hand-made using a variety of (or combinations of) techniques ranging from pinching and/or drawing, slab modeling (either segmental or morsel) coiling, and molding (hammer and anvil). Without fortuitous finds or X-ray analysis, it is often difficult to ascertain which method was used, because both the interior and exterior surfaces were methodically scraped in order to create walls of even thickness, and this action obliterated traces of the manufacture. The majority of vessels were slipped and smoothed. A smoothed surface is created with a soft tool like leather, grass, or hands and may include the use of a slip (Rice 1987, 138). Smoothed surfaces may also occur on vessels which have a self-slip (mechanical slip). Some received additional burnishing.

The terms burnishing and polishing are often used synonymously in the literature, although Rice (1987) distinguished between the two. Rice (1987, 138) defines burnishing as done with a hard tool, like a pebble, bone, or sherd in order to compact and reorient the fine clay particles of the slip or vessel surface, which is evidenced by parallel strokes on the surface of the pot; it is typically done when leather hard or dry. Polishing is done on a dry surface, with uniform luster and without parallel facets produced by burnishing (Rice 1987, 138). A highly burnished surface is describes as lustrous. Pattern-burnishing (sometimes referred to as stroke-burnishing) is the selective burnishing of areas of the vessel in order highlight the juxtaposition of lustrous, burnished areas with matte, unburnished ones (Rice 1987, 138). Similarly, the term “buff” is also used invariably in the literature to describe either a texture (slightly rough) or a color (like khaki). Painted decoration was done before firing, although white paste (such as kaolin) and red ocher could have been applied as fill on incised areas either before or after firing. Incised and plastic decorations were also common.

After the pots were allowed to dry, they were fired either in open firings, pit firings, or in domestic ovens. An open firing (bonfire, campfire, or clamp method) is short and reaches relatively low temperatures of ca. 600–850°C; the maximum temperature attained and how long it is sustained depends on the type of fuel used (Rice 1987, 153, 155, 156). It consists of a stack of fuel on the ground, the vessels, and then more fuel on top; typically the firing is over when the fire dies out, and the pots are taken out before being allowed to cool in the ashes (Rice 1987, 153). Since the fuel and vessels are in contact with one another and the conditions are not well controlled, their surfaces can be mottled by different flare-ups in the fire. Smudging (carbon-black technique) is a variation in open firings, in which the pyre is covered with manure, sawdust, wet leaves, etc. in order to deposit carbon to make black-surfaced vessel (Rice 1987, 158). Rice (1987, 158) considers a pit firing intermediary between open and true kiln firings because on the one hand, the fuel and the pots are together, but on the other, it is partially enclosed by the ground, which enables higher temperatures to be reached.

True pottery kilns are not attested in Late Neolithic Greece (or in any other phase of the Neolithic), although it has been suggested that some types of Late Neolithic pottery such as Black-on-red, Gray-on-gray, Graphite-painted , and Classic Dimini style Incised used them (Yiouni 2000, 210, 212; Vitelli 1994, 83 Frierman 1969, 44; Chourmouziadis 1977, 207–211). Kilns were supposedly identified at a number of sites including: Dikili Tash (Seferiades 1983, 643, fig. 6), Kryoneri (Malamidou 1997, 515, fig. 5), Dimini (Chourmouziadis 1977, 207–211), Olynthus (Mylonas 1929, 34–38; Heurtley 1939, 9–10), and Liminaria on Thassos (Malamidou and Papa 1993). Subsequently, many of these claims were challenged either on the details of the construction or the chronology, and the kilns were downgraded to regular domestic kilns or more vaguely, “thermal structures.” For instance, the Dikili Tash kiln is questioned by Tsirtsoni (2000), Olynthus by Vitelli (1974, 26, 29–30), Kotsakis (1983, 136–137), and Jones (1986, 776–777), and Dimini by Souvatsi (2008); although Kotsakis (1983, 137), Halstead (1992, 31–32), Andreou et al. (1996, 544), and Hitsou (2004, 88) do not seem to question the Dimini kiln.

The atmosphere of firing conditions, along with the type of clay and paint used determined the resulting appearance of the pot. Oxidized firing conditions yield red and light-colored pottery, while reduced ones create black ones, and mixed conditions give more gray and brown-tones. Iron-oxide pigments can produce red tones if fired in oxidized environments or dark brown-blacks if fired in a 3-stage process known as the iron-reduction technique, in which oxidized and reduced environments are alternated. The content of iron in the clay not only lowers the temperature necessary for firing (because the iron acts as a flux), and it also affects the resulting shade of red-brown depending on the type and amount of impurities in the iron oxide (Shepard 1965, 37). These differences can be scientifically measured using Mössbauer spectroscopy (Jones 1986, 21; Maniatis, Simopoulos, and Kostikas 1981). Manganese paint creates brown-blacks irrespective of firing conditions and was widely used in prehistoric periods (Noll, Holm, and Born 1973).

Motifs: Decorative Themes and Styles of Late Neolithic pottery

In ceramic analysis terminology, motifs are comprised of smaller units called elements, which are the smallest self contained component of a design that is manipulated or moved around as a single unit, such as one brush stroke or one incised tool mark (Rice 1987, 248). These elements make up motifs or designs, which are fixed combinations of elements to make larger compositions.

Late Neolithic pottery uses a variety of motifs and compositions; some of these determinations are caused by the type of pottery, chronology, or geographic location. The broad trend is a move from more geometric compositions in the Late Neolithic Ia to curvilinear ones in the Late Neolithic Ib. Similarly, the earlier pottery styles tend to use highly structured compositions (metopes, panel decoration) to emphasize different parts of the vessel such as the rim or belly. In the Late Neolithic Ib, however, the compositions are less rigid and cover the entire surface of the vessel. The geometric decoration is comprised of groups of parallel lines (horizontal, oblique, parallel, or alternating), zigzags, wavy lines, dot-edged lines, herringbone, arrows, ladder-motifs, “checkerboard,” cross-hatching, hatching, triangles, rhomboid, diamonds, rays, tongues, “Z” shapes and stepped motifs. Curvilinear decorations include quirks, isolated spirals, “J” hooks, wavy lines, spirals (isolated, antithetical, running, or reduplicated), arcs, circles, ovals, “ring-idols,” and dots. Painted anthropomorphic representations are rare, but they do occur and are rather schematic.

Similar to some shapes, the motifs of Late Neolithic are influenced from other crafts and material such as weaving, basketry, ring-idols, *pintaderas* (stamps or seals), figurines, architecture, etc. It has also been suggested that the repetition of certain elements may be part of a communication system (Gimbutas 1995; Mavridis 2008). The meaning of particular elements, however, is almost never commented upon. Gimbutas (1995) offered some suggestions in her grand synthesis of southeastern Europe in the Late and Final Neolithic, and although she argued that the Balkan Peninsula was a broadly common cultural unit, she drew most of her examples from Bulgaria, Romania, and Serbia rather than from Greece. More recent explanations for broad similarities consider the role of cognition and the role of material culture in externalizing entopic phenomenon (Williams and Pearce 2005).

While the different styles of decorated Late Neolithic pottery—both within one type, such as Matt-painted—and between types like Matt-painted and Black-burnished undoubtedly played a major role in establishing identities and communication base on its specific contexts, the exact nature of this social mediation is not well understood; surely in the thousand year time-span of the Late Neolithic, the different styles, technologies and even the base elements functioned as open systems, with shifting meanings and values. In this sense, "style" is here used in a more art-historical sense, as "a manner or mode of expression (as distinct from the content or ideas expressed), and the distinction, originality, and character of that expression" (Rice 1987, 244). It is used to examine variability in the archaeological record other than as mere chronology.

CHAPTER 3: MATT-PAINTED POTTERY

Late Neolithic Matt-painted Pottery (Figures 5–20)

Matt-painted pottery is defined as iron or manganese based paint on a buff brown or cream background to create dark-on-light painted pottery. It begins at (or shortly after) the start of the Late Neolithic period and lasts until just before the beginning of the Final Neolithic (Late Neolithic II) (Sampson 1993; Phelps 2004, 87). Wace and Thompson (1912, 17) defined Matt-painted pottery as B3ε (Brown on buff ware), which they noted was related on the one hand to Late Neolithic Ia Matt-painted Black-on-red (B3δ Black-on-red ware with linear designs, often matt), and on the other hand to Late Neolithic Ib Polychrome Arapi ware (B3γ Three-colour ware; black and white patterns on a red ground or with black and red patterns on a cream ground). This relationship with Late Neolithic wares from both phases underscores the long duration, which lasts until the Final Neolithic. The well-known Classic Dimini style of pottery belongs to Wace and Thompson's (1912, 16) B3α2 or B3α3 class (Chocolate-on-cream, and Black-on-red polished ware, or Black-on-white ware).

Two "new" important ceramic innovations define Matt-painted pottery as a class: one is technological, and the other is a stylistic change in the motif structure. The technological innovation of Matt-painted pottery is the new use of manganese paint from Thessaly to Southern Greece while iron-based paint is used for the first time in Macedonia (see technology section below).

The background of Matt-painted pottery is usually light brown or "buff" color. It is usually self-slipped, giving it a "buff" texture. Sometimes an off-white kaolin or calcareous slip different from the clay body was added by the potter to create a lighter-color background. Burnishing is typically found on sherds that are slipped, and these examples occur sometime after the ware is in use. The primary shapes, found from Macedonia to the Peloponnese, include "fruit-stands," spherical jars with flat handles, carinated bowls, and other types of bowls or tumblers, which are more regional in nature (see Figure 5–6).

Matt-painted pottery is the broadest class of decorated pottery because it is widely diffused throughout mainland Greece. For this reason, it is often referred to as a "*koine*" of the Neolithic, an idea first proposed by Theocharis (1981, 128). While it is not the first "*koine*" of Late Neolithic Greece, a title that belongs more properly to Late Neolithic Black-burnished pottery (Mavridis 2008, 159; Weinberg also referred to Early Neolithic Greece as a *koine* in 1965, 287), its endurance throughout the entirety of the Late Neolithic period is noteworthy and makes it a hallmark of the period (Sampson 2008a, 144).

Given the *longue durée* of the ware, there are several varieties or styles that are both chronologically and geographically determined. There are differences in technology, surface appearance, and motif organization that must be addressed independently by region (French 1974, 16). Aside from this brief overview, there is neither a focused regional study nor a broad review of Matt-painted pottery. No production centers have been located, and no petrographic or provenance studies have been conducted to help shed light on the production and circulation in Greece (Mavridis 2008, 159).

It should be emphasized that the famous "Classic Dimini" from the eponymous site in eastern Thessaly represents only one phase of Matt-painted pottery during the 1,000 year span of the Late Neolithic period and that, therefore, the term "Dimini" is not synonymous with “Late Neolithic” (Theocharis 1973, 101). Weinberg stresses that to even call it a phase is a misnomer (1965b, 299). Furthermore, despite the posterity of Dimini Ware, none of the pottery from Dimini (plain or decorated) has been systematically studied or published. The two exceptions are a symmetry study (Otto 1985) and a study of household distribution of different types of pottery (Soutvatsi 2008). Otto’s symmetry study was aimed at examining the chronological implications of style through symmetry, but since it is now believed that the division of Dimini into sub-phases, or the Ayia Sofia phase probably do not have chronological value and instead represents contemporaneous regional styles (Gallis 1987, 59; 1993; Coleman 1992, 256), it is not followed here.

Nevertheless, the division of the Late Neolithic into Ia and Ib (Sampson 1993) is essentially an arbitrary chronological marker that indicates changes in the decorative schemes of Matt-painted (and Polychrome) pottery. Matt-painted pottery in Late Neolithic Ia is characterized by conservative tectonic arrangement of motifs into bands and panels that emphasize the vessel’s morphologic characteristics. In Thessaly, Matt-painted falls out of fashion in the Late Neolithic Ib Arapi phase (Phelps 2004, 101), but when it reappears later in the period as the Classic Dimini style of Matt-painted pottery, whole-vase unity designs are used with varying degrees of symmetry and torsion. It is important to note that the more modest styles of Matt-painted pottery also continue to be used during this period (both in Thessaly and in other parts of Greece).

Given the predominance of studies at the local level, there is a proliferation in the terminology of wares that are herein included as Matt-painted pottery. All excavators except Vitelli (1999, 2007) subdivided Matt-painted pottery to some degree based on their surface appearance (i.e., Wace and Thompson 1912; Lavezzi 1978, 421, 423; Jacobsen 1969, 271; Weinberg 1962, 168). The only consistent application of five subdivisions is the one devised by (and used only by) Sampson, which he first laid out at Varka, near Psachna, Euboea (1975, 74–75) and subsequently revised at Skoteini (1993, 71) and the Sarakenos Caves (2008a, 112).

I. Origin and Diffusion

Saul Weinberg was the first scholar to equate the beginning of the Late Neolithic period with the appearance of Matt-painted pottery (1962; French 1972, 11). He based this assertion on the stratigraphy of the "*bothros*" deposit at Elateia. While the stratigraphy of the deposit may have been accurately recorded by him, it is not entirely representative of the actual ceramic sequence of Central and Southern Greece, because of the fact that it is a rubbish pit. For the present argument, what is important to recall is that Weinberg stated that Urfirnis and Black-burnished pottery were contemporaneous, while the Matt-painted pottery occurred later (Weinberg 1962, 198).

Weinberg concluded that Matt-painted pottery was not associated with either Black-burnished or Urfirnis and that there was a delay in the "arrival" of Matt-painted pottery, which was introduced to the site by new people (1962, 198). In his opinion, these "new" people were responsible for the destruction layer found between the Middle and Late Neolithic layers. Specifically, Weinberg found strong parallels to Matt-painted pottery in the Ubaid culture of the Near East and believed that this was the homeland of the ware (Weinberg 1962; 1972). Some scholars endorsed this rather implausible view (Schachermeyr 1955a; 1964; 1991; French 1974, 16; Letsch and Noll 1983, 110) while others were not convinced (Theocharis 1973, 101, 109; Holmberg 1964b). Foreign influence and invasion theories are no longer tenable, based on mounting evidence, such as discrepancies in chronologies.

Some recent scholarship, however, has maintained the existence of a temporal gap of an unspecified duration before the introduction of Matt-painted pottery. For instance, Phelps accepts Weinberg's dating of the "*Bothros*" and dates it earlier than the Forum West deposit at Corinth; he also believes that Matt-painted pottery began in the Northwest Peloponnese and spread to Central Greece, which explains the delay in its arrival at Elateia (Phelps 2004, 18, 95, 160). Similarly, Sampson agrees in the existence of "an intermediary chronological gap of unknown duration between the painted wares of the Middle Neolithic and the appearance of the Matt-painted that is bridged by Black-burnished pottery (Sampson 2008a, 145) (see chapter 6 on the Plateia Magoula Zarko phase). Sampson, however, believes that Matt-painted pottery began first in Central Greece and then spread to the Peloponnese and Macedonia, an opinion with which the present author agrees (1993, 85; Sampson 2008a, 83).

Conversely, Mavridis (2008, 158) believes on present evidence that Matt-painted pottery began simultaneously throughout Neolithic Greece and in fact may have begun just slightly later in the Peloponnese based on the Corinthian material excavated by Jacobsen (1973). In any case, both Phelps (2004, 18) and Mavridis (2008, 159) agree that this delay, if it truly existed, is not significant. The same argument may be true for the arrival of Matt-painted pottery in Macedonia.

Phelps concedes that some sites like Franchthi and Eutresis preserve the transitional evidence lacking at other sites, although the brevity of the transition makes it hard to document archaeologically (2004; 18, 96). For example, he believed that Matt-painted pottery developed out of the Middle Neolithic Urfirnis painted tradition, with Walker-Kosmopoulos's "Hybrid Ware" as an intermediate ware (Phelps 2004, 95, 96). Phelps recognizes Walker-Kosmopoulos's "Hybrid Ware" at Corinth as a combination of the fabric of Urfirnis with the matt paint (manganese paint); similarly, he also sees this relationship in the material from Eutresis (Group I) and Franchthi Cave, which also trace the development of Matt-painted out of Urfirnis (Phelps 2004, 96).

Many subsequent excavations have shown that the Matt-painted tradition coexists (albeit for an undetermined length of time) with Black-burnished and Urfirnis. For example, at Franchthi Cave, Matt-painted pottery starts to appear when Urfirnis begins to decline and Black-burnished ware peaks (Jacobsen 1969, 266). At Corinth, Aria Argolidos, and Varka (near Psachna on Euboea) the three wares also co-exist (Jacobsen 1969, 266; Sampson 1981, 110; Douzougli 1998, 93). At Varka, Matt-painted pottery was found together with Urfirnis and Red and Black-burnished wares (Sampson 1981, 110), which Douzougli and Mavridis assert is true for all of mainland Greece during this first part of the Late Neolithic Ia (Douzougli 1998, 93; Mavridis 2008, 118). Black-burnished pottery is contemporary with the beginning of Late Neolithic Ia and the Tsangli phase in Thessaly (Theocharis 1973; Sampson 2008b, 31).

Matt-painted pottery also occurs alongside Black Burnished pottery, in Thessaly, during the Tsangli-Larisa and Arapi phases (Mavridis 2008, 118). Matt-painted and Black-burnished pottery of the Tsangli-Larisa culture even utilize the same forms, such as the shoulder-carinated bowl (Gallis 1992, 59). Similarly, many motifs are also borrowed from the Middle Neolithic Red-on-white and Urfirnis repertoire, such as hatched triangles, lozenges, nets, and arcs. In northern Greece, Black-burnished pottery and Matt-painted pottery also occur together (i.e., Promachon-Topolnica;Vajsov 2007).

Pandelidou-Gofa (2004, 74) suggests that Matt-painted vessel shapes are imitative of metallic forms, which were beginning to be used in Neolithic Balkan cultures during the Late Neolithic period in Greece. She points to their tendency to have sharp carinations, strongly curved walls, and strap handles; even the buff color of the clay is reminiscent of copper.

Matt-painted Pottery Motif Structure

In addition to the new technology of matt paint, the second “new” aspect of Matt-painted pottery in Late Neolithic Ia is how the decorative schemes are handled, although many of the elements and motifs are the same as preceding periods. Generally, the tradition is characterized by rather austere decoration, organized in bands that are arranged in panels between the rim and carination in order to emphasize certain morphological features of the vessel, such as the shoulder, belly, and carination. These regular panels are reminiscent of a Greek temple’s architectural metopes or triglyphs and their structured use on pottery results in a frontal articulation of the vases (Sampson 2008a, 139).

Continuous patterns may have also existed, but do not survive. It is also difficult to determine shape-motif relationship given the fragmentary nature of the pottery. The exception to this stark style is the brief floret of Dimini Style Matt-painted pottery as described below. There is no *horror vacui*; on the contrary, empty space and negative space are embraced in Late Neolithic Matt-painted styles. The large numbers of undecorated sherds recovered from the Skoteini Cave is significant because it reveals that the intent was not to cover the entire pot with designs but to leave ample open space (Sampson 1993, 97, fig. 25).

Tectonic designs are used for the first time in the Greek Neolithic. The motifs are arranged neatly into panels and metopes rather than using a larger, unified composition (unity design) that encompasses the entire vessel. This type of organizational structure is very orderly, which may give the impression of being primitive ("retrograde" in Theocharis' words; 1973, 92) or perhaps at least less visually interesting in its use of space and motifs than in the previous unity designs. The "conservative" nature of Matt-painted pottery certainly defines the class from Central Greece to Macedonia.

While metope-like arrangements and mostly linear elements predominate, curvilinear elements are also used in the panel decoration of Matt-painted pottery. These curvilinear elements are incorporated into the highly structured organization of the vessel's surface as in the Classic Dimini style, but they also occur within panel arrangements. Curvilinear motifs and representational motifs, of course, are not new in the Late Neolithic. They occur occasionally in the Early and Middle Neolithic Red-on-white painted pottery of Thessaly (i.e., Agrissa Magoula and Pevkakia).

Matt-painted pottery is not, however, always "rigorously and geometrically tidy" because sometimes the motifs are more loosely applied to the vessel surfaces as if they were quickly drawn freehand (Lavezzi 1978, 421). At Corinth, Lavezzi noted a correlation between neater, tighter motifs on thin, fine sherds and more hastily painted designs on thicker, coarser fabrics, which he suggests might be "a desire to complement better pottery with 'better,' painting" (Lavezzi 1978, 422). Although exceptional pieces of craftsmanship may occur, Lavezzi states that “[i]n general, however, the undistinguished rendering is befittingly matched by the stodgily pedestrian linear patterns, for which so often the term “motif” sounds too elegant” (Lavezzi 1978, 422).

Sampson has a more positive opinion of Matt-painted pottery than Lavezzi. He finds the motif repertoire inexhaustible, and the vessel decorations handled with “outstanding style, originality, and quality” (2008a, 137). For Sampson, the decorative motives and patterns are combined in limitless arrangements so that it is hard to find exact parallels in motifs between sites, even when they are in close geographic proximity to one another (Sampson 2004, 137). Furthermore, the abundance of mending holes attests to the great value attached to these pots, which were probably passed down as heirlooms (Sampson 2008a, 112, 115).

What is striking about the Matt-painted motifs is that while their range is rather limited and repetitive, no two identical arrangements or pots have been found. Thus, the ware escapes monotony. The question is then, how to interpret why unique vessels were produced with redundant design elements. Were the vessels personal property that were used in public and thus it would be necessary to equate one pot with a particular individual? Mavridis (2008, 145) suggests that the repetition of the motifs may have been part of a communication system. That is, the repetition of elements could be another form of proto-writing, such as the “signs” found throughout the Neolithic Balkans (at Yiannitsa and Dispilio in Greece) on figurines, vessels and tablets (Gimbutas 1995; Mavridis 2008, 145). Mavridis suggests that some of the motifs in the Matt-painted pottery repertoire are abstracted forms, “symbols” or “signs” of objects from everyday life (2008, 148). Representational motifs and anthropomorphic pots are also found in the Early and Middle Neolithic Red-on-white painted pottery.

Examples of household or day life objects depicted in the Matt-painted Pottery from the Cave of the Cyclops pottery included (what have been interpreted as) a footed bed, hut, roof, animal herd, landscapes of trees, rocks, flowers, and people (Mavridis 2008, 148). Mavridis thinks they could very well have religious meaning, despite the resistance of Greek scholars to accept this view (i.e., Chourmouziadis 1973; Marangou 1992). For example, Gimbutas interprets the step pattern representing horns of animal Gimbutas et al. 1989, 221) or the rectangle or lozenge bordered with two horizontal lines that is suggestive of a “footed bed”, which is always inserted along a zone (Mavridis 2008, 141).

Thessalian, Central, and Southern Styles of Matt-painted Pottery (B3ε Brown on buff ware): Figures 6–13

Matt-painted pottery in Central and Southern Greece falls into Wace and Thompson’s (1912, 16) class of B3ε (Brown on buff ware), and they remarked that sometimes it was hard to decide if a sherd belongs to B3ε or with Matt-painted Polychrome (B3δ Black-on-red ware with linear designs, often matt) since the shapes and fabrics are identical. In Thessaly, Wace and Thompson (1912, 17) remarked that Matt-painted B3ε (Brown on buff ware) was well-fired and had thin walls and that the two most common shapes were tumblers and fruit-stands. Wace and Thompson (1912, 17) also noted that the paint applied directly to surface, which ranges from a pale buff brown to a reddish brown; in Central and Southern Greece, a slip may have been applied, and in later phases the surface may also have been burnished.

Matt-painted pottery was most common during the Tsangli phase, although it only amounted to 6% of the total ceramic assemblage (Hauptmann 1969, 26). While Hauptmann and Milojčić (1969, 27) and Mavridis (2008, 118) equate Central and Southern Greek Matt-painted pottery with Wace and Thompson's B3δ-B3ε Thessalian Matt-painted pottery (1912) in terms of techniques and motifs, while French (1972, 9) and Phelps (1975, 191–198) find significant differences between the Matt-painted pottery of these two areas. Some of the motifs are similar, and the shapes are shared with other types of Tsangli-Larisa phase forms. Others, such as the Classic Dimini Style of Matt-painted Pottery and of Late Neolithic Ib, have motifs that are arranged differently from the Late Neolithic Ia styles of Central, Southern, and Northern Greece.

Later, in the beginning of Late Neolithic Ib in Thessaly, Matt-painted pottery of the B3ε (Brown on buff ware) continued to be produced into the Late Neolithic Ib, particularly in the earlier phase where it has a close relationship both in shapes and motifs' with Arapi style Polychrome-painted pottery (B3γ Three-colour ware; black and white patterns on a red ground or with black and red patterns on a cream ground).

From Thessaly to Southern Greece, linear and geometric motifs prevail. Linear elements include lines and bands, zigzags, triangles, diamonds, lozenges, herringbone, hatching and cross-hatching, net patterns, arrows, check-boards, rays, "butterfly" (2 triangles joined at the apex), "flame", tongues, and step-sided motifs (loose denticulate motif; Sampson 2008a 138). Curvilinear decorations include "snakes" or wavy lines, flames, circles, semi-circles, spirals, hooks, pendant arcs, festoons, "arrows," curved bands, and floral motifs including lilies, ivy, and leaves on stems (Sampson 2008a, 138). Anthropomorphic representations (Figure 7) also occur, although they are predominantly painted and not molded, like those of Thessaly and Macedonia (the jar from Elateia is an exception). A jar from the Alepotrypa Cave at Diros in the Mani (Peloponnese) is of particular interest for its painted figure with up-raised arms (Papanthasopoulos 2011, 60–61, 230–231). This gesture has been interpreted as ritual dancing in Neolithic communities (Garfinkel 2003), which is of particular interest for a pot found in a burial context.

On open vessels (Figures 8–12) there is often a decorative zone below the rim, which is divided into square or rectangular panels, like a Greek temple’s architectural metopes. This arrangement results in frontal articulation of the vases (Sampson 2008a, 139). The metope or triglyph arrangement of the motifs is created by bordering a main motif, which is placed between horizontal bands around the pots, and between vertical or oblique lines that create successive denticulate motifs that occur within panels (Sampson 2008a, 138).

Closed vessels (Figures 13–14) with high necks often have horizontal lines below the lip with the rest of the neck undecorated (Sampson 1993, 81). There is no *horror vacui*; on the contrary, empty space is embraced in these Matt-painted styles. Pots may also be rather simply decorated, with three bands of equal or unequal width under the rim (Sampson 2008a, 138). Continuous patterns may have also existed, but they do not survive. It is also difficult to determine shape-motif relationship given the fragmentary nature of the pottery.

In Central Greece, there is a correlation between the type of vessel and the decoration it receives. Bowls tend to have a decorative zone below the rim, which is divided into square or rectangular panels or “metopes” (Sampson 2008a, 138) and zones. At the Skoteini Cave, Sampson found Coarse Matt-painted shapes that tend to be open; common open coarse shapes included deep and shallow bowls, which are overall the most common Matt-painted shapes at the cave (Sampson 1993, 101, fig. 27). Jars with high necks often have horizontal lines below the lip with the rest of the neck undecorated (Sampson 1993, 81; 2008a, 138). Interestingly, at the Skoteini Cave, fruit-stand lips were almost always undecorated, except for a few instances of rays; one would expect this elaborate shape to be highly ornamented (Sampson 1993, 97, fig. 25), while pedestals at the Sarakenos Cave had dense decoration, often with triangular or irregular perforations interrupting the designs (Sampson 2008a, 144).

In the Peloponnese, an early and late class of Matt-painted pottery based on shape and style is also found, but secure stratigraphy to prove this is lacking; the late class is Matt-painted and found with the Late Neolithic Ib Polychrome of the Gonia-Klenia style and is, according to Phelps, earlier than the Forum West deposit at Corinth (Phelps 2004, 87). Phelps states that the southern examples of Matt-painted pottery have an overall different emphasis from the motifs and shapes found in Thessaly, but there are many affinities. Shared shapes include pedestal bowls, carinated bowls (examples with wasted handles of a later date), and collar jars (Phelps 2004, 101). The hourglass strap handle found in the Black-burnished Pottery of Tsangli-Arapi is common in Matt-painted pottery (Jacobsen 1969, 368). Peloponnesian shapes that do not appear in the Tsangli-Larisa phase include open or convex bowls, pedestal bowls (fruit-stands), and shallow open carinated bowls, while Thessalian shapes from this era that are not found in the Peloponnese include the use of basket handles, horned handles, rim tabs, and spur lugs (Phelps 2004, 101).

Classic Dimini Style Matt-painted pottery: History of Study

Despite its prominence as being the diagnostic pottery of the latter half of Late Neolithic Ib, the Classic Dimini style of Matt-painted pottery has not been systematically studied. In fact, none of the pottery from Dimini is properly published (according to current archaeological standards). The first excavator of Dimini, Christos Tsoundas (1908), divided the ceramics into three main categories: monochrome (B1), incised (B2) and painted (B3). He subdivided the painted (B3) into three types: Brown-on-Buff (B3α), also known as “Dimini Ware,” Polychrome (B3β), and Polychrome (B3γ). Wace and Thompson (1912, 17) had subdivided it into B3α2 (Chocolate on Cream) and B3α3 (Black on white ware or Black-on-red polished ware), the difference being the presence of a slip, darker black paint tone, and invariable use of burnishing; the two are included together for simplicity, since the meaning or value of these variations is unclear based on present scholarship.

The most recent excavator of Dimini, Chourmouziadis, referred to the pottery only in a general sense to substantiate his socioeconomic theories and did not fully publish it (1980; 1981). He made a preliminary analysis of the design of the pots (1980b), Otto (1985), and Washburn (1983); Voulgari (2000, 101–141) expanded Washburn’s method in order to examine the individual identities and styles in the decorative patterns of Dimini Ware (Brown-on-Buff, B3α). Microscopic analysis on fabrics has also been conducted (Schneider et al. 1991a, 1994).

The only person to examine the entire ceramic assemblage of Dimini was Souvasti (2008). Her objective, however, was not a ceramic study, but rather an investigation into the horizontal distribution of artifacts at the intrasite level. Although extensive typological or technical analysis was beyond the scope of her book, Souvatzi created general categories and included basic statistics to be able to talk about the material (Souvatzi 2008, 119; 2000 for analytical issues).

Essentially, Souvatzi found that of her 4,941 samples, only 30% amounted to painted pottery. Virtually all of the painted pottery consisted of the Classic Dimini style of Matt-painted pottery (96.4%) (Souvatzi 2008,119). Nearly all of the clay used for the painted wares was highly refined, and she notes that a particular, fine yellowish clay body was preferred for the Dimini type bowl (Souvatzi 2008, 121). The Dimini type bowls and basket shapes were exclusively painted in the Classic style of Matt-painted Dimini, and other shapes painted in the Matt-painted Dimini style include round or straight sided bowls, deep bowls, fruit-stands, and jars (Souvatzi 2008, 120–121). At Makryialos in Macedonia, Vlachos (2009, 138) noted the presence of imported Matt-painted Classic Dimini jugs; these have a strongly inclined and everted rim, a medium to short and narrow neck, a small cylindrical or banded handle and a flat base.

According to Souvatzi, the Dimini bowl (or *philale*) is the predominant type of painted pottery, thus justifying it as a type bowl/ware (Souvatzi 2008, 122). This diagnostic shape is around 15 cm high, with sets of two or four small string-hole lugs placed symmetrically just under the rim; it is unclear if these are functional or stylistic because they are consistent but not standardized; miniature and monochrome versions also exist (Souvatzi 2008, 255). Dimini bowls are totally painted inside, and this elaboration sets them apart from other types of Matt-painted pottery, which feature more sparse decoration. It is also what makes even the smallest sherds instantly recognizable as Dimini Style Matt-painted pottery. Due to the standard consistency in fabric, shape, and decoration, Souvatzi (2008, 123) suggests that the Dimini style of Matt-painted pottery was the product of specialization.

Some Dimini Style bowls feature protruding knobs or protomes that are often modeled and painted like a human face. Similarly, human faces or figures may be schematically painted on Pre-Dimini Matt-painted pottery from Thessaly (Milojčić 1958, 28. fig. 33).

Classic Dimini Style Matt-painted pottery: B3α2 and B3α3 (Figures 15–18)

The Classic Dimini Style of Matt-painted pottery breaks with the proceeding tradition of panel and zone arrangement in favor of creating a new style of Matt-painted pottery based on using symmetry designs of varying complexity for creating a sense of dynamic movement (Washburn 1983; Otto 1985). The Classic Dimini style of pottery, it should be noted, was used not only for Matt-painted pottery, but also for Black-on-red painted pottery as well as Incised pottery. In the Classic Dimini style, compositions are applied to and designed for covering the entire vessel, both on the interior and exterior. Although this entire vessel coverage contrasts with other Matt-painted styles, vessels in

Thessaly were fully decorated on the interior and exterior since the Middle Neolithic with Red-on-white Painted pottery.

Perhaps the most eloquent description of Classic Dimini style Matt-painted pottery comes from Theocharis (1973, 102):

> Although a significant proportion of the decoration of Dimini ware can easily be attributed to Sesklo (maeanders, chessboard pattern, step-patterns, etc.) it is the preference for the spiral and the maeander that distinguishes it and gives particular tone to the decorative spirit of the period…the point is not where the decoration derived from, but how it is organised: the clear division of the vases in to area, the bold contrast offered by the insertion of spirals into a system of maeanders, and the clear delineation of the tectonic parts of the vases are achievements which have no analogies outside of the area of "classic" Dimini…One may therefore definitely exclude any general connection of the style with the North, though there are many parallels there. Furthermore, the internal hatching of the decoration reveals attempts to perfect the motifs had been made in some sphere other than pottery (probably on wooden vessels and with incision) before they were transferred to vase-decoration.
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> ***
>
> We may regard it as certain that the peak which is clear in many spheres during this phase corresponds rather to a successful realignment of the economy, and mainly perhaps the development of trade, than to new agricultural techniques. The whole [of the new] period is characterized by great mobility, a widening of social contact and mutual influences, and an opening of new horizons.

It has been shown, primarily by negative evidence, that Dimini style Matt-painted pottery had a rather limited circulation, even within Thessaly. Circulation of true Classic Dimini is confined primarily to south-eastern Thessaly, but many local imitations were also produced (Chourmouziadis 1978; Schneider et al. 1991b; 1994; Washburn 1983). Although French (1972, 16) stated that no Classic style Dimini Matt-painted pottery has been found south of Thessaly (particularly the Kallidromo mountain), Classic Dimini style pottery (Matt-painted, Black-on-red, and Incised) are found at Phthiotic Thebes (Arvanitopoulos 1907; 1908; Wace and Thompson 192).

North of Thessaly, sherds have been found only at Polyplatanos (Meroulis and Stefani 2004), Servia (Heurtley 1939), Olynthus (Mylonas 1929), Polystylo (Theocharis 1973, 92), Vasilara, and near the coast of the Thermaikos Gulf at Makryialos (Vlachos 2002; 2009), Argosykia A, Yiannitsa B (Chrysotomou 1996, 165), Paliambela, and Archontiko (Hitsou 2003). Interestingly, Dimini style Matt-painted pottery is not found at either Mandallo or Dispilio, but it somehow reached Neolithic sites in Albania (i.e., Carkan; Prendi 1982, 196–197).

Of these sites in Macedonia, Makryialos deserves special comments since more Classic Dimini style Matt-painted pottery has been recovered there than at any other site outside of Thessaly. Vlachos (2009, 120) estimated at least 1,147 Classic Dimini Style Matt-painted bowls alone were imported to the site; local imitations were also produced. Other types of imported Classic Dimini pottery (Black-on-red painted and Incised) were also imported to the site. The Late Neolithic Ib pottery from Makyrialos is discussed by: Hitsiou 2003; Vlachos 2002; 2011; Aulonitou 2010; for the Late Neolithic Ia pottery at Makryialos, see Urem-Kotsou 2002; 2006 and Urem-Kotsou, Kotsakis, and Stern 2002a; 2002b.

There are four main points of interest regarding the imported pottery from Dimini to Makryialos. First, the sheer number of imports is unprecedented at any other Late Neolithic site. Second, it solidly documents long distance circulation of pottery, when previously only East Thessalian Gray-on-gray painted pottery had been documented to travel only 43 miles (70 km) from its production center (Hitsiou 2003, 16). Third, is that the deposition of most of these vessels comes from a pit or *bothros* (called by the excavators a "burrow-pit"), which can be interpreted as a ritual deposit and perhaps imply a deliberate breakage of this kind of pottery (Vlachos 2009, 167). This particular concentration of Classic Dimini style pottery was found with an abundance of storage and cooking vessels, which Vlachos (2009, 180) suggests was related to conspicuous consumption of local surplus. Lastly, it seems the preference to import Dimini Style pottery was done at the expense of the production of local styles of painted pottery, as compared to other sites (i.e., at Servia,Ridley and Wardle 1979, 213–217) or Yiannitsa B (Chryssostomou 1996, 165) where Classic Dimini style pottery coexists with other decorative styles (Vlachos 2009, 179–180; although Vlachos suggests these difference may alternatively reflect detailed differences in chronology between Makryialos II, Servia, and Yiannitsa B).

Lastly, particular mention should also be made of the occurrence of "ring-idol" imagery (Figure 16, no. 7) in the motif repertoire of Classic Dimini ware (both Matt-painted and Black-on-red); it also continues in the Final Neolithic (as at Franchthi on a Crusted bowl from Phase 5, Vitelli 1999, fig. 64, a). This shape is known in metal and stone versions, and it originates in Bulgaria, such as at the cemetery at Varna. Its appearance as a motif adds another layer of signification to the vase. The interpretation and meaning of ring-idol imagery varies (i.e., Jovanović 1996; Gimbutas 1974; Zimmermann 2007). Most recently, it has been suggested by Gheorghiu (2011) that ring-idols are skeuomorphs of *spondylus* shell, another well know "prestige" item of the Neolithic. *Spondylus* shell originates only in the Aegean Sea, yet it reached the Baltic by means of the Danube. This suggestion is interesting because of the interplay between "prestige" items in three different media.

Matt-painted Pottery of Macedonia (Figures 18–20)

Aside from the imports of Classic Dimini Style Matt-painted pottery previously mentioned (see above), Yiouni (2001, 200) remarked that at the beginning of the Late Neolithic I Matt-painted pottery comprises 10–12% of the total ceramic assemblage in Macedonia. Since most of these wares make up such a small percentage of the ceramics, they have not been often classified in way that makes them easily comparable between sites. Generally, Matt-painted pottery tends to be more common in Western Macedonia. For instance, Yiouni (2000, 210) states that at Dimitra, it was common in the early levels of the Final Neolithic (LN II) and amounted to 52% of the decorated pottery. Matt-painted continues to be produced into the Late Neolithic II in Northern Greek chronology, but in decreasing frequency, as it is slowly replaced by Black-on-red and Graphite painted pottery (Yiouni 2000, 207).

There are, however, two distinctive styles unique to this area that deserve attention, both of which were first identified at the site of Akropotamos (Mylonas 1939; 1949). The first is the classic Akropotamos style of Matt-painted pottery, and the other is a more general Matt-painted ware with more locally-determined variations. Matt-painted pottery reminiscent of Central and Southern Greece also occurs in Macedonia. The Strumsko style (named after a site on the Struma River in Bulgaria) found at Promachon Topolnica and Galepsos ware are discussed in the Black-on-red section. Only the transitional Strumsko style variant that combines thick and thin line motifs is considered here. The Akropotamos style of Matt-painted pottery is discussed first.

Akropotamos Style of Matt-painted Pottery (Figures 18–19)

The Akropotamos style of Matt-painted pottery in Macedonia is found throughout the Drama basin in East-Central Macedonia, and imitations of it are found along the Lower and Middle Strymon River valley into Bulgaria. It was first discovered by Mylonas at the site of Akropotamos (1939; 1941) where it occurred at the earliest levels of the site. Its decoration is sparse and orderly, reminiscent of Central and Southern Greek varieties. It is a high quality fine ware that is characterized by black to brown paint on a cream polished surface (Mylonas 1941; 558). The style is easily recognized by its thin-lined (3–4 mm) motifs of spirals, concentric circles, parallel lines, hatching, ladder, and rectilinear elements; although broader bands occur and can be combined with the thinner lines (Yiouni 2000, 201). Like the Thessalian and South-Central Greece varieties of Matt-painted pottery, the motifs are not organized into panels, only zones. Also unlike the more southerly styles of Matt-painted pottery that are only occasionally burnished, the Akropotamos style is always burnished, which makes the matt-paint appear shiny rather than dull (Mylonas 1947, 556).

Mylonas saw the Akropotamos style of Matt-painted pottery as an evolution from earlier wares found in Macedonia. At the time of Mylonas' excavation, Servia was one of few sites available for comparison in Macedonia, and it was often viewed as an offshoot of the Thessalian culture (Mylonas 1947, 567–570). In particular, he related the excellent quality of the pottery and its orderly compositions to the transitional Middle-Late

Neolithic Gray-on-Gray pottery at Servia. Other motifs, such as what Mylonas calls "lining" or the fine cross-hatching between parallel lines have parallels in Middle Neolithic Red-on-white and White-on-red at Servia and Thessaly (Theocharis 1973, 91). This hatched motif is more commonly called the "ladder" motif (Vajsov 2007, 100; Yiouni 2000, 201). It is also similar to the hatching found in the Classic Dimini style of Matt-painted pottery (Mylonas 1947, 567; Vajsov 2007, 100).

Other elements characteristic of the Akropotamos style of Matt-painted pottery cannot be exactly equated with a Thessalian, Central, or Southern Greek Matt-painted variety and have more in common with other styles of Late Neolithic painted pottery. For example, Mylonas recognized some linear compositions of triangles, belts of parallel lines in zigzags, and wavy lines in the Thessalian class of B3δ (Black-on-red ware with linear designs, often matt) while other motifs, such as groups of parallel lines arranged in nested zig-zags can be compared to motifs in B3β (Three-color ware with black and white patterns on red ground) (Mylonas 1947, 556–567). The "sigma," "butterfly" (two filled-in triangles, joined at their apex), and spiral are common in the repertoire of motifs in Central and Southern Greece Matt-painted pottery.

A characteristic shape consists of jugs with a short neck and flat ribbon handle that starts below the neck and terminates at the shoulder, with the body bending sharply toward the base (Mylonas 1947, 564). Necks are often offset from the body and usually painted with parallel lines (1947, 564). Miniature versions also occur (i.e., cup on tall base) (Mylonas 1947, 564). Fruit-stands (sometimes with cut-out in their pedestals) and small and large carinated bowls, deep bowls, and fruit-stands are also common.

Since Mylonas' excavation, the Akropotamos style of Matt-painted pottery has subsequently been recognized not only at sites within the Drama basin (i.e., Dikili Tash, Sitagroi, Galepsos, and Polystylo) and in the Chalcidice at Olynthus (Mylonas 1929) and Stavropouli (Grammenos and Kotsos 2004). It is also found in Bulgaria, along the Middle Struma River (Grabska-Kulova 1994) at sites like Slatino (Čohadziev 1986), Bălgarcěvo (Perničeva 2002), and Promachon-Topolnica (Vajsov 2007; Koukouli-Chryssanthaki et al. 2007) on the Greek-Bulgarian border where both imports and local imitations are found.

There are technical and stylistic differences between the imports and the imitations. For instance, at Promachon-Topolnica, imports of the Akropotamos style often have spiral motifs combined with sheaves of three diagonal lines, whereas the imitations have concentric ellipsoidal spirals (Vajsov 2007, 85–86). Additionally, the imported pieces tend to have independent motifs, while the imitations feature more interdependence and connection to one another (Vajsov 2007, 86). Local, coarser clays tend to be used for the imitations rather than the refined clay used for the true Akropotamos style. Most importantly, the finds at Promachon-Topolnica demonstrated that a chronological delay existed between the appearance of imports and subsequent imitation, with another style of pottery acting as an intermediary. The intermediate pottery is a variant of the Strumsko style (Strumsko Type B). Incidentally, the Strumsko style is also an intermediary to Graphite painted pottery, as discussed in Chapter 8).

Typically, the Strumsko style features broad bands of black-brown paint on a red-orange surface. It is discussed in the section on Black-on-red painted pottery. The hue of the paint is darker black-brown, rather than the brown-black of Akropotamos. In the transitional version, both the thin lines typical of Akropotamos and the broad bands of Strumsko Type A and the use only of broad bands of paint declines (Vajsov 2007, 100). This hybrid Akropotamos-Strumsko version is called Strumsko Type B (Figure 20). Like the local imitations of Akropotamos Matt-painted discussed below, the Akropotamos-Strumsko specimens often have more of a red or red-orange background than the buff-cream of the imported Akropotamos, since they are made from local clays. In this respect, they are a true hybrid or transitional ware between Black-on-red and Matt-painted pottery.

The typical rounded carinated bowl has two handles, and the broad bands of paint emphasize the vessel's morphology (a band at the rim, carination, and sometimes above the base, with diagonal lines on the handles) (Vajsov 2007, 96). The zone between the rim and carinated shoulder is in-filled with arcs and lines that are so densely hatched that the distance in between them is barely visible (or "in-filled" decoration) (Vajsov 2007, 96). The hatching may take one of two forms: either as densely placed diagonal lines and slightly curved oblique arcs or as a dense hatching in a net pattern. The hatched motifs are new at this time, and their appearance is a ceramic indicator for the beginning of the Final Neolithic in the Drama basin at sites like Kryoneri and Dikili Tash (Vajsov 2007, 96). The hatched net is not used, however, in the local imitations of Akropotamos.

After the appearance of this combination Akropotamos-Strumsko style pottery, local Akropotamos imitations were made at Promachon-Topolnica (Akropotamos Type B or Classic Akropotamos), and it is this later style that is widely distributed, along with other cultural markers, such as incised clay lamps. It is also contemporary with the first appearance of Graphite Painted pottery, both at Promachon-Topolnica, and in southeastern Europe (see Chapter 8), the (Vajsov 2007, 105). Due to this wider distribution, the term “Akropotamos-Topolnica culture” is now found in the literature (Vajsov 2007). Akropotamos-Topolnica has also been referred to as “Topolnica-Damjanica culture” (Perničeva 1994), but the term Akropotamos-Topolnica was used first and more accurately for the connection between Neolithic Greece and Bulgaria (Vajsov 2007, 84). Like the Akropotamos-Strumsko hybrid style of Matt-painted pottery, Akropotamos Type B (Classic Akropotamos) has a more red or orange-red background than the buff brown on the imported Akropotamos, since is made from local clays.

Vajsov lists the typical motifs (2007, 100) as: in-filled upside down isosceles triangles in the middle of concentric ellipsoidal spirals that become arcs on the ends, sometimes as festoons. Sometimes additional festoons are combined with the ones at the carination by in-filled sheaves of three vertical lines. Bowls may have upside-down isosceles triangles from a band at the rim, whereas on a jug the triangles alternate between hanging from the rim and facing upwards from the band of paint at the carination; this a simple type of symmetry. Oblique, vertical and angular sheaves of three lines are used on the handles. Wavy parallel lines terminating in “S”-like oval shapes, which are found in Strumsko style, are also found. The ladder motif, small obliquely hatched ellipses, and the use of small spiral motifs to in-fill empty spaces between hanging triangles are also used. Vajsov (2007, 100) notes that, in general, the composition of the Akropotamos style is similar to styles found in Thessaly (and Central and Southern Greece) in that ornament serves to highly the vessel form, despite differences in typology.

Akropotamos Type B: Brown-on-cream Matt-Painted Pottery

The second type of Matt Paint (Figure 20) is brown paint on a buff or a white background with broader bands of paint (6–9 mm thick, Yiouni 2000, 201), and its motifs include thick wavy lines, parallel lines, concentric circles, and thick arcs; Mylonas identified this ware at Akropotamos as occurring after the Akropotamos style of Matt-painted pottery (he called it Type B, Brown-on-Cream). It utilizes more curvilinear decoration and black to brown paint on a cream-white ground similar to B3α3 (Painted Dimini Black on White ware) in Thessalian terms (Mylonas 1941, 556–558). Spirals and solidly filled arcs arranged in zones or metope-like arrangements are the most common motifs.

The arc is used exclusively in this variety, either serially or alternately along a line and as a rule is solidly filled, while at other sites it is used more for a pendant motif, and concentric arcs occur (Mylonas 1941, 560). Some motifs, such as the "egg and dart" have parallels in Graphite Painted pottery (Mylonas 1941, 560; i.e., with a sherd from Olynthus and also with Dimini Style Matt-painted). Mylonas remarked that the motifs appeared to be placed side by side until the surface of the vase was covered, but done in a way that lacks compositional planning (1941, 560). In terms of shape, bowls on high stands ("fruit-stands") are a diagnostic form in the Brown-on-Cream pottery of the Akropotamos repertoire, although many of the shapes are shared with the Akropotamos style, such as deep bowls, handled cups, and jugs with or without handles (Mylonas 1947, 562).

As a concluding remark, it should be noted that because Mylonas recovered both of the Matt-painted styles (Type B2 and E5) at other sites such as Olynthus, Polystylo, and Dikili Tash, he concluded that they were part of the same culture, which was related to developments within Neolithic Greece and not influenced by Bulgaria or Macedonia, contra Heurtley (Mylonas 1941, 568; Heurtley 1939). He was one of the few scholars at the time to assert such a position.

Concluding Remarks

The rise and persistence of Matt-painted pottery throughout the Late Neolithic period is remarkable. The impetus for this *koine*, which stretches from Macedonia to the Peloponnese, is surely indicative of a high degree of mobility of the Neolithic population, or at least to intensified contacts between distant regions. How and why these interactions operated on socio-economic, cultural, and symbolic levels is a complicated topic that is just beginning to be explored. Surely there is interplay of natural and human factors such as a changing climate affecting human behavior and vice versa; these in turn alter the nature of human social interactions. More than at any other time during the Neolithic period, mainland Greece was more integrated into a common material culture while preserving regional flavor.

Matt-painted Pottery Technology

The diagnostic characteristic of Matt-painted pottery is, of course, the eponymous matt-paint. The dull black-brown paint is produced by a combination of the type of mineral pigment added to the slip, the nature of the clay body, and the firing conditions (including temperature atmosphere and duration). There is more than one way in which to produce what appears as matt paint based on different combinations of these technological variables. Only two correct recipes produce matt paint, and two different methods were used in the Late Neolithic: manganese-based paint fired in a mixed atmosphere and iron-based paint, usually hematite, fired using the "iron-reduction technique."

These two approaches to creating Matt-painted pottery appear to be regionally determined, based on the current scientific data. In Thessaly, the Peloponnese, and Central Greece, manganese paint was primarily used for Matt-painted pottery, while in Macedonia iron-oxide pigments (i.e., hematite) were used. Interestingly, whichever technique was used within a particular region, it was a new process introduced at the beginning of the Late Neolithic period. Furthermore, a combination of the two techniques was also used at times in the creation of Polychrome pottery.

Systematic studies at either a site or on a regional level to determine which technique was used have been few. The exceptions are Vitelli's methodical work at the Franchthi Cave and Lerna (Vitelli 1999; 2004). A systematic scientific study is essential because it is impossible to tell simply by looking at a vessel whether manganese or iron-based pigments were used (Jones 1986, 778). A test (Energy Dispersive Spectrometry (EDAX) or re-firing) to determine the presence of iron or manganese can be used to determine which pigment was used. The following sections summarize the small scale characterization studies that have been conducted on Matt-painted pottery in the various regions of Greece.

More common are small scale characterization studies conducted on a small number of sherds, but no such study has exclusively focused on Matt-painted pottery. The ware has been briefly considered by: Phelps 1986; Maniatis and Kilikoglou 1993;

Mavridis 2008; Dimou 2008; Vitelli 1993; 1999; 2007; Wace and Thompson 1912; Letsch 1982; Letsch and Noll 1983; Jones 1986; Yiouni 2000; 2001; Maniatis and Tsirtsoni 2002; Gardner 1978; 2003; Schneider et al. 1991b; 1994; Kessissoglou and Mirtsou 1997; Quinn et al. 2010; Hirtsou 2003.

Central and Southern Greece

In Central and Southern Greece, the dullness of the brown-black paint is due to the use of manganese-based pigments (Phelps 1986, 373; Kilikoglou and Maniatis 1993, 440; Mavridis 2008, 118) fired using the "manganese-black technique" in a weakly reduced mixed atmosphere (Letsch and Noll 1983, 109–110). Its use in this geographic area is a new technology in the Late Neolithic period. Manganese paint, however, was known earlier in some places (i.e., at Early Neolithic Anzabegovo; Gardner 1976, 171; Jones 1986, 778). Prior to the Late Neolithic period in this region, iron-oxide based paints and firing with the "iron-reduction technique" (see below) to produce the "Dark-on-light" painted pottery (i.e., Red-on-white and "Urfirnis") was used.

The simplicity of firing manganese paint may have attracted Late Neolithic potters to switch from the more complicated iron-reduction firings (Jones 1986, 763, 778). Since manganese-based pigments do not contain sufficient fluxing materials to sinter or vitrify, the paint will be fugitive if the pot is not well burnished or if the clay does not contain enough impurities (Yiouni 2000, 203). Another alternative is to coat the vase with some types of organic resin post-firing, but such a practice is uncommon; conversely, a pre-firing application of very fine, whitish micaceous layer has been documented at Dimitra and Kryoneri in Macedonia on Black-on-red painted pottery where it is believed to have been used instead of burnishing the vessel (Yiouni 2000, 208). Toward the end of Late Neolithic Ia the surface is sometimes burnished (before or after the application of the paint) (Mavridis 2008, 118, 120; Phelps 2004, 100). While some examples of Matt-painted pottery are burnished, most are not. Instead, the potters chose certain clays for either the slip or the vessel body to help the pigment to properly adhere to it.

Generally, Matt-painted pots were made from calcareous clay bodies (ca. 10%) and were fired at low temperatures around 800–850˚C in a mixed atmosphere (Mavridis 2008; Dimou 2008; Sampson 2008a). Calcareous clay bodies fire to a light color (Jones 1986, 753–757). Other vessels with higher calcium carbonate content (ca. 20%) inherently resist thermal shocks better and could be fired at a higher temperature of 1050–1080˚C in order to attain a whiter background to contrast with the dark paint (Maniatis and Kilikoglou 1993, 440). Such high temperature firings have only been documented on Euboea (i.e., Varka and the Skoteini Cave). It is interesting to note that Matt-painted pottery falls in line with the general trend of firing pots during the Late Neolithic at a lower temperature than previous phases (see chapter 12). In thicker examples, sometimes the calcium carbonate can be quite large and show on the vessel surface, even if it has been finished by burnishing.

The fabric is usually fine to semi-coarse with few inclusions, and a thin whitish or buff slip is sometimes applied to the vessels prior to the addition of the manganese paint. This slip seems to occur mostly on vessels with a lower level of calcium carbonate and was added to help the pigment adhere to the clay body. If the clay body contained sufficient calcium carbonate, the paint could be directly applied to the “buff” textured surface of the pot. This buff-textured surface is a mechanical slip (or self-slip), and it, too, is a new technological advance used for the first time in the Late Neolithic (Sampson 1993, 286; Furness 1956). A mechanical slip reduced the necessity to laboriously burnish a vessel (and interestingly, cutting out the burnishing step was also the objective with the Middle Neolithic technology of Urfirnis pottery).

In order to preserve the whitish slip or pale background color, the kiln conditions had to be mixed. For instance, Kilikoglou and Maniatis (1993, 348–441) observed at the Skoteini cave at Tharrounia, Euboea that the firing conditions of the kiln were mixed in order to allow the black paint to intensify while also preserving a white background. Sherds with gray backgrounds had a similar calcium carbonate content and firing temperature, but the kiln conditions were somewhat reduced, which resulted in a darker background color. Additionally, pale backgrounds are also affected by the kiln temperature; they are produced when fired at above 800°C (Maniatis, Perdikatsis, and Kotsakis 1988, 272). If the clay contained lower percentages of calcareous inclusions (ca. 10%) and were fired at a lower temperature of 800–850˚C, the result is "Matt-painted Black-on-red" (Kilikoglou and Maniatis 1993, 240). Red-on-Black technology is discussed in the relevant section.

If properly fired, manganese paint will result in a dull black or dark brown finish, but if incorrectly fired, the paint may shade from red to orange or light brown (Mavridis 2008, 120). Thus, the different combinations of the level of calcium carbonate in the clay, the manganese pigment, the presence or absence of a slip, and the firing conditions (temperature and atmosphere) account for the variability of Matt-painted pottery.

Sampson first outlined five subdivisions of Matt-painted pottery from Varka, near Psachna, Euboea (1975, 74–75) Central Greece and subsequently revised them at the Skoteini Cave (1993, 71) and Sarakenos Cave (2008a, 112). His criteria are based on the clay color and quality and the presence or absence of a slip and can be summarized as follows:

> 1. true Matt-painted (pure fabric, brittle, with or without a beige or white slip and dark brown-black motifs, background color is the same as clay color)
> 2. variation of #1 but with a reddish background (although the clay is not red), usually unburnished
> 3. Coarse Matt-painted (gray background, yellow-green fabric, freely painted broad bands of paint)
> 4. Black-on-red (usually slipped and with black paint)
> 5. Polychrome (usually on beige surface, with black and red paint)

The inclusion of Polychrome and Black-on-red specimens as subsets of Matt-painted pottery by some scholars (Sampson 1975; 1993; Jacobsen 1969, 367) is because these varieties occurred very rarely and the excavators did not consider them as their own class of pottery. Similarly, in the Peloponnese, Phelps was not able to make a stratigraphic distinction between the wares and therefore also considers them together (2004, 96). The distinction between Black-on-red and Polychrome of Central and Southern Greece is discussed in Chapter 4. For the present discussion, it should be noted that these three types of pottery have different chronological and geographical characteristics.

Phelps (1986, 373; 2004) locates the origin of Matt-painted pottery to the Northeastern Peloponnese where it evolved out of Middle Neolithic “Urfirnis” painted pottery; in fact, the two wares coexist during the beginning of the Late Neolithic period (Phelps 1986, 373; Jacobsen 1969, 266; Sampson 1981, 110; Douzougli 1998, 93). Even the term “matt paint” is intended to contrast with the shiny veneer-like effect of Urfirnis pottery. While the lack-luster of the paint contrasts with the sheen of Middle Neolithic Urfirnis ware, Matt-painted specimens may at times appear glossy either as a result of a high firing temperature of from having been burnished.

An exception to the use of manganese paint for Matt-painted pottery in Central and Southern Greece includes some examples from the Franchthi Cave where Late Neolithic Matt-painted pottery was created using iron, not manganese based paints (such as the “Lime plus iron pattern painted variety”; Jones 1986, 778; Vitelli 1974; 1993b; 1999; 2007). Raw red coloring material was recovered by Weinberg in the “*Bothros*” at Elateia, but he does not specify its chemical composition (1965a, 195). Presumably it would have been an iron-oxide such as red ocher or hematite, if the “*Bothros*” really does date to the Middle Neolithic as Weinberg claims.

Thessaly

Holt and Hutchinson (1912) were the first scholars to analyze the chemical composition of Matt-painted pottery in all of Greece. They found that in Thessaly, almost pure iron oxide (hematite) was used as a pigment for Middle Neolithic Red-on-white pottery and that Late Neolithic Matt-painted pottery was a mixture of iron oxide and manganese, derived from powered pyrolucite (manganese), as was Black-on-red painted pottery (Holt and Hutchinson 1912, 259). Letsch (1982, 82) also proved that hematite was used for Red-on-white painted pottery during the Middle Neolithic, while manganese-based pigments were introduced during the Late Neolithic for Matt-painted pottery (and also Black-on-red painted pottery). Magnetite has also been identified by

Letsch and Noll (1983, 141) it. Vlachos (2009, 27) also suggests that use of manganese on the imported Dimini style Matt-painted pottery at Makryialos, in Central Macedonia, constituted a new technology, but his suggestion that access to it may have been restricted and that its used required new firing techniques and kilns (Renfrew 1973; Vitelli 1993) seems unlikely. As for the slip, the whiter the color the higher the lime content (Wace and Thompson 1912, 261). “Lime silicate white” was obtained by levitating calcareous clays (Letsch and Noll 1983, 110).

Letsch and Knoll state that while other clays were available to Late Neolithic potters, calcareous clays were selected for Dimini style Matt-painted pottery because calcareous clays fire to produce light colored backgrounds to contrast with the dark paint (1983, 109). Schneider et al. (1994, 65) note that the yellow color of Classic Dimini bowls comes from using a clay either low in iron content (less than 5%) or with a high calcium content fired at 850˚C, just as in Matt-painted pottery of Central and Southern Greece. They state that these factors were necessary in order to ensure that the iron would form calcium-iron silicates, which are pale colored, instead of producing a red background as in Black-on-red ware (Schneider et al. 1994, 65).

Schneider et al. (1994, 67) found that Classic Dimini ware was produced in large numbers at many sites in Thessaly, with the intent to circulate; Classic Dimini ware was, therefore, produced with a high degree of standardization, which Schneider et al. suggest may indicate specialized workshops . The specialized production and standardization of Dimini ware ensured both stylistic uniformity (which Schneider et al. equate with cultural identity) and also diffused the innovations that caused the stylistic development in the first place, thus perpetuating ceramic change (Schneider et al. 1994, 69). Classic Dimini pottery found at Dimini matched the local clay sources (Schneider et al. 1994, 67), and Hitsiou confirmed that it was imported to Makryialos in Macedonia (2003, 121). Local imitations were also produced at sites in Northern Greece such as Makryialos and Polyplatanos, as well as at sites in Thessaly, like Makrychori 2.

Vlachos (2009) and Hitsou's (2003) micro and macroscopic analysis of imported Dimini style Matt-painted pottery at Makryialos in Macedonia sustained Letsch (1982) and Letsch and Noll's (1983) finding on the technology this style (i.e., the use of manganese paint and the use of calcareous fabrics (more than 6%, Hitsiou 203, 116). Additionally, Hitsiou (2003, 118) found several instances where two clays—one of which was calcareous—had been incompletely mixed, which strengthens Schneider et al.'s (1991, 9) suggestion that the use of calcareous of clays was intentionally done in order to produce a light background. Additionally, Hitsiou (2003, 119) also observed that many Dimini style bowls were constructed using coils. Although Vlachos (2009, 123, 145) states that Dimini type bowls were fired in an oxidizing environment, since all vessels have light brown-red colors on their interior and exterior surfaces and their cores indicate complete firing, he found that a reducing atmosphere was used for open and carinated bowls. He (Vlachos 2009, 145) suggests that different firing conditions result in visible differences for the pot, which may have held "some socially important distinction in the context or meaning of their use." Perhaps, as with earlier Matt-painted pottery, the intended conditions were slightly reduced.

Macedonia

In some parts of Macedonia, iron-based paints (most commonly hematite) and the use of the iron-reduction technique were first introduced during the Late Neolithic period, although this process had been used in Central and Southern Greece since the Middle Neolithic (Yiouni 2000, 201). Until the Late Neolithic in Macedonia, manganese paints were used; this situation is the converse of that of Thessaly, Central Greece, and Southern Greece. Similarly, the resulting vessel appearance is a product of the technological choices made by the Neolithic potters, including the quality of the paint, the characteristics of the clay, and the firing conditions (particularly the kiln conditions, temperature and duration of firing) (Shepard1965, 38).

Neolithic potters may have been attracted to iron-based pigments because of their ability to change color according to the firing conditions, making them more versatile than manganese paint, which does not shade light to dark (Shepard 1965, 40; Jones 1986, 778; Farnsworth and Simmons 1963–394; Yiouni 2000, 202). If the pot was fired in an oxidized atmosphere, the paint would retain its original red color, but if it is fired in a reduced environment the paint will be a dark black-brown.

In order to produce a dark brown-black color like matt-paint with iron, however, the pots had to be first fired in a reduced atmosphere and then briefly brought into a mixed one to change the background color back to a light shade (Yiouni 2000, 203). This process is known as the iron-reduction technique. It is discussed in the Urfirnis technology section.

The iron pigment must be fine textured in order to vitrify during firing, and it must be applied in thick layers in order to achieve an even color; otherwise, it can appear streaky or bichrome (Yiouni 2000, 202; Jones 1986, 765). Iron-based pigments have been scientifically proved to be used in Western Macedonia at Sitagroi, Akropotamos, Dikili Tash, Dimitra, and Kryoneri (Gardner 1978, 109; Yiouni 2000, 202–203). Manganese paint was also used occasionally in Macedonia during the Late Neolithic for the production of dark-on-light pottery, as indicated by re-firing tests, but it has not been chemically proven for sites in Eastern Macedonia (Yiouni 2000, 201, 203).

The backgrounds of Matt-painted and other pottery were either coated with kaolin or calcareous slip to produce a whitish background or left unslipped to produce a buff-gray color (Yiouni 2000, 202; Gardner 1980, 109). Often the cream-beige slip was so thinly applied that it neither survives nor conceals the reddish color of the clay body background (Yiouni 2000, 204). Since the firing conditions were reduced and then mixed, a slip had to be applied in order to maintain a constant background color. In this sense, the firing conditions were not aimed at the production of the dark motifs, but at the production of the desired background of the decoration (Yiouni 2000, 204). Burnished sherds occur, but are rare (Yiouni 2000, 204). At Dimitra, the clay-beds used for Matt-painted pottery were located only three-hundred meters south of the site (Grammenos 1997a; 299). Yiouni (2001, 10; after Kessissoglou and Mirtsou 1997, table 1.) estimated the firing temperature of three Akropotamos style sherds from Dimitra at 750-850˚C, and Davrill (1997, 82) found the clays to be local.

Thus, whether intentional or not, variations of Matt-painted wares (such as "orange-on-orange and red-brown-on-red wares" at Sitagroi; Keighley 1986) were produced by using an iron-based pigment fired in an oxidized environment, turning both the paint and the background red (Yiouni 2000, 205). Yiouni believes these color variations were intentional, rather than accidental results of firing (2000, 205), but Demoule, Gallis, and Manolakakis (1988, 23–24) believe that in Thessaly, these variations represent trial and error on behalf of the potters.

At Dikili Tash, a Late Neolithic carinated jar, radiocarbon dated to ca. 5,000 B.C. was found to have once contained pure hematite (α-Fe_2O_3) pigment (Maniatis, Treuil, and Tsirtsoni 2001; Maniatis and Tsirtsoni 2002). Apparently the pigment was being stored inside the vessel when the house which contained it burned down violently. The intensity of the fire transformed the hematite into thick black pure iron oxide layer on the vessel's interior (Maniatis, Treuil, and Tsirtsoni 2001, 590; Maniatis and Tsirtsoni 2002, 229).

Hematite is the anhydrous ferric oxide mineral and is a common alteration product. Usually hematite is found as "red ocher," an earthy form of hematite mixed with clay. It can be used in this state without preparation such as grinding (Shepard 1965, 37). The modes of occurrence of iron oxides will suggest the frequency with which they carry impurities (such as carbonates, aluminum hydroxide, manganese compounds, and phosphates to name a few), which in turn affect the properties of the paint (Shepard 1965, 37).

Conclusions

The technical investigation of Matt-painted pottery production during Late Neolithic Greece revealed that two different methods were used, and that these techniques seem to be specific to particular classes of pottery, manufactured in particular workshops. It also debunks the assumption that generally similar results can be obtained by similar technological processes since two totally different methods can be used (Yiouni 2001, 1).

Instead, there are many combinations of variables which can result from the mineral content of the pigment, the properties of the clay body, the firing temperature and conditions, and the slips and burnishing of the background. The Neolithic potters were well aware of numerous factors they had to work with, and they combined them in various ways to produce Matt-painted, Polychrome, Black-on-red, Red-on-white, and other types of pottery.

Black-on-red Painted Pottery (Figures 21–30)

Black-on-red painted pottery was produced at different times in every region of Neolithic Greece. Therefore the styles of the decoration, shapes, and technology also vary. In Central and Southern Greece, it was a minor, transitional and perhaps experimental ware that combined Middle Neolithic Urfirnis fabric with new Late Neolithic Matt-painted forms and manganese paint. This (B3δ) type of Black-on-red painted pottery is also found in Thessaly. Another type (B3α2) of Black-on-red painted pottery occurs later, in the Pre-Dimini Otzaki phases. It anticipates the symmetry and dynamism of motifs used in Classic Dimini, and new shapes are exclusively used for this ware. Black-on-red painted pottery is perhaps best known, however, in Northern Greece, particularly in Eastern Macedonia. In this region, it begins at the end of Late Neolithic Ia, but it is most characteristic in a transitional phase (in form and motifs) from the Late to Final Neolithic (i.e., Sitagroi Phase III).

Central and Southern Greece (Figure 21–22)

Black-on-red painted pottery of Central Greece and the Peloponnese essentially equates to Wace and Thompson’s (1912, 17) B3δ category (Black-on-red ware with linear designs, often matt). Wace and Thompson (1912, 17) primarily defined this ware at Late Neolithic Ia sites like Tsani and Tsangli in West and Central Thessaly where it was most common in Thessaly. They (Wace and Thompson 1912, 17) also noted that the ware was found as well in Phocis and Boeotia; they further distinguished it as distinct from category B3α2, Chocolate-on-Cream and Black-on-red Polished Dimini Ware, which is confined to Thessaly and occurs later than the B3δ variety.

For these reasons, Sampson calls the Central and Southern Greek examples “Matt Black-on-Red” to maintain the distinction of B3δ in Central and Southern Greece from B3α2, with which it has no relation (1993, 71; Phelps 2004, 67–68). Black-on-red painted pottery is a highly variable ware in Central and Southern Greece: this situation contrasts with that of Thessaly and Macedonia, where these later varieties are much more standardized. Due to unresolved problems in scholarship, in defining and identifying regional variations of this ware, and because of its scarcity in Central and Southern Greece, these two regions are discussed together. Lastly, it should be noted that this type of Matt Black-on-red painted pottery is of a limited chronological duration (beginning in the Late Neolithic Ia and lasting only into the start of Late Neolithic Ib).

Phelps (2004, 67) succinctly describes the Black-on-red painted pottery as having:

> similar appearance to Matt Painted, but the fabric is different, and more similar to Urfirnis; it is more or less red or red-buff and sometimes contains white grit (calcareous inclusions), the colour of the slip varies from brick red to red-orange to red-brown and may be either matt or lustrous. The slip itself may be applied evenly or brushed-on and opaque. The black paint ranges from brown to chocolate to black and is generally matt (although shinier versions occur). Sometimes it is fully adheres to the vessel surface, while at other it has a powdery, granular texture which flakes off without leaving a trace behind.

Origin: A Development of Middle Neolithic Urfirnis?

Weinberg (1962) was the first to isolate matt Black-on-red as a separate ware in Central and Southern Greece (Lavezzi 1978, 429; Phelps 2004, 67), but due to its relatively rarity Black-on-red in Central and Southern Greece has mostly been included as a sub-variety of Matt-painted pottery (i.e., Sampson; 1977; 1993) . At Corinth, Black-on-red painted pottery constitutes only a fraction (2.5%) of the ceramic assemblage, yet it was ubiquitous in every Late Neolithic pottery lot (Lavezzi 1978, 418). It endured into the early phases of Late Neolithic Ib since it is found at some sites, like Gonia, along with Polychrome painted pottery (Mavridis 2008, 119). Although Phelps (2004, 17) suggests that Black-on-red originated in Central Greece, Mavridis (2008, 119) proposes that it may have begun first in the Peloponnese, where its relationship with Urfirnis is clearest. Mavridis (2008, 119), however, also states that Red-on-Black occurs with the developed Matt-painted (on a burnished ground): this implies it began—at least in Central Greece—after Matt-painted pottery. This suggestion is interesting, since it is supported by the fact that at Corinth, Black-on-red is found in every Late Neolithic lot, but none in Middle Neolithic contexts (Forum West), and only one sherd was recovered in Middle Neolithic-Late Neolithic lots (Lavezzi 1978, 422). This fact also contradicts Weinberg's "*Bothros*" stratigraphy, where Black-on-red and Urfirnis are found together in what he called a Middle Neolithic context, but not with Matt-painted pottery. In any case, given the close relationship of the two wares, Lavezzi suggests that "matt-Black-on-red ware might be a development from Urfirnis, perhaps under some influence from the matt-painted tradition" (1978, 423).

The consensus of scholarly opinion is that Black-on-red painted pottery is a transitional, if not experimental, ware that developed out of Middle Neolithic Urfirnis pottery either prior to or under the influence of Matt-painted pottery (Weinberg 1965, 40; Lavezzi 1978, 418, 423; Douzougli 1988, 90; Phelps 2004, 17; Mavridis 2008, 119). It often combines the fabric and slip of Urfirnis with the matt manganese paint and decorative motifs used in Matt-painted pottery. The technical differences and relationship of Black-on-red painted pottery with other wares is discussed in Chapter 4.

Since the Black-on-red painted pottery of Central and Southern Greece combines two different ceramic technologies, there is such a close resemblance of some Black-on-red painted pottery to Urfirnis ware that small sherds are indistinguishable. Both Weinberg (1962, 182) and Phelps (2004, 67–70) agree that Black-on-red can appear similar to Matt-painted and can only be discerned from it by an examination of the fabric. Indeed according to Phelps (2004, 69; French 1972, 33-35) some sherds in Central Greece with black matt paint on reddish sherds are classified there as Matt-painted, but if they were to be found in the Peloponnese, they would be called Black-on-red because there is little Matt-painted material with a red fabric or surface in the Peloponnese, and so it is easy to distinguish from Black-on-red, unlike in Central Greece. Similarly, in Thessaly Wace and Thompson (1912, 16-17) acknowledged early on the difficulties in isolating B3δ (Black-on-red ware with linear designs, often matt) and B3ε (Brown on Buff Ware) Matt-painted pottery.

The problem of distinguishing Black-on-red, Matt-painted, Polychrome, and Urfirnis remains problematic in Central and Southern Greece. In fact, similar sherds may be assigned to separate wares in different publications, without explanation. For instance, Corinth, Lavezzi (1978, pl. 110, no. 64) called one sherd Urfirnis, although Phelps (2004, fig. 44, no. 6) identified it as Matt-painted Polychrome, which underscores the close relationship in Central and Southern Greece of the relationship between Urfirnis, Matt-painted and Late Neolithic Ia Polychrome.

The shapes of Black-on-red are limited to fruit-stands (often with cut-outs) with shallow bowls and wide, flat rims, jars, deep bowls, and in-curved shoulder and carinated bowls (Phelps 2004, 17). In this sense, Black-on-red- shows no typological distinctions from Matt-painted forms in Central Greece (Mavridis 2008, 118) and also Thessaly (Gallis 1992, 59).

The motifs, like the shapes, are also limited: “usually restrained and characteristic” in Phelp’s words (2004, 68). They are drawn from the Matt-painted repertoire and are similarly arranged in zones and panels. They include arrows, hatched triangles, zigzags, arcs, parallel lines, cross-hatched rectilinear shapes, dot-edged bands, lozenges, plant-like forms and “ladder” motifs.

The distribution of Black-on-red painted pottery in the Peloponnese (Phelps 2004, 68), is limited to Corinth, Gonia, Aria Argolidos, Kouphovouno, and the Franchthi and Alepotrypa Caves; it is more commonly found in Central Greece and in greater numbers at sites like Orchomenos, Elateia, Chaeronea, the Cave of the Cyclops on Youra, and at the Corcyian and Sarakenos Caves. Phelps (2004, 69, 102) suggests that the Peloponnesian variety was produced in one center in the Kifisoss Valley and that it was imitated at Gonia in the Final Neolithic “Red Burnished Painted Ware,” which combines matt black paint on a red background with pattern burnishing. Holmberg (1964, 32) observed that Black-on-red painted pottery was found primarily in Central and Southern Greece at sites near the coast, such as Orchomenos, Marathon, Athens, Gonia, Prosmyna, Lerna, and Corinth, which suggests that it was distributed by sea rather than land (just like the later Black-on-red from Macedonia).

Thessaly (Figures 23-26)

There are two separate types of Black-on-red painted pottery in Thessaly in Wace and Thompson's classification (1912, 16–17): the earlier B3δ (Black-on-red ware with linear designs, often matt), which begins in the Late Neolithic Ia (Tsangli-Larisa phases) and the later B3α2 (Chocolate-on-Cream and Black-on-red Polished Dimini Ware), which begins in Late Neolithic Ib (in the Otzaki and early Classic Dimini phases).

The first type is essentially the same as the Black-on-red found in Central and Southern Greece. In Thessaly, it is more common in West and Central Thessaly (Wace and Thompson 1912, 17). Some specimens bear a superficial resemblance to the later B3α2 Black-on-red pottery, but the patterns and shapes are different, and most importantly the vessel surface and paint are matt (Wace and Thompson 1912, 17). Wace and Thompson acknowledged difficulties in isolating B3δ from B3ε, Brown on Buff or Matt-painted pottery, a difficulty which attests to the close relationship between the two wares (1912, 16–17). The second type is the dominant painted ware of the Otzaki B suphase (Dimini III). It continues into the early stages of Classic Dimini (Phase IIVA), but the Classic Dimini style Matt-painted then replaces it as the leading painted style (Phase IVC).

B3δ Ware: Black-on-red Ware with Linear Designs, Often Matt (Figure 26, no. 3–5)

Wace and Thompson (1912, 17) primarily defined B3δ (Black-on-red ware with linear designs, often matt) at sites like Tsani and Tsangli in West and Central Thessaly, but they also noted that it is also found in Phocis and Boeotia. In general, B3δ Black-on-red painted pottery is rare in Thessaly: Demoule, Gallis, and Manolakakis (1983, 26) suggest that B3δ Black-on-red specimens from the Tsangli phase are accidents of trial and error rather than intended products, since they are essentially more similar to Matt-painted pottery. They (Demoule, Gallis, and Manolakakis 1988, 26) also point out that Milojčić (1959, fig. 20.1) mistakenly places Late Neolithic Black-on-red (B3δ variety) in the Final Neolithic Rachmani culture. Nevertheless, B3δ Black-on-red painted pottery was certainly produced in Thessaly from the first stages of the Late Neolithic, in the Tsangli-Larisa phases (Gallis 1992, 59).

Hauptmann and Milojčić (1969, 27) also equate Central and Southern Greek Matt-painted pottery with the B3δ-B3ε Thessalian wares of Wace and Thompson in terms of techniques and motifs. The decoration of the B3δ variety of Black-on-red painted pottery consists essentially of a more limited repertoire of Matt-painted and Gray-on-Gray motifs, such as thin parallel lines bordered by thicker ones around the vase or oblique, zigzag, and curvilinear elements (Demoule, Gallis, and Manolakakis 1988, 26). Vertical elements are common and are used to divide the surface of the pot into panels, as in Matt-painted pottery.

B3α2 Ware: Black-on-red Polished Dimini Ware (Figure 23-26)

Wace and Thompson's second category of Black-on-red painted pottery, B3α2, begins in the Late Neolithic Ib Otzaki A subphase and is best known in the Otzaki B subphase of Dimini III. It continues, though far less frequently, into the early Classic Dimini (Otzaki C/Dimini IV) phase when the Classic Dimini style of Matt-painted pottery predominates. At the time of Wace and Thompson's writing, a distinction between Classic Dimini style of Black-on-red was not made because both types can sometimes be found on the same vase (1912, 16) and because the original red, which was not so well burnished, does not survive (Tsoundas 1908, 211).

For instance, at Rachmani, Wace and Thompson (1912, 31) found it difficult to tell the difference between Matt-painted Classic Dimini style from Black-on-red because the thin, chalky white slip of the Matt-painted variety did not always survive. Additionally, they noted it was also tough to distinguish Black-on-red sherds from White-on-red ones because the paint black sometimes survived only as a dull white paint ghost. Thus, the distinction between the two may be ambiguous in some cases. Furthermore, a chronological distinction was not observed between Classic Dimini Style Black-on-red painted pottery and its immediate predecessor, which began in the Otzaki A subphase and dominated the decorated pottery of the Otzaki B subphase. More recent research, however, has doubted the validity of Milojčić's Otzaki scheme (i.e., Coleman 1992, 256).

The Black-on-red of Otzaki B has compositional schemes similar to Arapi style Polychrome (B3γ), though there are new innovations in the motifs and their structure (Holmberg 1964b, 30). For instance, spirals and maeanders are now inserted into linear schemes by dividing the vessel surface into vertical or horizontal bands in fields and subsequently filling these fields with spirals, maeanders, oblique parallel lines, curved lines, checker-board, and cross-hatched patterns, whereas previously they were treated as isolated motifs (Holmberg 1964b, 30).

The characteristic vessel shapes include small amphora jars, fruit-stands, open bowls with rounded sides and incurved rims, and Dimini-type bowls (shallow conical bowl with pierced lugs under the rim and a flat base). A new aspect of some rims on some deep bowls and fruit-stands appears: the rim was pulled out in four directions to create an undulating quadrilateral format. This feature is also encountered in Black-on-red painted pottery of Macedonia, but there the fruit-stand bowls are deeper and the sinuous profiles are more exaggerated than the shallow Thessalian examples, which have only their rims manipulated. Strap handles and horn-handles are common. Black-on-red is most common primarily in east and north Thessaly (Holmberg 1964b, 31). One example from Arapi, has a human form with a ring-idol shaped head (Milojčić 1958, 28), the significance of which was explained in chapter 3.

Macedonia (Figures 27–30)

From chronological, stylistic, morphological and technological standpoints, Black-on-red painted pottery in Macedonia is completely different from wares of the same name found in Thessaly, and in Central and Southern Greece. Unlike the earlier matt Black-on-red (B3δ) or even the (B3α2) of Thessaly, Black-on-red painted pottery constitutes a major ceramic style, particularly in Eastern Macedonia. Contemporary (although considered Middle Neolithic in Balkan chronology) Black-on-red painted pottery is also found in several Neolithic Balkan cultures such as Starčevo, Anzabegovo, Vrsnik, Porodin, and Gradešnica.

Chronologically, Black-on-red in Macedonia makes its first appearance later than in Thessaly, Central and Southern Greece, namely toward the end of Late Neolithic Ia (around the Arapi/Dimini II phase in Thessalian terms; Grammenos 1997a, 310; Yiouni 2000, 207; Keighley 1986, 358), or in absolute terms ca. 4,800–4,700 B.C. (Kilikoglou et al. 2007, 304) and endures into the beginning of the Final Neolithic.

Black-on-red painted pottery in Macedonia has an interesting interplay with previous and succeeding painted pottery styles. When Black-on-red painted pottery first began in Macedonia, at the end of Late Neolithic Ia, it was contemporaneous with Matt-painted pottery and perhaps took some of its motif inspiration from Matt-painted pottery.

Black-on-red painted pottery then became the dominant painted ware in Late Neolithic Ib and in the transition from Late to Final Neolithic in Northern Greek chronology (i.e., Sitagroi Phase III, Evans 1986, 404). During this transition, Matt-painted pottery ceased to be produced, and the amount of Graphite-painted pottery increased. Graphite-painted pottery eventually replaced Black-on-red as the dominant painted pottery style (in the Final Neolithic) and its motifs relied heavily on those of Black-on-red painted pottery (Yiouni 2000, 207, 211). Yiouni (2000, 212) makes the interesting observation that manganese and graphite are common in the mountains surrounding the Drama Plain and are very often found in juxtaposition: this implies that the potters were familiar with where to obtain graphite and manganese, and that it was only a matter of time before the potters began experimenting with the different pigments.

Black-on-red painted pottery in Macedonia is typified by its high quality of manufacture and its distinctive style, which utilizes both linear (mainly lines and rectilinear forms) and curvilinear elements (mainly spirals and maeanders). Motifs include zigzags, triangle-edged lines, rays, parallel lines, and the “ladder” motif, as well as rectilinear forms like lozenges and parallelograms, but curvilinear elements like circles, arcs, spirals and maeanders are also common. Rare motifs include indeterminate curvilinear forms, while anthropomorphic and zoopomorphic forms also occur (see Malalmidou 2007, 303 for birds and quadrupeds; and Mylonas 1941, 560 fig. 2.2 for an anthropomorphic form which he described as a “butterfly” motif, or two-triangles joined at the apex).

Most aesthetic judgments of Black-on-red painted pottery have been negative, viewing the northern styles as degenerate Thessalian motifs. At Akropotamos, the earlier type of Black-on-red had motifs, as “a rule carried out in a careless way” (Mylonas 1941, 558); the later sort were judged a “haphazard grouping of patterns” similar to those found in Thessalian B3α2 Black-on-red (Mylonas 1941, 566). Welsch (1919, 44) critiqued the compositions at Dikili Tash as “laid on in barbaric profusion with very little idea of arrangement.” At Sitagroi, Thessalian parallels were made (Evans 1986, 410) not in vessel shape or the style of decoration, but rather in the paint and the paste of the fabric. An exception to these criticism is an anthropomorphic jar of a bull from Sitagroi (Phase III), which may have served as a lamp and has parallels in both Vinča (Mednednjak and Selevac) and in Karanovo VI in Romania and Bulgaria; Gimbutas (1986 255–256, 259) remarked that, “this elegant design is one of the most original encountered on Old European sculptures.”

The compositions in Macedonia are arranged on the vessel surface primarily in groups of parallel horizontal or oblique zones around the vessel. Large spiral maeanders are common, as are thinner parallel oblique lines, which are broken by smaller spirals, circles, or lozenges; sometimes these interruptions are stacked so that they form a diagonal opposite to the other oblique lines. Alternating oblique lines are also used to create lozenge or diamond-shaped areas into which spirals are frequently inserted, which is reminiscent of the use of the spiral in the Thessalian Arapi style of Polychrome painted pottery. Welsch (1919, 44) importantly notes that the step pattern of Thessaly is absent and that solid lines are used to form patterns instead of “ladder motifs” as in Thessaly; he ultimately posits the origin and inspiration of the ware as Macedonian. Vajsov (2007 , 96) also points out that notched bands of “ladder type” used in the Strumsko Style of Black-on-red painted pottery as well as in Akropotamos style of Matt-painted have no relationship to similar motifs in much later pottery from the Late Neolithic Ib-Final Neolithic transition.

Black-on-red was produced in a variety of shapes, unlike the more limited repertoires found in Thessaly and Central and Southern Greece. Shapes include pedestal bowls, flaring bowls, “Dikili Tash” bowls (shallow bowl, with a rounded shoulder and small pierced lug), sinuous or biconical-sinuous bowls, oval-mouth amphorae, basins, stands, plates, and *pithoi*. Small lugs, often pierced, are often found just below the rim, whereas strap handles are used on amphorae and *pithoi*. Perhaps the most characteristic shapes of Black-on-red Black paint pottery are the deep conical bowl either with undulating sides or undulating rim and deep bowl; with pedestal base, this shape becomes a fruit-standstand (Evans 1986, 396). Other bowl shapes include thickened rim bowls and biconical sinuous bowls; these are characteristic of phase III at Sitagroi (Evans 1986, 396). Regardless of the type of bowl, they tended to be decorated on both the exterior and interior (Evans 1986, 401).

Black-on-red painted pottery has occasionally (i.e., Schachermeyr 1955b; Deshayes and Garašanin 1964; Séfériadès 1983; Weisshaar 1991; Čohadziev 1992; Demoule 2004) been referred to as Galepsos ware (Galepsoskeramik) for Late Neolithic Ib Black-on-red painted pottery in central and eastern Macedonia (i.e., at Olynthus, Vasilika, Akropotamos, and Dikili Tash). This subcategory (Séfériadès 1983, 657) was isolated as a separate late Macedonian style that spans the Late Neolithic-Final Neolithic transition, found, for instance, at Sitagroi (phase III, contemporary with Gumelniţsa-III-Karanovo VI in Romania and Bulgaria, respectively) (Demoule, Perles, and Manalokakis 1988, 23).

Schachermeyr (1955, 109–111) introduced the term “Galepsos” to describe a group of Black-on-red painted vases that he believed derived from the Starčevo III culture in Serbia. He believed that it diffused into Macedonia and then to Thessaly. In particular, he thought that the spirals, maeanders, and hanging motifs, so predominant, were not native motifs to Greece (especially in respect to those of Dimini) but came from Starčevo (which in turn received the motifs from the Bükk and Theiss cultures in Hungary and Western Transylvania). The spiral he believed was later diffused back to Starčevo where it was embraced and transformed in the later Vinča A culture.

Deshayes and Garašanin (1964) continued to use the term Galepsos for Black-on-red sherds from Akropotamos, Galepsos, Olynthus and Dikili Tash, but admitted that they did not have the stratigraphy to locate it chronologically. Schachermeyr (1955; 1991) had placed it before Classical Dimini. Weisshaar (1979; 1979b; 1989) identified the Black-on-red imports found at Pefkakia as “Galepsos” (Demoule, Gallis and Manolakakis 1983, 23).

In fact, “Galepsos” is such a general term that its use has largely been abandoned (Vajsov 2007, 86), especially given the fact that recent studies (see below) have identified regional centers of production in Eastern Macedonia (an exception is Demoule 2004). Malamidou et al. (2006) revealed that Galepsos Black-on-red is really just one of four regional varieties (Group B). Diffusionist theories proceeding from Hungary into

Greece by way of Balkan Neolithic cultures are no longer valid, given the new chronologies and information on Black-on-red painted pottery in Greece.

Production and Circulation of Black-on-red Painted Pottery in Eastern Macedonia

An interdisciplinary scientific study was conducted between 2002 and 2004 in order to better understand the variations in surface appearance, shape, distribution, and technology within Black-on-red painted pottery (Malamidou et al. 2006), as well as to investigate the degree of standardization in the production and to identify the localization and scale of production centers (Kilikoglou et al. 2007, 306). The results were published in a series of articles that include: Lespez et al. 2001; Kilikoglou et al. 2002; 2007; Tsirtsoni et al. 2007; Yiouni 2000; 2001; Malamidou et al. 2006.

The results of these studies demonstrated that Black-on-red production occurred at a regional level and was extremely standardized. The vessels were fired in oxidizing environments at high temperatures (ca. 850–950˚C) probably in kilns (Yiouni 2000, 210, 212). The main area of Black-on-red pottery production was Eastern Macedonia, specifically around the vicinity of the Strymon and the Angitis Rivers (a branch of the Strymon) (Kilikoglou et al. 2007, 314).

Within the Eastern Macedonia Drama plain, four main production centers were located (Malamidou et al. 2006). There is a clear geographic breakdown to the location of these four groups with little overlap between areas, which means Black-on-red painted pottery was produced and distributed at a regional level. In fact, one group (Group D) was exclusively produced at Dikili Tash, and only one group had long-distance circulation (Group A).

Vessels of Group A circulated outside of their immediate production areas of Kastri on the island of Thassos, Pefkakia in Thessaly, Paradeisos and Makri in Thrace, and in Bulgaria along the Strymon/Strum River at Slatino, Strumsko, and Promachon-Topolnica. It has also been found in western Macedonia at Yiannitsa B, Polyplatanos, Makryialos and Megalo Nisi Galanis, and in central Macedonia at Vasilika and Stavroupoli. In fact, Malalmidou (2007, 305) states that based on their chemical composition, the Black-on-red imports at Pefkakia (Weisshar 1989; Schachermeyr 1991, who called them Galepsos ware) could have been produced at Kryoneri (Kilikoglou et al. 2007, 305).

The four groups as they are found at particular sites are (Malamidou et al.2006, 582):

Group A- Dimitra, Galepsos, Sitagroi, Kryoneri, and Fiokoryfi
Group B- Galepsos and Akropotamos
Group C- Fiokoryfi, Zevrochori
Group D- Dikili Tash

The difference in surface appearance of these four groups was shown (Malamidou et al. 2006; Kilikoglou et al. 2007) to be a direct result of the use of various local clays (see technology section), and this explanation can be applied to the Central and Western Macedonia Black-on-red vessels as well.

Morphological-stylistic differences, such as the frequency or a preference for certain decorative motifs, their organization, and vessel shape can also be recognized within the Eastern Macedonian group. For example, the majority of the decoration at Dikli Tash features rectilinear and curvilinear elements densely and strictly arranged, while at Galepsos and Akropotamos vessels are plainer, with more freely arranged motifs. Additional groups certainly existed in Western and Central Macedonia (Malamidou 2005), although these regions have not yet been as systematically studied as has Eastern Macedonia.

Eastern Macedonia: Home of Black-on-red Painted Pottery (Figures 27–29)

The four regionally-based production centers and their respective zones of interaction with one another (Malamidou et al. 2006, 589 fig. 10) within Eastern Macedonia explain the differences noticed in the assemblages at some sites. Additionally, Black-on-red painted pottery is more common at some sites in Eastern Macedonia than others. For example, at Dimitra it constitutes 52% of the decorated pottery (Yiouni 2000, 210) but at Dikili Tash Graphite-painted pottery is three times more common than Black-on-red painted pottery (Evans 1986, 407, 410).

As a whole, the Black-on-red painted pottery in Eastern Macedonia (Malamidou et al. 2006, 578–582) is characterized by a fine fabric with few inclusions. The vessels may or may not be slipped but are always burnished and the paint is brown-black but can appear sometimes as white or grey. Typical shapes include flaring-walled deep bowls, carinated bowls, rounded bowls, jars, and fruit-stands. Decoration covers the entire vessel surface in complex combinations of linear, geometric, curvilinear, and spiral-form motifs, generally organized into dense zones or panels or juxtaposed with open, negative space.

Although Malamidou et al. (2006) and Kilikoglou et al. (2007) demonstrated that the difference in surface appearance between the four production areas was a direct result of the use of various locals clays, there are, of course, chronological explanations for differences. For example, at Akropotamos Mylonas identified two different types of

Black-on-red painted pottery based on their color scheme, patterns, and chronology, both of which fall into Malamidou et al.'s Group A.

The earlier type (Type D) at Akropotamos uses matt black paint on a red ground with curvilinear and spiral motifs, which are not as elaborate as in the later type and as careless rendered (Mylonas 1941, 558). Similarly, the fabric is coarse; the firing often inadequate (Mylonas 1941, 558); this seems to be the Strumsko style (see below). The later type (Type A) of Black-on-red painted pottery uses black to brown paint on a red burnished ground with more elaborate curvilinear (spirals, spiral-form) and rectilinear motifs (particularly rhomboids and trapezoids) (Mylonas 1941, 558) and is what is sometimes called "Galepsos" ware.

Mylonas (1941, 588) states that Black-on-red was produced in large quantities when Akropotamos was abandoned, probably in Late Neolithic Ib (but before the Final Neolithic, since he noted that most of the interiors of the vessels were left undecorated, an observation made by Gardner (1978) for the Sitagroi Phase I-II material). Mylonas also noted the influence of Black-on-red on Graphite-painted in shared motifs, such as the "egg-and-dart molding" (Mylonas 1941, 560). The shapes, however, were more similar to Matt-painted ones at the site: i.e., open bowls with flat base and spreading sides, basin-like bowls with more vertical walls toward on the base, deep bowls, handled cups and jugs with our without handles and wide fruit-stands (Mylonas 1941, 564).

Differences in the style of the motifs in relation to vessel-shape were noted by Evans (1986) at Sitagroi, where two contemporaneous styles were in use. The first (Style I) is found on a wide range of vessels with curvilinear (i.e., spirals, maeanders, circles) and rectilinear patterns, filled motifs (mostly rectangles, triangles, quadrangles) and combinations of all three (Evans 1986, 400). The second style (Style II) has broad curvilinear lines that take on a “floral” appearance and this style is only found on oval-mouth amphorae, which often have rounded, protruding bellies (Evans 1986, 400; Yiouni 2000, 208).

Middle and Upper Strymon/Struma River Black-on-red Variation:

Strumsko and Strumsko-Akropotamos Styles (i.e., Promachon-Topolnica) Figure 30

Malamidou et al. (2006, 582) included a rare type of Black-on-red painted pottery that occurs mainly along the Strymon river on into Bulgaria: this was painted not with manganese paint, but with bitumen or some other type of organic material. Although Koukouli-Chyrssanthaki (1996, 114) has suggested that this kind of pottery may have served as a prototype for the idea of Black-on-red painted pottery, the technologies used to produced the two ware differ greatly. Bitumen-painted pottery is here considered a separate class of pottery from Black-on-red painted pottery and is addressed in its own section.

There are, however, two styles of Black-on-red painted pottery found in the Middle and Upper Strymon/Struma River valleys: the Strumsko and Strumsko-Topolnica styles. To date, these styles have only been recognized in Greece at Promachon-Topolnica, but they are found at sites along the Struma River in Bulgaria, such as at the eponymous site of Strumsko (Stefanovich and Bankoff 1998). The Strumsko style (Type A) occurs first and is characterized by straight or curvilinear broad bands (0.5–0.7 mm thick) of black-brown paint on a red-orange surface (Vajsov 2007, 96). The Strumsko-Akropotamos style (Type B) occurs later and combines the broad bands of the Strumsko style with the thin lines of Akropotamos style of Matt-painted pottery. A final point of interest is that sometimes wide bands of graphite paint are used on Strumsko style pots; this is the earliest known use of graphite in Neolithic Greece and the Balkans (Vajsov 2007, 96).

In first phase of the Strumsko style, the decoration on the upper and lower parts of the vessel is often treated differently, as two separate surfaces, but the two always complement one another (Vajsov 2007, 96). Broad bands of paint are also used to emphasize the morphological features of the pot, its rim, and any carination. Another band is sometimes painted just above the base. From the rim, running rows of free-standing or overlapping triangles frequently occur. If the triangles are independent, the empty areas are filled with an "S"-like hanging ornament, while the lower body receives other motifs, like vertical lines or "S" shapes terminating in solidly filled circles that hang from the transition line at the belly. The latter motif is characteristic only for the Strumsko Type and is not used in the thin-lined decorations of the Akropotamos Type (Vajsov 2007, 96–97).

The triangles themselves are hatched or filled with oblique arcs, but the filling is so dense that the gaps between the lines are hardly discernible, which sometimes makes them appear as solid (Vajsov 2007, 96). Later, hatched net patterns also occur in the Strumsko Style and are a chronological indicator for the beginning of the Chalcolithic in Northern Greek terms at sites like Kryoneri and Dikili Tash, but curiously they are not found in the locally made versions of Akropotamos style Matt-painted (Classical Akropotamos or Akropotamos B) (Vajsov 2007, 96).

In the second phase of the Strumsko style, broad bands of paint are no longer exclusively used and may now be combined with thin ones. This combination style is Strumsko-Akropotamos (Strumsko Type B). While the thick bands are used to separate ornamental fields and to delineate the morphological features of the rim and carination, the thin lines are now used as oblique arcs or lines for hatching; the overall design shifts to openwork (Vajsov 2007, 96–97). This hybrid style is essentially a cross between Akropotamos Matt-painted motifs with the Strumsko style fabric.

That is, the local versions of the Akropotamos style Matt-painted pottery (Classic Akropotamos or Akropotamos B) are not on a buff, matt ground as seen for the true Akropotamos style Matt-painted, but rather on a red-orange background like the Strumsko varieties. There are also differences in the hue of the painted decoration, which is deeper and more concentrated: a thicker paint consistency is used; the paint appears as black-brown whereas on the local imitations of Akropotamos (Classical Akropotamos, Akropotamos B) the paint is brown-black (Vajsov 2007, 86). This variation suggests that different clays were intentionally used for different wares. The appearance of these two wares (the Strumsko-Akropotamos hybrid style and local versions of Akropotamos) is characteristic of the Classical Phase of the Topolnica-Akropotamos culture (Vajsov 2007, 96).

Lastly, Vajsov (2007, 86) also points out that while the Strumsko style was previously referred to as "Proto-Galepsos" at Promachon-Topolnica, yet the wide black/brown painted decorations of the Strumsko Type at Topolnica-Promachon have nothing to do with the later broad-stroked painted decoration of what has been called the Galepsos Type. Furthermore, as Vajsov (2007, 86) correctly states, the term "Galepsos" is too general a term and does not offer a secure basis from which to determine typological connections (see above).

Central Macedonia Black-on-red (i.e., Vasilika, Stavropouli)

Malamidou et al. (2006, 583) regarded the Central Macedonia variety of Black-on-red as similar to Group A from Macedonia, but without any visible inclusions. They describe the fabric as brown-orange or red-orange, with cores that are often gray or black from incomplete oxidation. The paint is black or brown-black, thick, opaque and matt. Oval-mouth amphorae are the most common shape. The compositions are loose and composed of fine rectilinear and curvilinear lines; occasionally broad bands are used on channeled-burnished areas. In Central Macedonia this variety is found in the Chalcidice at Vasilika, in the Plain of Thessaloniki, the Langadas basin, and the Axios valley. Outside of Central Macedonia, it has been found at Yiannitsa (Chryssostomou 1996) and Pefkakia (Weisshaar 1989, 24).

Grammenos (1991; 1997a) outlined three categories of Black-on-red painted pottery based on his excavations at Vasilika (which typology he also used at Dimitra). Category 1 equates to Wace and Thompson's B3δ, Category 16 equates to Wace and Thompson's B3α2, and Category 22 includes specimens of Black-on-red that had areas of off-white or pale brown paint. Although Grammenos (1997a) had questioned if the result was intentional, it was not until later that Tsirtsoni et al. (2007, 60) showed it was accidental (see technology section).

Western Macedonia Black-on-red Variation (i.e., Makryialos, Yiannitsa)

Malamidou et al. (2006, 585–586) described the Black-on-red of Western Macedonia as having a medium-fine fabric with many inclusions. Its fabric is red or brown-orange and but rarely brown-red. Black, incompletely oxidized cores occur. The vessels are not slipped but are burnished. The paint is black or brown-black, a little thick but due to the burnishing it has a brilliant appearance. The decoration consists of fine lines and rectilinear motifs such as rectilinear maeanders, checkerboards, and hatched or empty rectilinear forms, but spirals also occur frequently: all these elements are organized into panels, zones, or stepped bands around the vessels. This style is reminiscent of the Classic Dimini Styles of Black-on-red and Matt-painted pottery. Unfortunately, Vlachos (2009, 121) notes that identifying which patterns were preferred on the predominantly Black-on-red decoration on Black-on-red pottery imported to Makryialos was difficult because of the high degree of abrasion of sherds from the site.

It is found in Western Macedonia in Pieria at Makryialos (Hitsiou 2003; Vlachos 2009), the Haliakmnon River valley, the Kitrini Limni basin (Karamitrou-Mentesidi and Papagiannakis 1997, 71), in Veria at Yiannitsa (Chryssostomou 1996), and on into the Amyntaion and Florina plains; it has also been found in Central Macedonia at Stravropouli (Grammenos and Kotsos 2002; 2004).

Black-on-red Technology

The details of the technology of Black-on-red painted pottery differ according to the different geographical areas of Greece, where local pottery traditions influenced it. The commonalities of these disparate regions are the preference for iron-rich clays with low calcium carbonate content, the use of a slip (iron or manganese) for the background color, manganese paint for the black motifs, and firing in an oxidizing atmosphere. Divergent aspects include chronological differences, the possible use of kilns, details of finishing the pot (i.e., burnishing, post-firing slips).

Southern Greece: The Peloponnese

The Black-on-red painted pottery in the Peloponnese combines two different ceramic technologies: the same fabric as Middle Neolithic Urfirnis, but the Late Neolithic manganese paint, as used in Matt-painted pottery. Given the close relationship of these three wares, Lavezzi suggests that "matt-Black-on-red ware might be a development from Urfirnis, perhaps under some influence from the matt-painted tradition" (1978, 423). Accordingly, sometimes Black-on-red vases superficially appear more similar to Urfirnis, at other times closer in appearance to Matt-painted. The difference can only be determined by an examination of the fabric (Weinberg 1962, 182; Phelps 2004, 67–70).

Differences in local clays also affect how the ware looks. For instance, Phelps (2004, 69; French 1972, 33–35) points out that from a Peloponnesian perspective, some of the sherds classified in Central Greece as Matt-painted are really Black-on-red (2004, 67). Phelps (2004, 67) also states that in the Peloponnese the Black-on-red fabric is different from that of Matt-painted and more similar to Urfirnis: it is more or less red or red-buff and sometimes contains white grit (calcareous inclusions). This relationship was particularly evident at Corinth (Lavezzi 1978, 423; Weinberg 1962, 182; Phelps 2004, 17, 67–70). Similarly, in Thessaly, Wace and Thompson (1912, 16–17) acknowledged early on the difficulties in isolating B3δ (Black-on-red ware with linear designs, often matt) and B3ε (Brown on Buff Ware or Matt-painted).

Kilikoglou and Maniatis (1993, 240) also found that sherds with lower percentages of calcareous inclusions (ca. 10%) were fired at a lower temperature of 800-850˚C, resulting in "Matt-painted Black-on-red." These two factors—less calcium carbonate and lower firing temperature—produce a darker-colored background for the matt paint, which is probably why the Neolithic potters chose to slip their vessel surfaces (rather thickly, 100–120 μm) red to make it contrast better with the painted decoration. The finer particles of clay in the slip were more calcareous than the vessel body, and thus fired to a lighter shade (Kilikoglou and Maniatis 1993, 40). If the calcium carbonate content and firing temperatures were higher, Matt-painted pottery would result (see Chapter 3). They do not explicitly state if the kiln atmosphere was mixed, as in Matt-painted firings, or if it was more oxidized.

Since manganese-based pigments do not contain sufficient fluxing materials to sinter or vitrify, the paint will be fugitive if the pot is not well burnished or if the clay does not contain enough impurities (Yiouni 2000, 203). Phelps (2004, 67) notes the common occurrence of this phenomenon in Black-on-red painted pottery, where the black paint often "has a powdery, granular texture which flakes off without leaving a trace behind."

Thessaly

Black-on-red painted pottery technology in Thessaly was similar to that of Central Greece, except that higher firing temperatures, ca. 950–1000˚C, were used (Letsch 1982, 79–80). Iron-rich clays (hematite) were used, but a manganese oxide pigment suspended in a clay slip was used to slip and paint the vessel (Letsch 1982, 76, 78). The clays indicate local manufacture and were low in calcium carbonate (Holt and Hutchinson 1912, 259; Schneider et al. 1991b, 9, 26, 65).

The later Black-on-red pots (B3α2) as a rule were burnished, but the earlier type (B3δ) was typically left unburnished. Of the B3δ Black-on-red sherds from the earlier Tsangli-Larisa phase analyzed by Schneider et al. (1991b, 26), however, all but one had a slip and all were burnished. The vessels were then fired in an oxidized atmosphere. Letsch and Noll (1983, 131) report that the manganese paint was generally applied 10–20 μm thick, far thinner than the slips used in Central Greece; this may be due to a higher iron content in the Thessalian clays that assisted fluxing.

An interesting suggestion proposed by Demoule, Gallis, and Manolakakis (1983, 26) is that the Tsangli phase Black-on-red (B3δ) vases are accidents of trial and error rather than intended products, because they are more similar to Matt-painted pottery. While this may be the case for the earlier B3δ Black-on-red, there are numerous examples of vessels which have of B3α2 Black-on-red on one surface and Matt Paint on the other, such as one by Schneider et al. (1991b, 26, 27) which was Matt-painted with manganese paint on the exterior, but on the interior was Black-on-red, slipped with an iron-based paint and with the motifs painted in manganese. Even so, Demoule, Gallis, and Manolakakis (1988, 23) still regard the technology of the later pottery B3α2 Black-on-red painted as inferior to that of its Northern versions.

Schneider et al. found that later examples of Black-on-red (Arapi phase) were poor in calcium (1991b, 9, 26), but were rich in chromium and nickel: they differ thus from the earlier Black-on-red examples, so demonstrating the use of different clays over time, perhaps intentionally (Schneider et al. 1991b, 27, 47; Schneider et al. 1994, 66). The use of clays lower in calcium carbonate would have enabled the production of a darker surface (Schneider et al. 1991b, 8–9).

Macedonia

Technical aspects of Eastern Macedonian Black-on-red are well documented and studies include: Malamidou et al. 2006 for SEM and NAA; Tsirtsoni et al. 2007 for SEM and NAA; Kilikoglou et al. 2007, NAA and XRD analysis; Yiouni 2000, petrographic analysis, re-firing tests and chemical analysis; Yiouni 2001; Gardner 1978 for Sitagroi; and Davrill 1997 for Dimitra.

From a technological standpoint, Black-on-red painted pottery in Northern Greece is significantly unlike the wares of the same name found in Thessaly, Central and Southern Greece. Production of Black-on-red pottery was more standardized. The only variables are the clays and the preparation of the manganese paint used for the black motifs (Tsirtsoni et al. 2007, 61). When Black-on-red painted pottery first began in Macedonia, at the end of Late Neolithic Ia, it was contemporaneous with Matt-painted pottery: it may, as at Dimitra, have similar fabrics (Yiouni 2000, 207, 210). Perhaps it takes some inspiration for its motifs from Matt-painted pottery too.

At Sitagroi, Gardner (1978) noted a progressive advancement in the technology of Black-on-red painted pottery from the end of Late Neolithic Ia to the end of Late Neolithic Ib (Sitagroi Phases I–II): improvements in clay refinement, surface finishing, firing conditions and temperature became increasingly controlled. The characteristic Late

Neolithic Ib-Final Neolithic Black-on-red painted pottery (Sitagroi Phase III) is well-levigated, inclusion-free clay, an iron slip with manganese paint and an overall heavy burnish (Gardner 1978, 126). Although Keighley (1986, 358) suggests that Phase II (Late Neolithic Ia) Black-on-red could possibly be a prototype for the Phase III (Late Neolithic Ib) variety, yet the fabrics are unrelated, and in the earlier phase the decoration is confined to the outside of the vase.

Yiouni (2000, 208; 2001, 10–11) and Gardner (1978) demonstrated in refiring tests that the black motifs were executed in manganese-based oxides and painted either on the clear red, fully oxidized surface of the pots, or on an iron-based (i.e., hematite) slip. Yiouni (2001, 10) also determined that the manganese slip used at Nea Bafra and Dimitra was fine textured, rich in aluminosilicates, and contained MnO_2 and Fe_2O_3. The manganese oxide pigment was held in a clay suspension at less than 10μm (Tsirtsoni et al. 2007, 60). Gardner (2003, 294) suggested that the amount of silica in these well-levigated examples acted like a glaze during firing and helped keep the paint from flaking off. Sometimes the slip was the same as the clay body, but at other times a finer slip from levigated clay was used. In these later instances the vessels are brighter in color and more durable. Such distinctions are also regionally determined (Tsirtsoni et al. 2007, 60-61).

The amount of calcium carbonate in the clays determined the firing temperature: the higher the calcium carbonate content, the higher the firing temperature required (Kilikoglou et al. 2007, 312). Although most pots were fired at a high temperature, around 1000˚C (Yiouni 2000, 208; 2001, 11), regardless of their calcium carbonate content, yet lower firing temperatures were also documented. For example, while most sherds from Dimitra were fired at 900-950˚C, Yiouni (2001, 11) found an example fired at 750–850˚C.

Over-firing the vessel could have adverse effects. On some vessels, the black paint appears as gray, white, or white surrounded by a black outline. Although this phenomenon had been observed and suspected to be accidental and even post-depositional (Grammenos 1991; 1997a, 44), it was not until the work of Tsirtsoni et al. (2007, 60) that it was chemically proved that these vessels had been fired at over 1000˚C and the color later transformed by post-depositional leaching of K and Na and enrichment of Ca (which is the same processes that happens to glass). The question of whether the extreme firing temperatures were created by the potters or if they were created when the house burned down is not clear, but the authors suggest it was an intentional aspect of the kiln firing (Tsirtsoni et al. 2007, 60).

Gardner (1978, 131, 139) suggests that there is a connection between ceramic pyrotechnology and the development of early metallurgy because of the high temperatures involved. This is a plausible suggestion, since the potters were clearly familiar with the locations of metallic ores because they used manganese paint. Yiouni (2000, 212) makes the interesting observation that manganese and graphite are common in the mountains surrounding the Drama Plain and are very often they are found in juxtaposition (see Chapter 8).

Two additional technical inventions associated with Black-on-red painted pottery are of particular interest. The first is the existence of a thin (3–5μm) milky-white, transparent layer, which was applied on top of the painted decoration; its existence is documented only in Black-on-red painted pottery from Dimitra and Kryoneri (Yiouni

2000, 208; 2001, 209; Malamidou 1997, 509–19). It is the first documented instance of a "clear" coating being used instead of burnishing. Post-firing coatings remain undocumented for Neolithic Greece. Yiouni (2000, 208) found that this transparent slip is highly micaceous and was wiped on in various directions, probably being applied with a cloth. Furthermore, whereas the white layer is micaceous, both the red slip and the black pigment are free from mica. She suspects that it was used to quickly produce a lustrous surface instead of the time consuming process of burnishing a pot (Yiouni 2000, 208).

The second interesting innovation is that the Black-on-red painted pottery was fired in pottery kilns. This deduction is made from the fine fabric employed, the high firing temperatures achieved, and the rarity of smoke-clouds on the vessels surfaces (Yiouni 2000, 210, 212; 2001, 23). This proposal fits with how Tsirtsoni et al. (2007, 61) describe the entire sequence of production, distribution, and circulation of Black-on-red vessels, as a "remarkable standardized chaîne opératoire."

Gardner (2003, 294) was skeptical if kilns were used. Since there is no evidence of the kilns themselves, Gardner (1978, 125) proposed for the Sitagroi Phase II Black-on-red vessels that they were fired with woods which produced dry heat (such as pistachio) in the open firing: such woods do not produce much smoke and help to maintain an oxidizing atmosphere rather than the reducing atmosphere that tends to happen in pit firings. In fact, no pottery kilns have been conclusively documented anywhere in Neolithic Greece (see Chapter 2).

CHAPTER 5: POLYCHROME-PAINTED POTTERY

Late Neolithic Polychrome-painted Pottery (Figures 31–40)

Late Neolithic Polychrome-painted pottery occurs in very different manifestations both chronologically and geographically (similar to Black-on-red painted pottery). The term *polychrome* denotes two colors of paint (black and red) on a white or pale buff-brown background, or the inverse: black and white paint on a red ground. Three different colors of paint are not attested in Neolithic Greece. The term bichrome is avoided because it has been already used in various ways in the literature – from describing Black-on-red painted pottery (Gardner 1978) which does have paint to "Black-topped" pottery (Hitsiou 2003), which uses no added mineral pigment (paint) whatsoever.

Polychrome-painted pottery was created during the Late Neolithic period, which was the first time that the Neolithic potters gained full knowledge of the properties of mineral pigments and firing techniques (Demoule and Perlès 1993, 392). By varying the thickness of an iron-rich pigment in the painting and changing from reducing to oxidizing atmosphere in the firing, a dichromatic or polychrome effect can be produced (Jones 1986, 765; Yiouni 2001, 9). More commonly, though, it is produced by using a combination of both manganese and iron-based pigments. The use of manganese (and graphite) paint eliminated the need for the three-stage firing (iron reduction technique) required when iron oxides only were used to achieve a black paint on a light background (Frierman 1969; Jones 1986). The control of color may also have been aided by the invention of new firing techniques such as kilns and saggars (Renfrew 1972; Vitelli 1991).

Except in Macedonia, Polychrome-painted pottery began with Matt-painted pottery at the start of Late Neolithic Ia (Tsangli phase). In Central and Southern Greece it shares many shapes, motifs, and compositions. It is also contemporary with Black-on-Red (B3δ): as has happened too with the early B3δ type, Polychrome-painted has often been considered a subset of Matt-painted pottery (Sampson 1977; 1993). In such examples, the black and red elements tend to have been used separately; later the two were combined. Polychrome-painted pottery in this area did not develop into a wide-spread style or produce advanced compositions as in Thessaly.

A later, Late Neolithic Ib type of Polychrome, the Gonia style, is found in the Peloponnese: this ware was imported to several sites in Central Greece, where there was no longer a local Polychrome tradition. Although some scholars (i.e., Mavridis 2008, 120; Psimogiannou 2008, 73) are under the impression that Phelps (1975, 245; 2004, 101–102) pushes for a Final Neolithic date for Polychrome pottery in Central and Southern Greece, this is, in fact, not the case. Phelps (2004, 96) dates all Polychrome, except the Gonia style, to the Late Neolithic period. This confusion may be due to the fact that Phelps (2004, 70) first states that Black-burnished pottery in the Peloponnese existed in the Late Neolithic and Final Neolithic periods (his periods III and IV), but then later (Phelps 2004, 74) states that it ends at the end of Late Neolithic Ib (his period III) because it is absent at sites where Late Neolithic Ib Polychrome-painted pottery was produced. It may also be due to confusing B3γ Arapi ware with Late Neolithic Ia Matt-painted polychrome (for example, Psimogiannou 2008, 73).

In Thessaly, there are three main types of Polychrome-painted pottery with chronological and geographic distributions: B3ζ, B3γ, and B3β. The early Polychrome

B3ζ variety begins at the start of Late Neolithic Ia and shares many shapes, motifs, and compositions with Middle Neolithic Red-on-white painted pottery (A3β). Polychrome-painted pottery is most characteristic, however, of the first phase of Late Neolithic Ib (Arapi) in the the B3γ Arapi style. This type of Polychrome in Thessaly is contemporaneous with the Gonia style in the Peloponnese. Polychrome-painted pottery continued to be used in another, new form, B3β, in the Otzaki and early Classic Dimini phases, but only in a limited number of shapes. Curiously, all Polychrome pottery (B3ζ, B3γ, and B3β) ceases to be produced in the Classic Dimini phase, when only Black-on-red and Matt-painted Dimini style pottery is used (Holmberg 1964b, 30).

In Macedonia, Polychrome-painted pottery is much more of a rarity, with the only real instance being the Dimitra style, in which broad black bands are used to outline red ones. It dates to the beginning of Late Neolithic Ib. There are also examples of sherds from the middle of Late Neolithic Ib which constitute a hybrid of Black-on-red and Graphite-painted pottery.

Polychrome-painted Pottery in Central and Southern Greece (Figures 31–34)

In Central and Southern Greece, there are both similarities and differences between the types of Polychrome-painted pottery that was produced. The similarities are that both areas began making Polychrome-painted pottery at essentially the same time when Matt-painted pottery was introduced. This earlier Late Neolithic Ia type of Polychrome is so similar to Matt-painted pottery in shape, motif, and compositions that some scholars merely consider it a sub-type of the same ware (i.e., Sampson 1975; 1993; French 1972; Mavridis 2008) and can therefore be referred to as Polychrome Matt-painted pottery. In this kind of polychrome, the red and black elements are generally used independently of one another. At the Sarakenos Cave (Sampson 2008a, 158–159), the “Red Decorated Ware” pieces are probably Polychrome Matt-painted without the black.

Later, in Late Neolithic Ib a style of Polychrome-painted pottery develops in the Peloponnese in which the black paint borders red bands. It is known as the Gonia style of Polychrome-painted pottery. While the Gonia style of Polychrome-painted decoration is not the only existing later variety in the Peloponnese, it is the clearest-defined polychrome ware. It is of particular interest for the large numbers recovered at the Sarakenos Cave in Central Greece. For these reasons it is discussed below in further detail.

The relationship between Thessalian polychrome varieties and the ones found in Central and Southern Greece is not clear (Mavridis 2008, 119; Theocharis 1973, 109). Additionally, different styles appear to exist (in shapes, motifs, syntax) both within central Greece and within the Peloponnesian styles. It is unclear if these are just geographical differences or if they have a chronological significance (Mavridis 2008, 119, 120).

Weinberg (1962, 198; 1965, 46) and Phelps (2004, 96) discussed the material relatively, as earlier or later, although Phelps (2004, 96) was partial to creating different groups of polychrome in each region based on shapes and motifs since he did not have enough stratigraphic evidence to justify a sequence for the different styles (i.e., Orchomenos (Matt-painted Polychrome), Thespai (Gonia style), and Orchomenos (Klenia style) in Central Greece: Corinth (Polychrome Matt-painted), Gonia (Gonia style) and Klenia (Klenia style) in the Peloponnese.

Central Greece: Late Neolithic Ia Polychrome Matt-painted

In Central Greece, Polychrome-painted pottery first appears as the Polychrome Matt-painted style in the mature phases of Late Neolithic Ia and continues to be produced into the Late Neolithic Ib, but ends before the Final Neolithic (Mavridis 2008, 120).

Similar Polychrome Matt-painted is also found in Thessaly and the Peloponnese. Although stratigraphy at Elateia was not clear enough to say if Polychrome-painted pottery and Matt-painted began at the same time, Weinberg thought this was the case (1962, 198). Mavridis (2008, 120) and Touchais (1981, 52) however, believe that it began later in Late Neolithic Ia, when burnished Matt-painted pottery was produced.

As mentioned in chapter 4, there is a close relationship between Polychrome, Black-on-red, Matt-painted, and Urfirnis in Central and Southern Greece. French (1972, 11) noted the similarities between Black-on-red, Matt-painted and Polychrome Matt-painted sherds in Central Greece, but was not sure of the order of development; furthermore, he observed that while some shapes, such as fruit-stands, are common in all three, there are differences in the rim and bowl profiles, and on the whole Polychrome Matt-painted pottery was widespread in Central Greece (French 1972, 12). Thus the exact appearance of this polychrome pottery remains undetermined and may have varied from site to site at an inter-regional level.

The shapes are fruit-stands, carinated bowls, rounded shoulder bowls, and jars, and the motifs are similar to Matt-painted pottery. It is found at many (i.e., Orchomenos, Elateia, Proskynas, Chaeronea), but not all sites, which may or may not have a chronological significance.

In this style, the contrast between the two colors is slight; the elements are linear and generally kept separate (Phelps 2004, 99). Weinberg (1962, 198) related the fruit-stand motif of crosshatching (in which one set of lines is black and the other is red) and jars with chevrons alternating black and red chevrons to examples from Kouphovouno in Thessaly (Weinberg 1962, 198; Theocharis 1959a,b), and the same motifs are found on jars from the Alepotrypa Cave in the Peloponnese (Papanthanopoulos 2011).

Central Greece: Late Neolithic Ib Polychrome

The Late Neolithic Ib type of Polychrome B3β is similar to the Gonia style of the Peloponnese: the black paint borders the red. Weinberg (1962, 198) associated this type to B3β (Black and White Paint on a Red Ground or Black and Red Paint on a Cream Ground) of Thessaly and believed that it belonged at the end of the Late Neolithic period. Phelps (2004, 100) related it to Gonia and Klenia styles in the Peloponnese. He (Phelps 2004, 100) also claims that this type of Polychrome is more widely distributed (i.e., Thespiai, Eutresis, Elateia, Kalami, and Orchomenos), which again may or may not have a chronological significance. In Attica, Phelps (2004, 100) distinguished between a Late Neolithic Ib Polychrome on a white slip (at Nea Makri and the Cave of Pan at Oine) and one without the white slip (Athens Acropolis). Lastly, there is the unique case of the Sarakenos Cave in Boeotia, which as an abundance of Late Neolithic Ib Gonia style Polychrome; it is discussed in detail below.

The Peloponnese: Late Neolithic Ia and Ib Polychrome Matt-painted (Figures 34–35)

As in Central Greece (and Thessaly), the first polychrome pottery appeared in Late Neolithic Ia and was similar to Matt-painted pottery. This type is best represented at Corinth. Black is the dominant color and the motifs are generally linear (Phelps 2004, 100). A motif or particular interest is the dot-edged band called by Phelps either “snake,” “caterpillar,” or “black-dot fringed red icicle,” which he claims is a Boeotian motif in origin (Phelps 2004, 99, 100; see Fig. 34, no. 3). This motif is popular on the interiors of fruit-stand bowls. The dots are painted in red and the line in black.

At Corinth, Lavezzi (1978, pl. 110, no. 64) categorized one such sherd as Urfirnis, although Phelps (2004, fig. 44, no. 6) and Walker-Kosmopoulos (1948, 52; 1953, 5) identified it as Polychrome, which underscores the close relationship in Central and Southern Greece between Urfirnis, Matt-painted, and Late Neolithic Ia Polychrome (see above).

Generally speaking, the red paint here is lustrous while the black paint is dull and matt, although at Gonia red can also be matt or crusty (Phelps 2004, 97). The red paint is the slip used in Red Burnished pottery (Phelps 2004, 97). While Phelps, like Weinberg (1962, 198; 1965, 46), acknowledged the existence of an earlier and a later style, Phelps discussed all Peloponnesian Polychrome sherds together since he did not have enough stratigraphic evidence to justify a sequence for the different styles, although he dates the material from Corinth to Late Neolithic Ia and Gonia, Klenia and Prosymna to Late Neolithic Ib (Phelps 2004, 96). Most importantly, Polychrome-painted pottery is not a Peloponnese-wide phenomenon: it appears that it flourished at sites where Matt-painted pottery was nearly extinct in the Late Neolithic Ib, while those sites which continued to produce Matt-painted pottery did not develop a late polychrome tradition of their own (Phelps 2004, 101).

Although Phelps (2004, 101) stated that the Peloponnesian types of Polychrome-painted pottery can only be roughly equated with Thessalian ones because they are not "sufficiently detailed to establish a precise synchronism," he acknowledged some similarities in shape in Late Neolithic Ia Matt-painted Polychrome and Late Neolithic Ib Arapi style Polychrome-painted pottery (B3γ). The shared shapes include pedestal bowls (more common in the Arapi phase), concave cups, piriform and collared jars, waisted handles on carinated bowls, and collar jars. Phelps (2004, 101) also claims that the open convex bowls at Gonia and the Klenia Cave are of a kind found in the Otzaki and Dimini phases in Thessaly, and since neither Gonia nor Klenia had carinated shapes, they must date to later in the Late Neolithic Ib.

Some of the Polychrome examples from the Franchthi Cave (i.e., Fig. 34, nos. 6–9) are striking similar to B3ζ (Black and red on white) of Late Neolithic Ia in Thessaly rather than Matt-painted Polychrome. The utilize groups of thinner, parallel red lines bordered by thicker black bands in zigzags around the vessel; this motif is derivative of the Middle Neolithic and also points to an early date for this type of Polychrome.

Other aspects of Thessalian Polychrome, however, are not found in the Peloponnese. These include basket handles, horned handles, rim tabs, and spur lugs, a large number of Arapi motifs, and the disappearance of Matt-painted pottery in the Arapi phase; generally the repertoire has a different emphasis in Thessaly (Phelps 2004, 101).

Late Neolithic Ib Peloponnesian Polychrome-painted Pottery Styles (Figure 35)

Phelps (2004) discusses two Late Neolithic Ib types of Polychrome-painted pottery: the Klenia Cave and Gonia styles. In the Klenia style, the black paint is used separately from the red and is a subordinate element in the design. Horizontal divisions between the upper and lower parts of the vessel are common. It is never as a border; and generally there is a horizontal division between the upper and lower parts of the vessel (Phelps 2004, 99). Some of the other differences between these two styles include minor points of procedure: i.e., at the Klenia Cave, the red paint is applied after the black, whereas at Gonia the black is always painted after the red (Phelps 2004, 96, 99).

This difference in the order of paint application is of note because the motifs at the two sites are also used differently: in the Gonia style, they are tectonic, with broad red bands of paint, usually edged in black, while in the Klenia style the black is never used as a border, but rather as a separate and subordinate element in the design, which is typically divided between the upper and lower parts of the vessel (Phelps 2004, 96; Mavridis 2008, 119).

The examples from the Franchthi Cave (Fig. 55, nos. 8–9) are difficult to assign to either the Klenia or Gonia styles; even Vitelli (1999, 20) had difficulty locating exact parallels. This is because while the primary motifs are generally executed in broad areas of red outlined in black, the two colors may also be used separately. Furthermore, the use of small hanging triangles from the lip on the interior of the vessel is more characteristic of the Klenia style rather than the Gonia style, based on Phelps' illustrations.

Late Neolithic Ib Gonia Style of Polychrome-painted Pottery (Figures 35–36)

The Gonia Style of Polychrome-painted pottery takes its name from the site of Gonia in the Peloponnese, lying 3 miles west of Corinth. Blegen (1930, 69) first defined the Gonia Style of Polychrome-painted pottery as being of a not extremely well refined clay, buff or terracotta in color, with occasional gray cores and a buff-brown surface that is usually highly burnished and painted with red, brown-red to orange-red and gray to black paint. The red at Gonia ranges in hue between orange, brick, vermillion, and orange-red according to Phelps (2004, 97). The recognizable shapes at Gonia included tumblers, wide-mouth collared jars, bowls, fruit-stands, and carinated bowls; handles are generally rare (Phelps 2004, 98).

The zigzag is the most frequently occurring design element (Blegen 1930, 70). Phelps characterizes the motifs from Gonia as usually broad red bands edged with thin black ones and arranged in tectonic compositions (2004, 99). Zones in different combinations of bands of lines around the vessel are particularly common, and black auxiliary motifs can be used to embellish these linear bands (Phelps 2004, 98). Blegen believed that the Gonia style of Polychrome-painted pottery corresponded to B3β in Thessalian terms and that in particular, “it is of course intimately related to the characteristic pottery of Dimini” (Blegen 1930, 70). Similarly, Walker-Kosmopoulos (1948, 56) also called it “Tricrhome Dimini Ware.” These remarks suggest a date more toward the end of Late Neolithic Ib, and this may be true for the examples at Gonia and Corinth. It is important to note, however, that both Sampson (1997, 232) and Phelps

(1975; 259; 2004, 96) date the Gonia style to the beginning of Late Neolithic Ib, while the Dimini style occurs at the end of the period.

Prosymna was the only other site in the Peloponnese that produced a substantial amount of Gonia style Polychrome-painted pottery. Phelps even considered the site as an offshoot of Gonia ("for whatever reason, colonizing, refugee or transhumant") and even suggests that it may be a center of production of Polychrome given its frequency at the site (34%) (2004, 100, 101). Curiously, Gonia style Polychrome-painted pottery is much less common at Klenia, which is half way between Gonia and Prosymna (Phelps 2004, 99). Similarly, it is also rare at Corinth, which is only three miles away: Weinberg recovered only 15 sherds when, conversely, Gray Ware from Corinth was abundant at Gonia (1937, 515). Sampson (2008a, 211) suggests that the potters at Prosymna possibly came from Gonia at a time when Polychrome Matt-painted pottery was still being produced.

In the Peloponnese, the Gonia style of Polychrome-painted pottery is found at Corinth (Weinberg 1937, fig. 23d, Walker-Kosmopoulos fig. 37, pl. IV, 1 and k), to a limited extent at Franchthi (Phelps 2004, fig. 46, no. 47), in the Klenia Cave, and at Aria Argolidos (Phelps 2004, 100). Outside of the Peloponnese, it is found at the Pan Cave and on the South Slope of the Acropolis. It has most recently been recovered in large numbers at the Sarakenos Cave in Central Greece: an "unprecedented number of Gonia sherds outside the Peloponnese" were recovered (Sampson 2008a, 211). Though primarily fragmentary, the motifs and shape are the same as those at Gonia (Blegen 130) and Prosymna (1937).

Late Neolithic Ib Gonia Style Pottery in the Sarakenos Cave in Central Greece (Figure 36)

Sampson (2008a, 211) points out that in some of the literature Gonia style Polychrome has been mistaken for the earlier Polychrome Matt-painted (i.e., Daux 1967, fig. 18). He reasserts that the Gonia style Polychrome sherds are easily distinguished from Polychrome Matt-painted sherds because the red is lustrous and unlike the dull matt red paint of the latter. Moreover broad bands and zones constitute the main characteristics of the Gonia style in contrast to the panel compositions of Polychrome Matt-painted, although metope arrangements can also occur (Sampson 2008a, 201). Although black decoration typically outlines motifs executed in red, red decoration can also be used independently on the exterior of bowls, while black and red are used together on the interior (Sampson 2008a, 201).

Broad and narrow zones are the characteristic compositional scheme, and the motifs include zigzag lines, sometimes next to a line and so creating a "flame," lozenges, crooked lines, curvilinear lines, step motifs, denticulated motifs, indeterminate shapes, and arcs. Sampson notes an interesting contrast in how the motifs are freely handled on the interior of vases, while their application on the exterior tends to be much more rigid and controlled (2008a, 201).

Sampson (2008a, 198) suggests that large parts of the vase may have been devoid of decoration, but without the result seeming severely austere. Sampson also points out that it is unclear if patterns were regular and symmetrical, but "a more plausible scenario is that the painter was carried away from inspiration, and did not focus on the final result; thus most probably, the complete vase originally was not satisfactory in appearance," and points to some clear examples where the painter has made a mistake and unsuccessfully attempted to fix it (2008a, 198, fig 105, 537).

At the Sarakenos Cave the shapes are rather limited to mainly small and medium-sized hemispherical bowls and deep bowls: all vessels rested upon flat bases (Sampson 2008a, 198). Handles and lugs are rare, but do occur: they include strap handles, pierced horizontal lugs near the rim, horn-shaped handles, and tubular and false vertical handles, as well as a “lug in the shape of a grubbing maddock” (Sampson 2008a, 197, 202).

Regarding the circumstances behind the deposition of large amounts of Gonia style Polychrome-painted pottery in a cave in central Greece, there are several considerations and problems to ponder. First, the pottery at Sarakenos has not been subject to provenance studies so it is unclear if it is locally made or imported from the Peloponnese (Gonia or elsewhere), although Sampson (2008a, 212) implies that it was imported. Second is the question of how the pottery came to be deposited in the cave. Although Phelps (2004) does not repeat his earlier suggestion (1975, 289), namely that it was diffused to Prosmyna by transhumance, Sampson does not exclude the idea (2008a, 211). Third, the why and how the vessels were used in the Cave remains problematic because, as Sampson points out (2008a, 213), the vessels which are often elaborately painted on the interior are preserved with few signs of active use. No burials were found in the cave, so if the pots were for ritual or display it was for purposes other than that of burial.

Ultimately, Phelps best describes the Gonia style as “a short-lived floruit” that occurred when Matt-painted was on its way out (2004, 100). There is also the problem of establishing for how long the ware was being produced as opposed to how long a vessel could have been in use (Sampson 2008a, 213). Demoule and Perlès (1993, 387) add that polychrome maeanders from the Corycian Cave are probably contemporaneous with the Gonia and Prosymna material.

Gonia Style Polychrome-painted Pottery Chronology

The Gonia style of Polychrome shares characteristics in shapes and decoration with the Arapi phase in Thessaly (Hauptmann 1969; 60; Tsoundas 1908). Thus, chronological correlations between the Gonia and Arapi styles (B3γ) of Polychrome-painted pottery can be made (Sampson 2008a, 211) at least to some extent although Douzougli (1994) points out that the exact simultaneity or succession of these wares cannot be fully substantiated.

Sampson (2008a, 211) suggests that at "sites where local production of polychrome ware did not develop, unlike Gonia and Prosymna, the Matt-painted production continued, and occasionally a second color (red) is applied." By this he implies first that the Gonia style was produced at a limited number of sites and then that the sites which did not produce it continued to make Matt-painted Polychrome pottery, perhaps because this satisfied the painted pottery need at that particular site. The Gonia style-Polychrome was thus produced at a time when Matt-painted pottery was waning, but still being produced (Sampson 2008a, 211).

Sampson indirectly dates Gonia style Polychrome-painted pottery by correlating it to a type of plastic and incised pottery that he found in the Limnes Cave in Kastria in the Northern Peloponnese (1997, 232): this dates to Late Neolithic Ib. Blegen (1937) unearthed the same plastic-incised ware at Proysmna on the Eastern Yerogalaro ridge, along with Gonia style Polychrome-painted pottery: both wares are therefore of the same date (2008a, 211). Phelps (1975, 259) had come to a similar conclusion earlier, based on the Gonia and Prosmyna material: he dates most of the Corinth material to Late Neolithic Ia, possibly transitional to Late Neolithic Ib –when Prosmyna, Gonia and Klenia Polychrome-painted pottery is all in use (2004, 96). Phelps (2004) does not date any Polychrome-painted pottery to the Final Neolithic (LN II), as he previously did (1975, 283, 285).

Douzougli (1994, 167) found the same ware with Klenia-type polychrome at Chronika in the Argolid and dated it to the early Final Neolithic (Late Neolithic II). Indeed it may continue into this period, as the stratigraphy at the Sarakenos Cave would allow, but it certainly began in Late Neolithic Ib or at the transition to the Final Neolithic (Sampson 2008a, 190, 211). Coleman (1992, 259) dated the Gonia style to Late Neolithic Ia, which Lavezzi (2003, 70) pointed out is incorrect.

Polychrome-painted Pottery in Thessaly (Figures 37–39)

There are three main styles of Polychrome-painted pottery in Thessaly (B3ζ, B3γ, and B3β) that use various combinations of red, black and white paint on a light brown-buff or white ground. These styles are chronologically successive, and are therefore discussed in order from oldest to most recent. Polychrome-painted pottery first occurs during the Late Neolithic Ia Tsangli phase and continues to be produced into the middle of Late Neolithic Ib or early Classic Dimini phase, but ends before Classic Dimini IVC (Otto 1985). It should, however, be kept in mind that the styles also have strong geographical correlations within Thessaly, rather than implicit chronological meaning (Gallis 1992).

B3ζ Light Red-orange and Black Paint on a White Background (Figure 37)

Polychrome-painted pottery first occurs during the Late Neolithic Ia Tsangli phase where it exists alongside Matt-painted pottery and is essentially the same in motifs and shapes, but with the addition of red paint (Phelps 2004, 96; Hauptmann 1969, 26), and it this regard it is similar to the early Polychrome Matt-painted pottery of Central and Southern Greece.

Another type of early Polychrome pottery is also found in Thessaly: B3ζ Polychrome-painted pottery (Red-orange and Black Paint on a White Background). Wace and Thompson (1912, 17) first found B3ζ Polychrome-painted pottery at Tsani and Tsangli where they remarked on its resemblance both in shape and motif to the earlier Middle Neolithic A3β (Red on White) ware, such as the use of zigzag groups of lines bordered by thicker bands, or groups of alternating oblique lines that intersect to form hatched rhombuses.

Since the motifs are—in Wace and Thompson's words (1912, 17)—"less pretentious" and more akin to Red-on-white painted pottery, it is easy to isolate this style of polychrome from B3γ or B3β, which have much more complicated motifs and compositions. At Tsangli the main shapes consisted of fruit-stands, carinated collared bowls, small necked jars, jars, wide open bowls, small parallax cups, and ladles; yet other shapes probably existed (Wace and Thompson 1912, 100). At Tsangli, the black paint had more of a brown tone; sometimes black-brown wavy lines crossed red ones; many sherds preserved only one color although they clearly belonged to this ware (Wace and Thompson 1912, 1001). B3ζ Polychrome-painted is most common in Western Thessaly.

In B3ζ style Polychrome, the red paint is the primary decorative element. It is mainly used in Western Thessaly at Tsangli, Tsani, and Tsapocha (Wace and Thompson 1912, 17, 101; Hauptmann Milojčić 1969, 29; Theocharis 1973, 79; 1981, 122), but it has also been found in Eastern Thessaly at Tsalmas and at Plateia Magoula Zarkou, which is on the border between these two areas (Demoule, Gallis, and Manolakakis 1998, 29). Some examples at the Franchthi Cave (Fig. 34, nos. 6–9) are also similar to this style.

B3γ Black and Red Paint on a White Ground (Figure 38)

The Thessalian B3γ (Black and Red Paint on a White Ground) Polychrome-painted pottery is particularly characteristic of the Late Neolithic Ib Arapi phase. It is known as Sägebortenware (Schachermeyr 1991) or Dark-on-light painted Arapi ware, or even simply Arapi ware. B3γ Polychrome occurs later than B3ζ and the motifs are more sophisticated. B3γ Polychrome also begins after the appearance of B3α1 (White-on-red) and B3α3 (Dimini style Matt-painted pottery). Milojčić et al.'s (1976, 13) Ayia Sofia phase is essentially a substyle of B3γ Polychrome. This transitional style is characterized by the main motif executed as a broad-white area, outlined in black, and the rest of the vessel is painted red; Milojčić et al. (1976, 13) thought represented a transition between the Otzaki (Dimini III) and Classic Dimini phase (Dimini IV). Conversely, Coleman (1992, 256) claims that since this transitional phase in not well documented elsewhere in Thessaly, it should not constitute a separate chronological phase.

The red paint often appears as red-orange, and the vessels are always highly burnished (Wace and Thompson 1912, 16). The ware uses buff clay and a creamy slip with black paint outlining the red linear motifs, which are similar to those of Matt-painted pottery (i.e., straight, zigzag and curved lines) but more carefully rendered (Holmberg 1964b, 29). The spiral also makes its appearance at this time (Otto 1985, 135-135), but it occurs as an isolated element; running spirals and maeanders are used (Holmberg 1964b, 29). The compositions of B3γ Polychrome are arranged with strict panel decoration dominating and with an emphasis on hanging motifs (Otto 1985, 134-135). Souvatsi (2008, 120) noted that at Dimini B3γ Polychrome decoration had more pendant arcs and festoons than the contemporary Matt-painted pottery.

The shapes, too, are basically that same as in Matt-painted pottery: forms such as carinated bowls with or without handles, bowls with rounded sides, fruit-stands, and handle-less collared jars. New forms include the collared jar with two vertical strap handles (a type of amphora) and two more that become popular in the subsequent Otzaki and Dimini phases – the Dimini-type bowl and the more elaborate fruit-stand with slightly incurved rim (Holmberg 1964b, 29). B3γ Polychrome is primarily an eastern Thessalian style. The repertoire of forms is rather limited, and the most common shape is the fruit-stand; small cups with loop handle, conical bowls, jars, and deep bowls also occur (Wace and Thompson 1912, 16, 100, 142, 157).

Outside of Thessaly, B3γ Polychrome has been found in Central Greece on the islands of Aegina and Euboea, in the Corcycian Cave (Touchais 1981, 142, 400), and in the Peloponnese at Prosymna, Corinth, Astakos, and Gonia (Christiadou 1996, 181; Weinberg, 1937, 513). Holmberg (1964, 29) connected the Polychrome at Akropotamos and Galepsos in Macedonia with B3γ Polychrome, although the material from these two northern sites is really Dimitra style Polychrome. Katsikaridis (2012) remarks that Arapi style (B3γ) Polychrome painted pottery was found at Avgi in Western Macedonia. This is an interesting find since later Classic Dimini style pottery is not found at the neighboring site of Dispilio, although it is found at Makryialos and Čakran in Albania.

B3β Black and White Paint on a Red Ground or Black and Red Paint on a Cream Ground (Figure 39)

The defining feature of B3β Polychrome-painted pottery is that, regardless of the color scheme (on a red or cream ground), the black paint is always used as a secondary color, which merely outlines the designs that are in either white or red (Wace and Thompson 1912, 16). When the decoration is white and black paint on a red ground, it is more similar to B3α1 (White-on-red) and when black and red paint are used on a cream ground, it is closer to B3α2 (Classic Dimini style). Sometimes the two styles can be combined on the same vase, with one style on the interior and another on the exterior; this is most common with B3α2 and B3β (Wace and Thompson 1912, 16). Furthermore, at Tsani, some sherds combined the local styles of A3γ (Red-on-white painted pottery of north-eastern Thessaly) and A3ε (Red-brown on buff) with linear designs executed in black on top of them (Wace and Thompson 1912, 141).

The most common shapes are fruit-stands and “spit-supports,” but Dimini-type bowls do occur (Wace and Thompson 1912, 16, 141). Souvatsi (2008, 120) noted that at Dimini, some fruit-stands were painted using B3β Polychrome, although the majority used Dimini style Matt Paint. Similarly, most jars were Matt-painted in the Dimini style, but some employed B3γ Polychrome (which includes the famous jar found by Tsoundas).

The diagnostic shape for the ware, however, is undoubtedly the so-called “spit-support” or “spit-stand.” Souvatsi (2008) found in her study of the material from Dimini that all of the “spit stands” were exclusively painted using B3β (Black-and-white-on-red or Black-and-red-on-cream) Polychrome. Spit-stands or spit-supports are four-sided elongated pyramidal forms with concave interiors, 25–30 cm tall. Their sides may have angular cut-outs like those seen in fruit-stand pedestals; a series of plastic knobs is found along two opposite edges at the top (where wooden sticks or skewers supposedly could have been placed). The insides are monochrome and crudely finished, while the exteriors are exclusively painted using B3β Polychrome, using geometric patterns arranged into horizontal panels (Souvatsi 2008, 146).

Chourmouziadis (1979) recovered 13 “spit stands” in his excavations at Dimini, all of which were found near hearths with ash and charred food remains scattered about; the interiors are all blackened. They are the only type of painted vessel made out of coarse reddish-brown clay (Souvatsi 2008, 259). In one room (Souvatsi’s Space 10) three spit stands were found in situ with charred wood in their interiors, alongside a complete cooking vessel, a clay sieve, a painted neck jar, a cup, charred bones, and shells – all along a bench on the inner wall of building (Souvatsi 2008, 146). Evidently, they were actively used in food preparation.

B3β Polychrome belongs to the Otzaki Group B. While the predominant color scheme is black outlining white paint on a red surface, the colors can be inverted so that red motifs are outlined in black paint on a cream ground. In either color scheme, the black serves primarily to outline the other color (red or white). In this inverted version, the color scheme is similar to Arapi ware, but the compositions differ. Spirals and maeanders are now used and are the dominant themes (Otto 1985, 134–135). They are better integrated into the compositions, “put logically in the linear scheme by dividing the surface through vertical or horizontal lines in fields and filling these with the spirals or the maeanders” with curved lines, checkerboard, hatching and crosshatching used to fill in these fields (Holmberg 1964b, 30). Other motifs include zigzag bands, spiral curls, checkerboards, hatched diamonds, rectangles, and rhombuses, which are organized into alternating fields of decoration (Otto 1985, 134–135). B3β Polychrome was particularly common in northern and eastern Thessaly (Holmberg 1964b, 31).

Polychrome-painted Pottery in Macedonia (Figure 40)

In Macedonia, Polychrome-painted pottery is much more of a rarity (like Central Greece), with the only real mode being the Dimitra style. It uses broad black bands to outline red ones (like the Thessalian B3β or the Gonia style in the Peloponnese); it dates to the beginning of Late Neolithic Ib. There are also examples of a hybrid version, mixing Black-on-Red and Graphite painted styles from the middle of Late Neolithic Ib.

Dimitra Style of Polychrome-painted Pottery (Figure 40)

The name “Dimitra ware” was first suggested by French (1964, 33) for Polychrome sherds he found at Akropotamos, Dimitra, and Galepsos. Vajsov (2007, 88) points out that it is not the most suitable name since it is exceedingly rare at Dimitra itself (Grammenos 1997a, 43, Category 17, “Trichrome”). It has, however, been accepted in the literature, particularly in the Balkans (i.e., Grabska-Kulova 1993, Perničeva 1995). French (1964, 33) described the ware as fine, micaceous, well fired, and well burnished, having a pale brown surface with red and black paint. In particular, the decoration features broad bands of red paint outlined by broad black lines. Schachermeyr (1991) included Dimitra style Polychrome sherds in his “Galepsos” Black-on-red painted pottery class; this is problematic both because the term Galepsos is also outdated and because he has combined two different types of pottery.

At Promachon-Topolnica, two versions of Dimitra style Polychrome-painted ware were found. The first type uses thick black lines to border red bands. The second variety occurs later and uses thinner black lines to outline broad bands of red paint. Both of these styles use similar compositions to the contemporary Strumsko style Black-on-red painted pottery. Its motifs and shapes are similar to those of contemporaneous Akropotamos-Topolnica style Matt-painted pottery (Vajsov 2007, 88, 98).

The main motifs are triangles, spirals, circles, and other curvilinear forms. Hanging motifs (garlands or festoons) are popular, set from the vessel rims. Of particular interest is an anthropomorphic pot from Promachon-Topolnica in which the pierced-lugs at the rim have been transformed by the vase painter into human heads; they thus appear as a series of individuals holding hands around the vessel body. Fruit-stands, rounded carinated bowls, shallow bowls, and jars are the most common shapes.

Vajsov (2007, 100) believes that “the concept of ornamental compositions that comprise motives of two contours enclosing a filled space belongs definitely to Thessaly,” which may also account for the rarity of this ware. Only a few sherds turn up at sites in Eastern Macedonia (i.e., two at Sitagroi; Evans 1986, 403); though they are more common in Central (i.e., Toumba) and Western Macedonia (i.e., from sites the Kitrini Limni basin) (Yiouni 2001, 11). In addition to the finds of Dimitra style Polychrome-painted pottery in Eastern Macedonia at Dimitra and Galepsos, this type of Polychrome is also found along the Struma River in Bulgaria at Slatino and Bălgarcĕvo (Peničeva 1995). Dimitra style Polychrome-painted pottery and Black-on-red painted pottery are in use at the same time, at the beginning of Late Neolithic Ib.

Polychrome-painted Pottery Technology

Advances in ceramic pyrotechnology enabled the creation of Polychrome-painted pottery for the first time in the Late Neolithic, since the Neolithic potters now had full knowledge of the properties of mineral pigments and firing techniques (Demoule and Perlès 1993, 392; Vitelli 1995, 56). True Polychrome-painted pottery uses both ferruginous and manganese-based pigments on the same vase. The properties of manganese paint are such that it always fires to a dull, matt black; whereas iron-based pigments can produce either lustrous red or black motifs, depending on the firing conditions (it will turn black if reduced and red if oxidized). The firing atmosphere to create a Polychrome-painted vase would have been an oxidizing or weakly reducing one, which kept the iron-based pigments red, the manganese black as ever, and left the background a light buff color (or whiter if a slip was applied). This Polychrome-painted pottery technology was practiced from the Peloponnese to Macedonia.

A polychrome-like effect (better described as bichrome or dichromatic) can also be produced by varying the thickness of the iron-rich pigments and then using the iron reduction technique (where the atmosphere is reduced and subsequently oxidized) (Jones

1986, 765; Yiouni 2000, 205; 2001, 9). This method is documented in Macedonia, but it is uncommon. The control of color may also have been aided by the invention of new firing techniques such as kilns and saggars (Renfrew 1973; Vitelli 1991, 113–114).

Central and Southern Greece

In Central Greece at the Cave of the Cyclops on the island of Youra in the Sporades, Late Neolithic Ia Polychrome (and Matt-painted) fabric contained abundant calcium inclusions, which allowed the light background color to be produced. These vessels were fired at 1050–1080°C, an unnecessarily high temperature for fabrics high in calcium carbonate, which are capable of being fired successfully at lower temperatures (Mavridis 2008, 118). This high firing temperature has yet to be confirmed at other sites in Central Greece.

Kilikoglou and Maniatis (1993, 440) determined that the surface of the Late Neolithic Ia Polychrome pottery at the Skoteini Cave near Tharrounia on Euboea was smoothed ("buffed" or burnished) in order to provide an even surface for the paint to adhere to and that the black paint consisted of a suspension of clay particles mixed with manganese oxides.

In the Peloponnese at Gonia, Blegen observed that while the red paint is sometimes so heavily burnished it looks blurred (1930, 69, 70), the black paint seems to have been applied after burnishing because it is often rubbed off or flakes off easily at the touch, whereas the red adhered better to the vessel surface because it had been burnished. Phelps (2004, 97) suggested that this condition may be related to the fact that many sherds show signs of reduction, although it is unclear if this is due to the original firing of the pots or a post-firing damage

Thessaly

Polychrome-painted pottery in Thessaly was created by using iron and manganese-based pigments and fired in an oxidizing or weakly reducing atmosphere. The Late Neolithic Ia Polychrome style B3ζ (light red-orange and black paint on a white background) in Thessaly sometimes uses a white slip that is made from calcite; it is applied to heighten the contrast with the dark-colored decoration (Demoule, Gallis, and Manolakakis 1998, 29). This slip continued to be used in the B3γ (black and red paint on a white ground) Arapi style of Polychrome in Late Neolithic Ib (Demoule, Gallis, and Manolakakis 1998, 35). Various surface and fabric-colors that are attested in the B3ζ style Polychrome are the result of the use of local clays, slips, and firing conditions (Demoule, Gallis, and Manolakakis 1998, 29).

Macedonia

As in the more southerly regions, Polychrome-painted pottery was created by using iron and manganese-based pigments and firing using the manganese black technique in a weakly mixed or oxidizing atmosphere (Yiouni 2000, 205; 2001, 11) in Central and Eastern Macedonia (i.e., Galepsos, Dimitra, Toumba, Kitrini Limni) for the Dimitra style of Polychrome.

In Western Macedonia, at Megalo Nisi Galanis, a different technique was used. There a polychrome-like effect was achieved through varying the thickness of an iron-based pigment and then firing the vessel using the iron-reduction technique, in which the kiln conditions are reduced and then oxidized (Yiouni 2001, 9, 25; Kalogirou 1994, 114; 1997; Jones 1986, 765).

CHAPTER 6: BLACK-BURNISHED POTTERY

Black-burnished Pottery (Figures 41–53)

The so-called Late Neolithic Black-burnished pottery begins at the Middle Neolithic-Late Neolithic transition; in Macedonia it continues into the Final Neolithic period and to a lesser extent elsewhere. It is characterized by a lustrous, well burnished surface, highly carinated shapes, and additional decorative embellishments. Black-burnished pottery is the first ceramic class that is broadly distributed throughout Neolithic Greece, from the Peloponnese to Thrace and, for this reason it has been called a *koine* of Late Neolithic Greece (Demoule and Perlès 1993, 392).

Black-burnished monochrome pottery, however, existed in various manifestations at different times and places during the Greek Neolithic (Demoule, Perlès, and Manolakakis 1988, 35). It is attested the Early Neolithic from Thessaly southwards, and it was even decorated with groups of small, round knobs and added plastics (A5γ Black Polished Ware; Wace and Thompson 1912, 15). Distinguishing between the early and late sherds is not difficult, because, as Kunze (1931, 28–31) pointed out, the early appliqué pellets are much larger and applied using a different technology than are the Late Neolithic type.

The most characteristic shapes include carinated bowls with high or low concave sides, sometimes with thickened carinations, off-set rims, or waisted handles (i.e., broad vertical strap-handles, pinched at the middle to make an hourglass shape), round-shouldered bowls with in-curved rims, cups and jars with straight collars, biconical bodies and flat bases, fruit-stands with wide bowls on splayed feet (Holmberg 1964a, 343). The upper body received additional decoration, which has somewhat hindered establishing a more precise chronology for the different decorative styles (Holmberg 1964a, 343).

During the first phase of the Late Neolithic Ia (Tsangli-Larisa), Black-burnished pottery from the Peloponnese to Macedonia shared similar shapes and types of decoration. Pattern burnishing, ribs and beading, added plastics, incision, thick white paint, and grooves were first used during the Tsangli period and in the Larisa phase, with the addition of rippling and channeling on the shoulder (Demoule, Perlès, and Manolakakis 1988, 34-35). The shapes of this period tend to have curved, streamlined profiles with marked carinated shoulders or carinations below the belly (keeled bowls) (Demoule, Perlès, and Manolakakis 1988, 34-35).

In the early Late Neolithic Ib period and from Thessaly southwards, a few varieties of decoration begin to disappear such as ribs and beading, white paint, and pattern burnishing. White paint and pattern burnish, however, reappear at the beginning of the Final Neolithic (Phelps 2004, 74). Other elements, like rippling, remain and new ones are introduced: grooving, channeling, and black-tops. Black-topped pottery is an interesting twist on the Black-burnished theme, in which only the upper body of the vessel is so treated. Beginning in the Arapi phase, the carinations move up to the belly to create a more truly biconical vase; piriform (pear-shaped) shapes result if the inflection point is located on the lower part of the belly (Demoule, Perlès, and Manolakakis 1988, 34–35, 38). While these later varieties of channeling, grooving and black-tops are found throughout Neolithic Greece, they are best represented in Macedonia where they endure into the beginning of the Final Neolithic (in Northern Greek chronology).

Black-burnished pottery has received a lot of attention because of its wide distribution (Sampson 1977, 52) and because its chronological position within the Greek Neolithic was once debated. It is now clear that Black-burnished pottery was an indigenous development which began in the late Middle Neolithic to early Late Neolithic transition and that it endured throughout the Late Neolithic period. Previously, however, there was much speculation on the dating and origin of Black-burnished pottery: these former hypotheses are reviewed below.

Lastly, it should also be noted that the separation of Black-burnished from Gray-burnished pottery remains rather problematic. The difficulty lies in the fact that such a division is not possible at all sites. This discrepancy is most likely due to selective excavation and the particularity of certain deposits, for instance at Corinth (see Gray-burnished pottery section). Failure to appreciate this may mean that production and circulation issues as well as chronological considerations may be unnecessarily sought out as explanations. Such, in effect, makes the picture unnecessarily complicated, if not outright wrong. Even Gray-burnished and Gray-on-gray pottery, which was claimed as a specific ware on petrographic grounds, has also been challenged (Vitelli 1994). Gray-burnished is discussed in a separate section along with Gray-on-gray painted pottery.

"Larisa Ware and Larisa Culture"

The stratigraphical location of Black-burnished pottery was suggested by Grundmann (1932, 102, 109) and demonstrated by Theocharis at Pyrasos (1958) and Koufovouno (1959), as well as by Milojčić at Otzaki-Magoula (1955), but its significance was overlooked. It was not definitively proven on stratigraphical grounds in the excavation at Plateia Magoula Zarkou (Gallis 1987). Subsequently it was confirmed at Makrychori 2. Until that point, there was great disagreement and misinformation in the literature about Black-burnished pottery for several reasons.

First, Wace and Thompson (1912), when expanding Tsoundas' (1908) ceramic typology, mistakenly assigned some Late Neolithic Black-burnished wares (Γ2) to the Final Neolithic. A second part of the confusion is due to the fact that Black-burnished pottery can be somewhat regionally distributed, as in Thessaly for example (Demoule, Perlès, and Manolakakis 1988, 35). It is more common in Western Thessaly (where the eponymous sites of Tsangli and Larisa are located) than Eastern Thessaly; Phelps (2004) also came to similar conclusions in the Peloponnese. Similarly, the use of pattern burnishing also seems to be highly regional in Central Greece. This regionality made it difficult for pioneering researchers like Hauptmann and Milojčić to date sites relatively, even within a small geographic unity like Thessaly.

A third problem in dating Black-burnished pottery stems from the fact that the ceramic sequence at several key sites in Greece (i.e., Elateia, Oztaki, Arapi, and Rachmani), the Balkans (Vinča and Karanovo), and Anatolia (Troy) were based on rather questionable stratigraphy (which is still debated; i.e., Bogdanović 2002; Brunker 1983; Stevanović 1996; Krauss 2008; Milojčić 1949b; Schier 1996; 2000; Nikolov 2000; 2003). Unclear or inverted stratigraphy ultimately lead to the incorrect assignment by Milojčić (see below) of Black-burnished ware to the end of the Final Neolithic, rather than to the beginning of the Late Neolithic. The problems of stratigraphy and relative dating are considered immediately below in some detail because it has not been thoroughly reviewed in the existing literature.

In drawing upon comparative material in the Balkans to relatively date Black-burnished pottery in Greece, both Holmberg (1964a, 347) and Weinberg (1965c, 161) correctly determined that Black-burnished pottery was contemporary with the Vinča A culture in Serbia, but their absolute dates of 4,200 and 4,425 B.C, are far too late. Parallels with the Vinča culture remain tenuous due to the methodology used at Vinča, namely artificial 10 cm passes with elevations measured from an arbitrary point at the site: this resulted in the false presentation of older and more recent finds as contemporaneous (Vasić 1932; 1936a; 1936b; 1936c).

Although Milojčić (1949) pointed out some of the shortcomings of the Vinča excavation and publication, he too, failed to properly address the stratigraphical complications brought about by excavating Neolithic sites riddled with *bothroi*, or pits. It turned out that the main sites he excavated in Thessaly to establish his Neolithic chronology did not preserve complete sequences (Rachmani, Otzaki), contained many intrusive *bothroi* from various periods (Arapi, Otzaki), or had been disturbed by bombing during World War I (Otzaki).

Additionally, Milojčić was convinced "*a priori* that the Larisa culture must be later than the whole Dimini period" and belonged to the Final Neolithic-Early Bronze Age transition, thus ignoring his own evidence (i.e., Milojčić 1955b, 163; 1959a, 24–26) to the contrary (Holmberg 1964a, 346). Since Milojčić (1958) was also skeptical of radiocarbon dating (he only took one sample from Dimini, which dates far too late (3,680 ±150 B.C.), this potential corrective was denied to him.

To his credit, even Milojčić (1949, 3; 1959a, 53–54) expressed some doubt about his dating. It was accepted by some (Schachermeyr 1962, 184; Hauptmann 1981, 75–

110) and rejected by others (Holmberg 1964a, 344; French 1972, 15; Treuil 1983; Lichardus and Lichardus-Itten1985). Holmberg (1964a, 343) in particular presented good evidence to disprove Milojčić's late dating. Lastly, it should be noted that Phelps (2004) did not update his 1975 doctoral thesis to accommodate this major chronological change; he does come to this conclusion though, more or less (2004, 85).

Origins of Black-burnished Pottery: Invasions and Prototypes

Late Neolithic Black-burnished pottery developed in Greece. Early on, Childe correctly (1936-1937, 29) pointed out that Greek Black-burnished cannot be derived from a northern Balkan Neolithic base (i.e., his "Vardar-Morava complex") because of the fact that Black-burnished pottery exists during the Early Neolithic in Corinth. Kunze (1931) also reiterated the view that Black-burnished was a local, indigenous development in Greece (1931, 30).

It was not introduced to Greece through invasions from the north (i.e., Vinča A, Danilo-Kakanj, or Kodjaderman-Gumnelitsa-Karanovo VI, Phase I: Grundmann 1932; Frankfort 1927; Heurtley 1939), immigration from Anatolia (i.e., from Illpinar, Can Hasan: Titov 1969, Lichardus and Lichardus-Itten 1985; Weinberg 1965; 1970; Holmberg and Milojčić 1949; 1960; French 1967; Theocharis 1973; Demoule, Perlès, and Manolakakis 1988,) or diffusion (i.e., Schachermeyr 1955a; 1955b; 1991, Holmberg 1964a).

These outdated ideas were based on what was then perceived as simultaneous destruction layers at sites throughout Neolithic Greece. The apparent holocaust is now understood to be composed of events that occurred at different times, and the cause of destruction may have varied from site to site (i.e., accidental or intentional house burning, as practiced in some Balkan Neolithic cultures like Vinča), but with no evidence of foreign invasion. Certain elements of Black-burnished pottery, particularly in Macedonia, may have been encouraged and inspired by Black-burnished pottery either of the Vinča culture to the northeast or Karanovo to the northwest, such as channeling, biconical jars with button finials, and a preference for Black-topped pottery.

The ubiquitous presence of Black-burnished pottery from the Central Balkans to Anatolia has more recently been recognized as a cultural-chronological-geographic horizon, known as either the "Late Balkano-Anatolian Complex" (Garašanin 1982, 116-29), "Dark-face burnished wares" (Özdoğan 1993), or the "Black-Burnished Ware Horizon" (Sériadès 1995, 95, 90). Understanding why this phenomenon occurred is still debated along the same lines as it was in the older scholarship: that is, internal developments or external culture stimulus, and the issue of in which direction the influence went.

For instance, Özdoğan (1993, 179; 1999) maintains the concept of "a common developing zone" between Macedonia, the Balkans, and Anatolia. That is, each region interacts within itself, internally. If cultural similarities are inspired by foreign contacts, the question is then the direction of this diffusion: from the Orient or the Occident? Childe (1939) first suggested the influence came *ex oriente lux*, a belief upheld by some (i.e., Nikolov 1993), while others (i.e., Todorova 1978; Steadman 1995) believe the opposite, in *ex balcanis* diffusion. In any case, equating pots with ethnic identity must be questioned (Chapman 2006).

Skeuomorphs of Metallic and Wooden Forms

Invasions, migrations, and diffusion aside, the origins of Black-burnished pottery have also been suggested to come from either metallic or wooden originals. Non-ceramic forms often provided inspiration for prehistoric potters. For instance, Phelps (2004, 70) suggested the heavier Peloponnesian Black-burnished pieces like rhyta and fruit-stands may have been inspired by stone. Similarly, Walker-Kosmopoulos (1953) saw the influence of wood and stone carving, basketry, and metallic influence in Late Neolithic Black-burnished pottery. This process of imitation, or course, did not begin in the Late Neolithic, but perhaps it continued, as Walker-Kosmopoulos (1953, 12) suggests, in order to maintain a connection with past tradition.

Wooden Prototypes

Walker-Kosmopoulos proposed that Late Neolithic Black-burnished pottery (and to a lesser extent, Matt-painted pottery) was influenced by vessels made out of birch bark, based on her ethnographic observations of Native American specimens. She pointed to seven peculiar elements common to both media that are explicable in the ceramic form only if they derived from birch-bark vessels. The shared attributes include: use of a corded rim, isolated rim patterns, polygonal forms, demarcation of the exterior into vertical panels, used of strong vertical elements to create panels, isolated wavy lines, and the successful aesthetic combination of the proceeding elements. Rectilinear forms may have also been inspired either by wooden or birch-bark shapes. Her point is that Black-burnished decorative features which “often seem meaningless, capricious, clumsy, barbaric" are on birch-bark receptacles necessities imposed by the physical limitations of that material and which enhance its appearance (Walker-Kosmopoulos 1953, 13).

Acknowledging the restrictions in working with birch bark, Walker-Kosmopoulos (1953, 13–21) suggested how they were overcome. For instance, on a birch-bark vessel, a piece of rope was sewn on to the rim of a bowl (and thus the corded rim) so that the pot would not fray. This feature was imitated in the everted, undercut lips of Black-burnished pottery. Similarly, polygonal forms are created in birch bark by folding and stitching, the resulting angles not only hold the vessel together but also reinforce it. These corner seams were focal points of decoration for Native American Indians, and perhaps this explains the Late Neolithic tendency to use strong vertical elements to delineate the vessel surface into planes. Additional sewing was used to reinforce birch-bark vessels, and this stitching was echoed in most of the elements in Black-burnished pottery: the random wavy lines are where small branches had been sewn together and the isolated hanging motifs from the rim (such as triangles) are where a birch bark vessel would have been stitched perpendicularly to the wood's grain to hold it together.

While it is ultimately difficult to prove Walker-Kosmopoulos' theory, since perishable materials like birch bark rarely survive in the acidic soils of Greece, it remains an intriguing one because a wide range of materials were undoubtedly used for containers, from animal hides or organs, to stone, basketry, cloth sacks, wood, and bark devices. Furthermore, the use of birch-bark tar is documented in Greece not only as a sealant, glue, and antiseptic, but as an applied medium used to decorate ceramic pottery. This type of pottery is known as Promachon-Topolnica Bitumen Decorated pottery and it found at Apsalos, Dimitra, Dikili Tash, and Promachon-Topolnica (see chapter 9).

Metal Prototypes

Walker-Kosmopoulos (1953, 3–4) observed that metallic influence began in the Middle Neolithic with the sharply carinated Urfirnis vessels. She suggests that the potters must have had indirect or remote experience with metal in order to explain the thin walls, delicately modeled lips, and uniform high polish; yet interestingly, she attributes the motifs as coming from textiles and basketry.

Milojčić (1949; 1959) also thought Black-burnished was a metal skeuomorph. Metal prototypes should not be ruled out, especially in Macedonia where copper metallurgy was already taking place (i.e., Sitagroi I, Dimitra II, Promachon-Topolnica) despite the rarity of metal vessels at the time when Black-topped pottery with grooved spiral-form decoration was being produced. Metallic influence on ceramic pottery can be seen in the angular shapes of these vases, which refer to where two sheets of metal were attached, the use of strap handles (Sampson 2008a, 104), and the use of button finals, which may refer to rivets. The gold (Benaki Museum numbers 1516, 2029, and 2050) and silver bowls (Metropolitan Museum accession numbers 46.11.1 and 1972.118.152; Thimme 1977, 426–427) suspected to be from the Early Bronze Age cemetery at Makrikapi on Euboea (Sapouna-Sakellarakis 1987, 236) may in fact date to the Late Neolithic or Final Neolithic periods, rather than being later Bronze Age imports from the east as suggested by Immerwhar (1971, 10) and Branigan (1974, 126).

Shared Decorative Style in Late Neolithic Black-burnished Pottery

The different decorative styles of Black-burnished pottery were first defined by Tsoundas (1908) in Thessaly. Wace and Thompson (1912, 17) subdivided Tsoundas' Γ1α into three categories based on surface decoration: Γ1α1 (White painted), Γ1α2 (Pattern Burnished), and Γ1α3 (Rippled or Ribbed). Γ2 (Incised and White-filled) comprises a fourth type of decoration only found in Thessaly. Although these methods of decoration were first identified in Thessaly, as techniques they are found throughout Neolithic Greece. Although they differ in the details of shape and decoration, there is also enough similarity to indicate parallel development and dating from one region of Greece to another (Phelps 2004, 76). For this reason, these categories are retained merely as headings to denote a decorative technique rather than a style since he details of the motifs and their composition vary. Additional types of Black-burnished embellishment not identified by Wace and Thompson include "Scratch-crusted," only found at a few sites in the Peloponnese and Central Greece and Black-topped pottery. These techniques are described below.

Some of these decorative styles lasted, although the length of duration cannot be pinpointed at this time. It seems that from Thessaly southwards, Γ1α1 (White painted), Γ1α2 (Pattern-burnished), and Γ1α3 (Added plastics, rippled or ribs) are decorative styles belonging primarily to the Late Neolithic Ia on into the beginning of Late Neolithic Ib. Black-topped in this area belongs to the Late Neolithic Ib and in Macedonia it continued into the Final Neolithic. The other techniques seem to be used throughout the Late Neolithic in Macedonia.

The range of decorative techniques and the various technologies employed to produce Black-burnished pottery are remarkable rather than "monotonous" as Theocharis claimed (1973). Although Walker-Kosmopoulos (1953, 6) found some specimens to be grotesque, demonstrating the qualities of "young barbarians at play," she also remarked that "there is no ware more dynamic and vital…There is constant indication of striving to overcome limitations, to invent what is aesthetically satisfying, of soaring confidence: characteristics found only among craftsmen, unfettered by outworn traditions."

Black-burnished pottery demonstrates the versatility and confidence of Neolithic potters to create daring carinated shapes and to embellish them in totally different ways. Ribs and beading, appliqué, and channeling are rather subtle, and they cater more to the touch than the eye. Black-burnished with white paint and incised with white paint filling utilize the stark contrast between light and dark. Pattern burnished designs serve as a middle ground of subtle and simple decoration. Some of the different decorative techniques were also used in combination, such as white paint and added plastics, or black-topped and white paint and or appliqué. A few of the motifs were also shared between techniques, such as the garland or festoon-like motifs of connecting arcs with dots, which is found in white painted, incised, and plastic decoration.

Γ1α1: White Painted Decoration on Black-burnished Pottery (Figures 42–45)

The white paint on Black-burnished pottery is often preserved only as a "paint ghost." While some compositions are linear and neatly arranged in zones around the shoulders, isolated motifs also occur, especially wavy lines and hanging triangles form the rim, which Walker-Kosmopoulos attributed to influence from birch-bark prototypes (see above). The main motifs are groups of parallel, vertical or oblique lines (these sometimes intersect to form cross-hatched lozenges), zigzags, ladder motifs, chevrons, arcs, triangles, rays, curvilinear lines, circles, and wavy lines. Solid shapes like triangles and lozenges could either be left empty, or filled, hatched or cross-hatched. Unlike the other decorative styles of Black-burnished pottery, white painted decoration is not confined to the shoulder of the vessel, but may in fact cover the entire vessel surface.

The fineness of the shapes, with their thin walls, lustrous burnish, and precisely drawn motifs vastly differs from the White-on-black painted pottery that appears in the Final Neolithic, particularly in the Aegean islands. The two wares are totally unrelated. In fact, as Phelps points out, the Late Neolithic Ia type died out sometime after the beginning of Late Neolithic Ib (2004, 74). Following Hansen (1931, 181), Weinberg (1937, 512) originally misdated Late Neolithic Ia white painted Black-burnished pottery to the end of the Neolithic, but subsequently rectified the situation at Elateia (1962). Similarly, Welsh (1918–19, 46) misidentified Late Neolithic Ib Graphite-painted pottery from Dikili Tash as Late Neolithic Ia Black-burnished with white paint (Γ2α1), also because as in Thessaly, he noted that the corresponding incised patterns were similar to the painted ones.

Γ1α2: Black Pattern Burnish on Black-burnished Pottery (Figures 46–47)

Pattern Burnishing utilized differential burnishing to create a design (see technology section). It is used on the same shapes as form the repertoire for the other types of Black-burnished decorated and undecorated pottery sets. Compositions are neatly arranged in zones between the shoulders and the rims, or just above the carination. This reserved zone then received more precise pattern-burnished decoration. Due to the limitations of manipulating a burnishing tool, the patterns of pattern burnishing tend to be linear, consisting primarily of groups of lines and bands rather than solid shapes or curvilinear forms. Vertical rim bands, triangles, hatched and cross-hatched rectilinear shapes, and groups of alternating oblique lines arranged in zones are the most common motifs. Some of these are shared with the appliqué decoration.

The decoration is on the exterior of the vessel, while the interior receives only a burnished band below the rim; only fruit-stands receive interior pattern burnishing. The motifs to do not float randomly, like the wavy lines and isolated lines of contemporary Black-burnished pottery with white paint (Γ1α1) or Matt-painted pottery (Β3ε). At times though, some pattern burnished motifs can be rather freely executed, or simply scribbled on (Vitelli's Scribbled Burnished Urf; Vitelli 1993). Phelps (2004, 74) noted that somescribble burnished patterns (Vitelli's Patterned Burnished Urf) from Corinth resemble some Black-burnished specimens from Thessaly (Hauptmann and Milojčić 1969, fig. 12, 6, 7, fig. 17, 9, fig. 20, 4)

The technique of pattern burnishing may have been more popular at sites lacking in a Black-burnished relief tradition. For instance, at the Sarakenos Cave, pattern burnishing was the most common type of embellishment on Black-burnished pottery, while white painted and added plastic decoration was rare. The converse is true at Varka and Skoteini (Sampson 2008a, 99). Pattern burnishing on Black-burnished pottery is more common in Central Greece than in the Peloponnese (Phelps 2004, 74). The main shapes are carinated shouldered bowls, conical bowls, and inward-leaning jars, handled bowls, biconical jars, and fruit-stands. Lastly, it should be noted that while the majority of Black Pattern Burnished vessels are truly black, many specimens have a gray-brown, reddish or even green tone to them.

Γ1α3 Plastic Decoration on Black-burnished Pottery (Figures 48–51)

When Wace and Thompson (1912, 17) originally defined Γ1α3 (Rippled or Ribbed Ware), the category included only ribbed or rippled ware. Here it is extended to incorporate all other appliqué decoration including applied discs, pellets, barbotine arcading, channeling, and grooving. Plastic decoration could also be used with other Black-burnished ornamentation, such as white paint.

Ribbed decoration is frequently used in conjunction with tiny circular pellets; when the two are used together the effect is known as "ribs and beading." Ribs and beading is most common in Thessaly and Central Greece (Phelps 2004, 75), although it occurs in the Peloponnese and in Macedonia. Ribs and beading motifs are simple and concentrated on the shoulders of carinated vessels, although the decoration may extend to the belly. They may comprise rows of pellets with groups of alternating oblique lines or painted decoration below, horizontal rows of ribs and beading, ribs ending in beads, zigzags, and even rectilinear shapes. Larger added plastics on the shoulders of shouldered bowls and collared jar bellies include elongated ovular strips, arcs, ovular pellets, and circular pellets. Few of these dimensional appliqué decorations seem to span the entire Late Neolithic I periods (Phelps 2004, 75).

Rippled decoration is defined as shallow, parallel depressions created by burnishing the vessel surface while semi-plastic. Phelps (2004, 82) describes rippling as having furrows that are "narrower or equal to the space between them, to appear almost corrugated," whereas in channeling and grooving (fluting) "the channels are wider and more closely spaced so that a narrow ridge forms between them."

Phelps (2004, 82) noted at Corinth that rippling was used more for Black-burnished pottery and that grooving for Gray Burnished pottery, but this observation seems to apply only to Corinth. At Megali Nisi Galanis (Kalogirou 1994) rippling consisted of arcs or oblique furrows either arranged in panels or running around the vase or arranged in one or more zones around the vase; circular motifs were alwayss placed near carinations.

In between the subtlety of rippling and the more pronounced furrows of grooving lies channeling. Here the furrows are more subtle, like in rippling, but deeper and set farther apart. Rippling and channeling can also be combined on the same vase (Heurtley 1939, 69). Rippling precedes channeling and grooving throughout Neolithic Greece. Channeling, rippling, and grooved decoration were particularly common in Macedonia. This may be due to the fact that similar decoration existed in the contemporary neighboring Balkan cultures (i.e., Vinča A and Karanovo II). Heurtley's (1939, 72) unique "barbotine arcading" at Servia is essentially but a variation on channeling (see technology section).

Channeling and grooving can be combined (i.e., at Servia or Sitagroi Phase III; Evans 1986, 403), although the grooves tended to be placed horizontally. Channeling may be used all over in Macedonia for piriform (pear-shaped) vessels; this rule is also true for Balkan channeled wares (Keighley 1986, 367). Channeling or grooving at Sitagroi was almost always strictly linear (Keighley 1986, 367), with motifs consisting of zigzags, groups of oblique, horizontal, and vertical lines or chevrons. Curved arcs and concentric circles were used at Promachon-Topolnica (Vajsov 2007, 88) and Dikili Tash (Deshayes 1970, fig. 10; 1973; fig. 3; Tsirtsoni 2000, fig. 8; 2001, 15, fig. 5) and is also found in Vinča C (Milojčić 1949, 281, fig. 7, 13). At Promachon-Topolnica, channeling mostly consisted of what Vajsov (2007, 88, 95) describes as “pleat type” or narrow channels: it is used on fine ware, in simple compositions of diagonal, straight, or arc-like channels. Relief knobs could also be incorporated. Two instance of wide, deep channeling are imports from Bulgaria (Vajsov 2007, 88).

Lastly, an interesting observation was made, independently, by two different scholars regarding the plastic decoration of Black-burnished pottery. At Megali Nisi Galanis, Kalogirou (1997, 14) 10% of black-topped pots had rippling furrows, but she noted that no two rippled pieces were the same, which she interprets as an attempt at personalization. Similarly, Vitelli (1977) suggested that the appliqué on Middle Neolithic Urfirnis were mostly potter’s marks (or alternatively, aids to the blind, intended to match with a lid; Vitelli 1977, 23 or had some magic property; Vitelli 1977, 28). Her argument could be extended to include Late Neolithic Black-burnished.

Γ2 Incised and Filled Black-burnished Pottery (Figure 80)

Like pattern burnishing, incision and impression are simple techniques, but they were used rather infrequently. Wace and Thompson (1912, 18) included three different styles of incision on black-surfaced pottery in their Γ2 (Incised ware); they mistakenly dated this class of pottery. Perhaps this early failure subconsciously affected future researchers like Milojčić, who continued to incorrectly assign some Black-burnished pieces (of the “Larrisa” culture) to the Final Neolithic.

Only one of the three types of incised pottery fits into the broader class of Black-burnished pottery, while the rest are better assigned to the Incised pottery class (see

Chapter 11). It is limited to Thessaly, primarily at Tsangli, although some sherds were recovered from Tsani and Zerelia (Wace and Thompson (1912, 18). The main shapes are fruit-stands, shallow conical bowls, carinated bowls (Wace and Thompson 1912, 18).

The patterns consist of lines and dots, usually placed in alternating rows, although dot-edged bands also occur. Rectilinear shapes such as zigzags, lozenges, and triangles are also attested. These designs cover only a fraction of the surface, which they divide into panels (Wace and Thompson 1912, 111). The incisions were filled with white paste. The designs recall those found in B3γ (Black and Red Paint on a White Ground or Arapi Ware) Polychrome of Late Neolithic Ia.

Incision was used elsewhere, such as in the Peloponnese, in a very limited fashion, such as a single zigzag around the vase, or as isolated incised arcs on the shoulder of a bowl. Impression may be used in a similar fashion, though larger, circular patterns are attested in Thessaly, while more delicate ones were created in the Peloponnese and Macedonia. It is discussed in more detail in chapter 11.

Scratch-crusted Technology (Figure 52)

While this particular stylistic variety as described by Wace and Thompson is limited to Thessaly, the technique is also used in the Peloponnese, Central Greece, and Macedonia in different manifestations (i.e., with other shapes and motifs). In Central and Southern Greece, there is a particular variation called “Scratch-crusted” technology, which consists first of lightly incising motifs, mainly triangles, lozenges, broad bands, into the vessel surface, and subsequently after firing of filling the fine incision with white paste (Phelps 2004, 75). This technique is used on fruit-stands, collared bowls, and wide collared jars; at Lerna, Vitelli (2007, 107) found it only on closed jars, a basin, and a shoulder basin or lid. The motifs include triangles, lozenges, and broad bands.

Phelps (2004, 75) believed that this type of decoration originated in Central Greece, where it is found at Elateia, Thespiae, Orchomenos, Chaeronea, the Cave of Pan, and Eutresis; in the Peloponnese it is found only at Corinth and Lerna. Phelps (2004, 75) could not stratigraphically place it, but suggested in the Peloponnese it began after Matt-painted pottery but before Polychrome painted pottery. Vitelli (2007, 106, 108) dated the few examples at Lerna to the Middle Neolithic because of the fabric's resemblance to Middle Neolithic Urfirnis, although the excavators had originally assigned it to Late Neolithic.

Late Neolithic Ib Black-topped Pottery (Figure 51)

The term "Black-topped" refers to either a dark black band below the lip of a vessel or when the entire upper part of a carinated vessel (from the rim to the shoulder) is so treated. The former type appears on isolated examples of monochrome pottery beginning in the Early Neolithic period, while the latter is characteristic of the Late Neolithic period and begins during the Late Neolithic Ib (in the Arapi phase). Black-topped pottery is most common in Macedonia and to some extent Thessaly, although some examples do occur in southern and central Greece. In Thessaly, white paint can be applied to it (Demoule, Perlès, and Manolakakis 1988, 35), while in Macedonia, white paint, graphite, red ocher, rippling, channeling, and incision are also used. More rarely, the color-scheme can be reversed, so that the vessel is "Red-topped" and black on the bottom (i.e., Keighley 1986, 386, fig. 11.17.6).

Based on Makrychori 2 stratigraphy (Demoule, Perlès, and Manolakakis 1988, 39) Black-topped pottery began in the Arapi phase in Late Neolithic Ib. At Megalo Nisi Galanis Black-topped was a ceramic sub-phase from 5,200- 4,950 B.C. (Kalogirou 1994; Andreou et al. 1996, 569), while at Promachon-Topolnica it first appeared at the site at the same time as did the imported Matt-painted Akropotamos style (Phase II) (Vajsov 2007, 95). It is found throughout Greece, from Thrace at Makri (Phase II; Efstratiou 1996, 575) and Paradimi (Bakalakis and Sakellariou 1981) to the Peloponnese at Corinth. It is unclear when the technique ceases, since any black rim fragments may have come from Black-burnished vessels. For instance, Black-topped potery in Vinča culture had a limited duration, disappearing in Vinča B, but Keighley (1986, 365, 529) did not consider Black-topped at Sitagroi diagnostic because of its long duration at the site.

At Promachon-Topolnica, Black-topped was used primarily mostly on carinated bowls, sometimes with a handle from the rim to the carination, and carinated piriform jars (Vajsov 2007, 95). Most Black-topped pots have the top part covered with graphite paint and channeled ("pleat type") from the rim to the carination or in between small protuberances (Vajsov 2007, 95).

Hitsiou (2003, 82) observed that Black-topped shapes at Makryialos were larger and more carinated than Black-burnished specimens. The technique was reserved for small and large bowls, and unlike other sites, no Black-topped jars were recovered (Hitsiou 2003, 82). At Makryialos (Phase II), impressed decoration appears on the top half of the form (if it is not sharply carinated): small dots or triangles in groups of double, parallel, or zigzag lines and filled with white paste, which often does not survive (Hitsiou 2003, 81). An additional subtype featured triangular impressions about the carination and white paint on top of the Black-top, and an additional zigzag band of red-orange slip below the carination (Hitsiou 2003, 82).

By analogy from the Khartoum Neolithic in Egypt (Arkell 1960, 106), the inspiration for Black-topped pottery (particularly in the cases where the black is limited to the area immediately below the rim) may stem from fire-treating wooden or gourd bowls in order to prevent the cut edges from splintering. Similarly perhaps the colors also have a symbolic meaning in Neolithic Greece as they did with Black-topped pottery in Early Dynastic Egypt (Naqada III): Sowada (1999) proposed that the colors red and black partook of Egyptian religious symbolism of chaos and death (red) vs. fertility and resurrection (black). With or without a deeper symbolic meaning, Black-topped pottery is important, as Vajsov (2007, 85, 95) points out, because the "two-tone use of black and red" has implications not only for how to "decorate" a vessel, as with painted or incised motifs, but in how to fire it too (see technology section).

Black-burnished Pottery and Ritual

While the use, deposition and contexts of Late Neolithic pottery is discussed in the conclusion, two interesting aspects concerning Black-burnished pottery and ritual should be noted. Firstly, is the suggestion that Black-burnished vessels—at least on some occasions—were deliberately broken. Weinberg (1962, 201; 1965a, 195) curiously noted that none of the Black-burnished sherds that he recovered from the "*Bothros*" deposit at Elateia joined; each piece was only a third or half of a bowl, which lead him to suggest that the other pieces were deposited elsewhere or distributed to the participants and taken away. A similar argument may apply to Neolithic rhyta (see Chapterr 10), of which a specimen was recovered in the Elateia “*Bothros*.”

Indeed, Black-burnished appears to have more repair holes than any other class of Late Neolithic pottery, as noted at Asea (Holmberg 1944, 48), Eutresis (Caskey 1960, 131), Elateia (Weinberg 1962, 190), Olynthus (Mylonas 1929), and Corinth (Lavezzi 1978, 419). Similarly, at Megali Nisi Galanis, Kalogirou (1994) remarked on the abundance of Black-topped pottery with mending holes, but also noted that the overall preservation of pots was remarkable; there was little evidence of food storage, transport, or few use-wear marks. Their use remains unknown. Hitsiou (2003, 82) also remarked on the numerous repair holes (as in Matt-painted and Black-on-red) from Makryialos, which indicated that Black-topped was highly valued.

Secondly, at Plateia Magoula Zarkou, Black-burnished pottery was used as the receptacles for cremation burials (Gallis 1982). Demoule, Perlès, and Manolakakis (1988, 38) believed that the dominance of Black-burnished pottery in the burials at Plateia Magoula Zarkou implies some “intrinsic value,” which idea is perhaps strengthen by the fact that Pentedeka (2007, 116) determined that both local and imported (from Otzaki and Makrychori 2) Black-burnished pottery was used for the burials.

Brief Regional Notes on Black-burnished Pottery

Peloponnese

The duration of Black-burnished into the later phase of the Late Neolithic in the Peloponnese is unclear.. As Phelps (2004, 70) observed, Black-burnished sherds can be difficult to date because many of the shapes are unspecialized and used for a long time.

Further, distinguishing between a Gray Burnished and Black-burnished sherd can be challenging when the surface may be mottled or vary in tone: yet the decision may have chronological implications in the Peloponnese.

Phelps contradicts himself: first (2004, 70) he states that Black-burnished pottery in the Peloponnese existed in the Late Neolithic and Final Neolithic periods (his periods III and IV), but he (Phelps 2004, 74) also stated that it ended by the late Late Neolithic Ib (his period III) because it is absent at sites where Late Neolithic Ib Polychrome painted pottery is being produced. Phelps (2004, 74) correctly notes that pattern burnishing and white paint die out early in Late Neolithic and reappear at the end of the period.

The most common shapes are fruit-stands, shouldered bowls with offset, slightly everted or corded lips, carinated bowls; collared bowls are rare, whilst piriform jars and collared jars occur infrequently, as do pedestals, lugs, strap handles and “altar” fragments (Phelps 2004, 70–74). Decoration includes Γ1α1 (white paint), Γ1α2 (pattern burnish), Γ1α3 (ribbing or rippling), and incision (Phelps 2004, 74). Rippling is rather uncommon in Black-burnished pottery and is considered a later Late Neolithic development by Phelps (2004, 75). Pattern Burnished Black-burnished is primarily common at Corinth and Franchthi and developed from Middle Neolithic scribble and pattern-burnished Urfirnis (Phelps 2004, 74; Vitelli 1999). Usually the white paint survives as a “paint ghost.” Motifs are primarily linear (i.e., vertical lines, chevrons, zigzags, triangles, ladder pattern, and wavy lines) and limited to the upper body of the vessel.

Central Greece

Late Neolithic Black-burnished Ia pottery is found at a number of sites in Central Greece, (i.e., Chaeronea, Orchomenos, Ayia Marina, Elateia, Eutresis, the Coryican and Kitsos Caves, Nea Makri, South Slope, and Marathon); it is particularly common in Boeotia (Holmberg 1964a, 344). Late Neolithic Black-burnished Ib, like the phase as a whole, is not well studied in this area. For instance, examples of Late Neolithic Ib Black-topped examples are rare. In fact, Phelps (2004, 76), believes that Black Burnish is a rather limited ware in Central Greece and claims that many profile-types found in the Peloponnese and Thessaly are not represented.

Black-burnished pottery was being produced, however, since the Early Neolithic Period (Kunze 1931, 30) in Central Greece. Although Kunze (1931, 30) lumped Early and Late Neolithic Black-burnished together in his publication, he traced its technological development and made a distinction between the Early (Wace and Thompson's A5γ Black polished ware) and Late Neolithic (Γ1 Black-burnished) types. Theocharis (1956) also lumped them together at Nea Makri.

Based on the finds from the Sarakenos Cave in Boeotia, the most common shapes were deep vases with thin rims, fruit-stands with various rim treatments (i.e., sometimes slotted rims), carinated bowls, wide-mouth carinated bowls, with inward-leaning upper bodies (biconical), biconcal bowls, deep bowls, and "S"-profiled and more rarely necked jars. Handles were not common at the Sarakenos Cave but they are at other sites in Central Greece (i.e., Elateia, Varka, and Skoteini). At Elateia, the most common shapes were carinated bowls with waisted handles, fruit-stands, incurved rim bowls, and biconical jars (Weinberg 1962, 186-190).

Whether or not there are substantial grounds for defining Black-burnished as separate from Gray Burnished, as Phelps has done in the Peloponnese, remains to be definitively proven. In any case, there is clearly a close relationship between the two, and one may have developed out of the other (although the order of any such evolution also remains uncertain).

Thessaly

Black-burnished pottery is more common in Western Thessaly than Eastern Thessaly and every site has Black-burnished (Demoule, Perlès, and Manolakakis 1988, 35, 38).

Macedonia

The Late Neolithic Ia Black-burnished decorative varieties Γ1α1 (white paint), Γ1α2 (pattern burnish), and Γ1α3 (ribbing or rippling) are primarily found concentrated in Western and Central Macedonia (especially at Servia; Heurtley 1939; Wijnen et al. 1979) but they also occur in Eastern Macedonia, and Thrace. Incision, white paint, added plastics and rippling at other sites has a very different stylistic nature and less of a "Thessalian" feel.

Heurtley (1939, 69–71) noted that most of the Black-burnished decorative techniques (Γ1α1 white paint, Γ1α2, pattern burnish, Γ1α3 ribbing or rippling) were also found at other sites from Western Macedonia to the Chalcidice: beading at Servia, Vardina, and Hagios Mamas, rippled and grooved known from Kapouzedes, Vardina, Aivate, Hagios Mamas, Olynthus, Kritsana, and Armenochori, and pattern burnish at Kritsana.

In Western Macedonia, at Servia, the predominant pottery shapes include gently carinated or sub-carinated shallow bowls, more sharply carinated ones, flaring bowls, small handled cups, and concave "S" profiles and hour-glass or waisted handles (Wijnen et al. 1979, 213). Decoration includes opposing groups of narrow, oblique ripples, often combined with a row of beading with a plain band between it and the rim (Wijnen et al. 1979, 213). White-on-black painted shapes are bowls with concave sides, "S" profiles, or carinations; the paint is watery and fugitive. The designs are simple, like that of rippled decoration, but they are not confined to the shoulder (Wijnen et al. 1979, 216). Heurtley (1939, 70) noted that curvilinear elements of loops, undulating lines, spiral volutes, plant-like motifs, and curved lines tended to be found on vases with curved outlines, whereas rectilinear motifs were found on vessels with angular profiles, which are more suited to such tectonic decoration.

In Central Macedonia, at Stravropouli (Urem-Kotsou and Yioura 2002, 221) the main Black-burnished (Grammenos' Category 3α, Gray-Black-burnished, and Black-burnished) shapes included cups, plates, bowls, basin, fruit-stands, jugs, and jars: a noteworthy variety of shapes. Some large open vessels have diameters of 45 cm. Plastic decoration included knobs and strips; incision or impression exist. Often techniques are combined on the same vessel, and white paint was also used. Interestingly, although Black-burnished vessels usually have flat bases, a few ring bases were recovered, some of which had had pierced holes, so that the vessel could have been hung up.

In Eastern Macedonia, at Sitagroi, the earliest Black-burnished pottery (Phase I) consisted of round bowls (some with corded rims), flaring and straight-sided bowls, carinated shouldered bowls, sinuous bowls with thickened carinations, hole-mouth and bucket-shaped vessels, strap handles, and flat bases, to which appliqué pellet or strips could be added. This ware developed in the next phase (II "Fine Dark Burnished Ware"), in which many of the shapes from the preceding phase are still used (Keighley 1986, 359-360). Black-topped ware occurred next (Phase II) and continued into the next phase (Phase III); Keighley (1986, 529) considers Black-topped ware undiagnostic because of its long duration.

Black-burnished pottery from Paradimi in Thrace has received a lot of attention in the literature because of its geographic location at a crossroads between three geographic areas with contemporary Black-burnished pottery: Greece, Asia Minor, and the Balkans. Bakalakis and Sakellariou (1981, 27–40) that it constituted a unique hybrid called the "Paradimi Culture" (also known as the Paradimi Horizon or Paradimi I Group).

Andreou et al. (1996, 592), however, correctly point out that the elevation of Paradimi to such prominence presents a skewed perspective of a site which is in fact quite typical of Northern Greek Neolithic. The material culture at Paradimi probably represents internal development and not diffusion (Koukouli-Chryssanthaki 1996, 115). Similarly, while Keighley (1986, 366) saw a strong relationship between Sitagroi (Phases I-III), Vinča (A-B), and Veselinovo (both Karanovo II and Karanovo III), she was unable to quantitatively evaluate the relationship for all sites.

The so-called "Paradimi I Group" features Black-burnished pottery with white-filled incision, ribs, and grooved motifs, particularly on carinated shapes. Biconical jars and bowls and four-legged bowls are the most characteristic shapes, and distinctive button-finials are also a common feature both on jars and on bowls. Paradimi I corresponds with Karanovo III-Veselinovo culture on the Stara Zagora plain in Bulgaria and also with the early phases of Vinča A-B; at this time, Black-burnished pottery is a new, dominant ceramic style (Koukouli-Chryssanthaki 1996, 115; Gimbutas 1991, 66).

The emphasis of the Black-burnished repertoire (in shapes and motifs) between Vinča, Karanovo III-Veselinovo, and Neolithic Greece are not the same. To some extent these three cultures were isolated by geography; for instance, Karanovo III-Veselinovo culture has a different character from Vinča because isolated by both the Balkan and Rhodope mountains (Gimbutas 1991, 31). This geographic distance manifested itself in different cultural material, such as the prevalence of button-shaped finials (zoopomorhpic, dog-shaped handles) of Karanovo III that are not characteristic of Vinča (Gimbutas 1991, 33).

Black-burnished Technology

Methods of Producing Black-burnished Pottery

There are at least three methods by which a black-colored vessel can be produced: the use of an all-over manganese slip (either fired in a reducing environment for the duration of the firing, or in an oxidizing atmosphere and smudged at the end), the reduction of iron-rich clays (with or without an iron-oxide slip) and fired using the iron-reduction technique, or lastly fired using the carbon-black technique (with or without a slip or organic/inorganic pigment). It should be emphasized, however, that with both of the first two techniques, the carbon-black technique can also be used; that is to say the two sets are not mutually exclusive.

From the published scientific and technological studies (i.e., Gardner 1978; Letsch 1982, Letsch and Noll 1983), it seems that the dominant means in both Thessaly and Macedonia of blacking a vessel was with the carbon-black technique. In Thessaly, an additional all-over manganese slip was also often used (Letsch and Noll 1983, 109). The iron-reduction technique was employed in the Peloponnese (i.e., at Franchthi, Vitelli 1993; 1999) and in Central Greece (i.e., the Sarakenos Cave, Sampson 2008a, 89) as well as the carbon-black technique (i.e., Asea, Holmberg 1944). Most Neolithic Black-burnished vessels in Greece were fired at low temperatures of ca. 700-850°C. Both before and after firing the vessels were heavily burnished with a stone, bone, or wooden polisher to create the highly lustrous, polished surfaces.

Certain clays may have been preferred for Black-burnished pottery, but this was not an integral part of achieving a black surface, since a slip or the carbon-black technique may also have been used. In fact, petrographic analysis at the Corcyian Cave confirmed that a great mineralogical and technological diversity existed within the sherds, which suggests that the materials (i.e., particular clays) were not the determining factor but rather the desired result was. Nevertheless, at other sites, specific clays were used (Courtois-Lambert 1976). In Western Macedonia, for instance, the fabric of Black-burnished and Black-topped vessels contained little or no calcium carbonate and was micaceous (Kalogirou 1994 76-92). At Makryialos (Phase II) the majority of Black-burnished and Black-topped pottery was manufactured using calcareous clays (i.e., "Semi-fine to Medium-coarse with Carbonate Rocks"), but non-calcareous clays were also used (i.e., “Coarse Schist-Phyllite-Serpentine fabric”, “Fine to Semi-fine, Non-calcareous”, or “Local Yiannitsa B”, Hitsiou 2003, 128, 136, 139, 149).

Vitelli (1999) revealed a chronological change in the use of clays at the Franchthi Cave. First (in Phase 3), a calcareous clay (Low Lime Burnished) was used for Black-burnished but later (in Phase 4) the non-calcareous Andesite Burnished fabric was preferred. Additionally, the earlier Black-burnished vessels were thickly slipped (with more than one coat) with iron-oxides, otherwise the clay would fire blue-gray (Vitelli 1999, 23, 25). Similarly, clays rich in iron oxide may have been preferred in some areas, like Central and Southern Greece, where the iron-reduction technique was used to produce at least some of the Black-burnished vessels.

Carbon-black Technique (Smoking or Smudging)

The carbon-black technique is also known in ceramic literature as smoking or smudging. It is a firing procedure in which carbon is introduced and deposited into the pores and on the surface of pottery by creating a smoky, reducing atmosphere 1986, 763). For instance, greenwood, sawdust, manure, wet leaves, seaweed, or even damp earth could have been added to the fire to create the smoky environment (Gardner 2003, 293; Vitelli 1999, 26). The presence of moisture from these organic materials causes a glassy, metallic sheen to form on the surface (Skibo 1992, 162; Vitelli 1999, 26; Letsch and Noll’s “Glanzkohlenstoff” 1983, 138, 259-260), which is further enhanced by post-firing burnishing. This superficial layer of carbon, however, will burn off at low temperatures if the pot is re-fired in an oxidizing environment (Shepard 1968, 220). Since pottery kilns are not documented, such a firing would have taken place either in a pit or a hearth

(Gardner 2003, 294; Weinberg 1965, 27). They may also have been fired in a temporary enclosure of which nothing remains (Vitelli 1999, 25).

Based on an ethnographic analogy from the American Southwest (Pueblo), firing temperatures around 700-750°C were used and smudging times could vary from fifteen minutes to an hour (Shepard 1968, 88–90), although lower temperatures of around 400°C (Skibo 1992, 160; Vitelli 1999, 26) may have also been used. This means that the vessels could be fired in an oxidizing environment for most of the duration of the firing and only smoked at the end: this sequence is often visible in the colors of a cross section of the pot. Smoking could also be done at the peak of the firing (Gardner 2003, 293). A smoked pot will have black and gray edges to its cross section and a red core, while a fully reduced pot will be gray or black throughout. The resulting surface color varies from jet-black to gray and its appearance from highly lustrous to matt, depending on whether the vessel had been burnished prior to firing and the specific firing conditions.

Smudging differs from the reducing atmosphere of the iron-reduction technique. While the two both used reducing conditions, the smoky ones are intentionally produced by adding organic substances. In the carbon-black technique, the carbon is superficially deposited onto the vessel surface (into the pores of the clay and partially into the fabric), while in iron-reduction, physical and chemical changes occur within the mineral properties of the clay itself (Gardner 1978, 79; Tsirtsoni 2000, 14). When using the iron-reduction technique, the oxygen is removed from the clay body (it is not present in the firing atmosphere at this point), which causes a chemical change in the clay (Shepard 1968, 219). The challenge for the potter is to maintain the temperature for the reaction to take place while ensuring a reducing atmosphere (Vitelli 1999, 26). The control of the temperature and kiln conditions is more demanding in the iron-reduction technique.

Due to these technical differences, it is important to ascertain which method was used to produce a black pot, although as Childe (1936-1937, 27) remarked early on "inspection cannot reveal how a prehistoric potter actually blackened her vessel." There are, however, some visual indicators as to which technique was used. For instance, oxidized mottled spots on the exterior are indicative of the carbon-black technique, whereas more even color graduations arise from the reduction of ferruginous clays; in either case, it is apparent that "black" burnished pottery is a fluid category (Childe 1936–1937, 27). Looking at a cross-section of the clay body may also reveal the method used, and whether or not a slip was applied. Since smudging is but a partial reduction, the core remains red, whereas if it were fully reduced it would be gray or black (Tsirtsoni 2000, 14).

At Anzabegovo (Phase I) near Štip in the Republic of Macedonia (a site which is contemporary with sites in Late Neolithic Greece) Gardner (1978, 79) observed that the carbon-black technique in combination with an organic slip (such as ash added to the clay slip) was used for Black-burnished pottery: her opinion was based on the presence of a sharp line of delineation where the paint penetrated into the pores of the clay, while the core remained red, indicating that the firing was not a prolonged reducing one. A more gentle gradation indicates that the carbon-black technique alone was used to black the vessel (Gardner 1978, 79). The depth of penetration of carbon depends on the porosity of the ceramic body (Letsch 1982, 95).

In Thessaly, most sherds were slipped, and fired in reducing conditions, as revealed in the cross sections with their gray cores and clearly delineated slip lines (Letsch 1982, 95). At Asea, however, Holmberg (1964a, 343) could not always distinguish the slip from the clay body since it had penetrated into the clay mass, although he did note that some pieces were slipped and had uniformly gray cores, indicating a prolonged reducing firing.

Regardless of which technique was used, there are many examples of “mistakes” or misfired Black-burnished pots. In the Peloponnese, Phelps (2004, 77) noted that some red-slipped vessels were otherwise identical to forms more common in Black-burnished . Wijnen et al. (1979, 213, 216) stated the same for the gray, red, and tan examples at Servia. At Varka on Euboea, Sampson (1977, 47) identified five groups of black-surfaced pottery, mostly of poor quality, either gray or lead-colored. While at the Sarakenos Cave, Sampson (2008a, 91) attributed inferior examples of Black-burnished (i.e., with the surface easily worn off and diverse gradations of black) as either indicative of failures during firing or production by less competent pottery workshops. Vitelli (1999) also points out that the vessel color of this type of decorated Black-burnished may have had more of a green-brown tinge to it, and that fugitive red (ocher) pigment seems also to have been applied.

Ultimately, scientific and chemical tests are needed to determine whether iron-reduction or carbon-black was used. Unfortunately, most reports simply do not consider how Black-burnished pottery was produced, or only offer speculations (i.e., carbon-black technique suggested by Frankfort 1927; Robinson 1927; Wace and Thompson 1912, Holmberg 1944; 1964a).

Technology of Additional Decorative Techniques

There are three main additional decorative techniques that may be used on Black-burnished pottery: white paint (Γ1α1), pattern burnishing (Γ1α2), and plastic decoration (Γ1α3). These techniques were used from the Peloponnese to Macedonia (particularly in Western Macedonia). Although Wace and Thompson defined them based on their particular stylistic use in Thessaly, their technology is the same, regardless of location.

Γ1α1: White Painted Decoration on Black-burnished Pottery

White painted decoration was applied before firing, and often survives only as a "paint ghost" (Phelps 2004, 74); at Franchthi it was never burnished (Vitelli 1999, 25). Shepard (1968, 43) states that the majority of white paints were relatively pure kaolin or white marls. Letsch and Noll (1983, 89) determined that the white pigment used in Thessaly consisted of "lime silicate white" created from finely slurried calcareous clays. Conversely, Vitelli (1999, 39) determined that calcareous clay was not used, because the white pigment did not react to hydrochloric acid (HCl) and suggested that it consisted of kaolin or marl. Vitelli (1999, 39) noted that the white at Franchthi was not bright white and smooth, but rather gray and granular in texture and not burnished: she (Vitelli 1999, 25, fig. 10, a) also found evidence of where a painter had made a mistake and had tried to fix it by wiping off the paint.

Γ1α2: Black Pattern Burnish

Pattern burnishing, as Vitelli (1993, 196) notes, is "a technique that required little preparation of materials—no fine grinding, mixing of pigments, or preparation of brushes—and little practice or skill to execute." Similarly, Phelps (2004, 74) states that "pattern burnishing in general is a natural development wherever black pottery is widely produced and a fine burnishing technique is employed," which suggest an amount of inevitability regardless of established ceramic traditions. After the vessel has been slipped (and perhaps burnished once) and dried, it can then receive pattern-burnished decoration. Essentially, the additional burnishing compacts the pores of the clay further, so that they appear darker than the background which remains unburnished (Vitelli 1999, 23). While it is a simple technique, it is nonetheless "an elegant method of decoration" (Letsch 1982, 104).

Wace and Thompson (1912, 17) mistakenly thought Γ1α2 (Pattern Burnished Black-burnished) was "made by first covering the whole with a black slip and then scraping off some of it so as to leave a pattern reserved in the gray colour of the biscuit,": they thus linked it to Middle Neolithic Scraped wares of Thessaly (i.e., A3δ). This may be true for some speciems, but not all; Heurtley (1939, 68) stated that some of the vessels at Servia were created this way, as were some from Orchomenos (Kunze 1931, 18, 19), while the rest (both at Servia and Orchomenos) were created by burnishing.

Furthermore, Scraped decoration, however, is not attested in western and southern Thessaly (Demoule, Perlès, and Manolakakis 1988, 10) where Black-burnished was popular. Instead, Gray-on-gray painted pottery was common in the same area as scraped pottery. These distribution patterns are interesting because Black-pattern burnished is reminiscent of the subtle tonality found in Gray-on-gray painted pottery. Perhaps it was even imitative of it, in an area which did produce it. Granted there are differences in shapes and motifs, but the overall concept and effect is the same: a black-on-gray surface (Wace and Thompson 1912, 17).

While it is possible that a relation exists between the Middle Neolithic Scraped wares in Thessaly and the development of pattern burnished Black-Burnished, in the Peloponnese the idea clearly derived from the Urfirnis burnished pottery of the late Middle Neolithic period (Vitelli 1993, 190; Phelps 2004, 74). Touchais (et. at 1981, 78), however, remains skeptical of this proposition and maintains that the origin of the technique remains obscure. Lastly, it must be stated that the designs found on Black-burnished with pattern burnished are not the same as those on Thessalian Gray-on-gray, as Sampson (2008a, 99–100) erroneously states.

Γ1α3: Plastic Decoration on Black-burnished Pottery

Wace and Thompson's (1912, 17) original definition of Γ1α3 (Rippled or Ribbed Ware) included only rippled or ribbed ware, but it is here used as a general heading for all plastic decoration including channeling, grooving, and large added plastics. In contrast to Black-burnished pattern-burnished pottery (Γ1α2), appliqué decoration was created on the vessel while it was still rather damp. According to Rice (1987, 148), appliqué refers to the addition of small, shapes pieces of clay to the surface of the vessel; but can also be large and complex attachments made by hand or in mold.

"Ribs"—or "ribs and beading" when small circular added plastics are used in combination—may have been created in a similar way throughout, but their exact technology is debated. Sampson suggested that this type of relief decoration was mold made (2008a, 89).

Kunze (1931, 18) suggested that rouletting was used, as does Phelps (2004, 75). Phelps (204, 75) defines this technique as a series of vertical and horizontal cuts, where as Rice (1987 145) defines rouletting as rolling a cylindrical tool over the surface to leave a continuous impressed deign. Vitelli (2007, 106) suggested that the fine ridges were made with burnishing tools, with the beading done by stamping the outermost ridges with a thin and hollow tube or a concave-tipped comb. Additional types of larger added plastic would have been applied by scoring while the clay was still malleable.

Heurtley (1939, 69) thought that a thicker line of paint was added and then burnished to form the ridges and the tiny raised, circular dots of “ribs and beading.” Heurtley (1939, 69) also suggested that ribbed decoration arose directly from techniques of Scraped ware, in that the Neolithic potters observed how shallow raised ribs were left where paint remained in situ and subsequently imitated that process in Black-burnished pottery.

The terms rippled, grooved, channeled, and fluted have been used synonymously by different authors. Evans (1986, 403) described grooving as “elongated depressions on the pot surface which have been smoothed or burnished with the remainder of the pot surface.” Heurtley (1939, 69) defined rippled as burnishing the clay in shallow, parallel grooves; but if the striations are deeper and further it should be described as grooved. Rice (1987, 145) actually considers grooving a type of incising created with an instrument that has a broader round tip to create broad and shallow lines; it may be made with a gorge-like tool, held either perpendicular to the surface or at an angle.

“Rippled” decoration is created by heavily burnishing the vessel while it is still somewhat plastic. Portions of clay are manipulated with the burnisher to produce subtle fluctuations in the topography of the vessel surface. When the technique of rippling is used to form more organized designs, the burnishing troughs tend to be deeper, and this variant is referred to as “channeling” in the literature. Chronologically, it appears as a technique after rippling. Channeling is usually shaped into groups of oblique lines or chevrons, but sometimes arcs and circles are created, particularly in Macedonia. “Grooving” is an even deeper and broader-furrowed type of decoration, created by manipulation of the vessel surface with a burnishing tool. It was made while the clay was wetter than for channeling or rippling; like channeling, grooving occurs chronologically after rippling (Vitelli 1999, 24).

A unique from of plastic decoration found only at Servia is “barbotine arcading” in which the clay was gently scraped or pushed upwards from the bottom in rays; the resulting effect is a series of vertical furrows ending in an arch of clay that radiates from the bottom of the pot (Heurtley 1939, 72; Wijnen et al. 1979, 213). It was primarily used on large vessels (Wijnen et al. 1979, 213). Perhaps this type of decoration could also be called fluting, which Rice (1987, 145) defines as one or more, shallow broad grooves or channels in the clay, usually vertically as multiple contiguous flutes although (horizontal flutes around the vessel, of course, are also possible. It is similar to the “pleat-type” at Promachon-Topolnica.

Γ2 Incised and Filled

Like pattern burnishing, incision and impression are simple techniques, but they were used rather infrequently. Although Wace and Thompson (1912, 18) poorly defined this ware and also misdated it (see also chapter 11), their technological remarks are valid. The surfaces are usually burnished, and the incisions are “rendered by lines and irregular round holes made by pressing a blunt instrument into the clay” (Wace and Thompson 1912, 18). The white paste may have been kaolin, chalk, or another calcareous substance.

Incision elsewhere in Greece was created in a similar fashion and also filled with white paste. Red ocher may have also been used to fill incisions in Macedonia. Impressed decoration may have also been used; like its incised relative, it was created when the vessel was still damp, by pressing a pebble into it. Also like incision, it could later be filled with powdered lime to create a white-on-dark effect (Vitelli 1999, 23).

Scratch-crusted Technology

“Scratch-crusted” technology is related to incised and filled decoration. The scratch-work was done while the vessel was wet, with a lightly rounded tip to impress, rather than to incise, outlines of the primary motifs into the damp clay; lime or plaster or some other carbonate paste then filled the impressions Vitelli 2007, 106; Phelps 1975, 213; Phelps 2004, 75). The light scratching of the vessel surface facilitated the post-firing application of the white fill (Phelps 2004, 75). At Lerna, Vitelli (2007, 106) found the few extant examples of scratch-crusted sherds to have a similar fabric to Middle Neolithic Urfirnis (and she also placed them in the Middle Neolithic, although the excavators did not).

Black-topped Pottery Technology

The “black top” effect was created at the end of the firing process. A vessel that had been fired first in an oxidizing environment was then inverted, and briefly re-fired using the carbon-black technique (see above). Because the rim and upper body were slightly pressed into the ashes from the fire (Letsch 1982, 105) or into wet leaves (Vajsov 2007, 95), the upper body and the interior of the pot were turned black, while the rest of the body retained its red, oxidized color (Gardner 1978, 73; Letsch 1982, 105-106, 114; Demoule 2004; Jones 1986; Kalogirou 1994, 76-92; Tsirtsoni 2000, 14). It was not created by stacking pots or using saggars as suggested by Letsch (1982, 105).

Gardner (1978, 84) states that a high iron oxide content in the clay insures the success of this kind of partial, superficial reduction. The transition between the black top and the rest of the body can appear as a “nebulous and uneven” zone if the vessel had a more gently rounded profile and carinated shapes offer a clear transition of where the Black-topped effect begins and ends (Gardner 1978, 73). “Red-topped” vessels could also be produced this way, although they are rare in the Greek Neolithic record (i.e., Keighley 1986, 386, fig. 11.17.6).

Kalogirou (1997, 14) stated that the technology of Black-topped pottery is much more complex and nuanced in execution than is generally assumed by Gardner (1978) or Kaiser (1990, 270). Lucas (1930) suggested that a combination of smudging and iron-reduction was used to create Neolithic Egyptian Black-topped ware, and the same may be true of some Greek Neolithic specimens, particularly in Central Greece and the Peloponnese. Gardner (1978, 111) suggested that either a black organic paint or smudging (or both) were used for the Black-topped pots from Sitagroi (Phases I-II), since upon re-firing the black-topped effect vanished.

Additional Regional Black-burnished Technology Remarks

The Peloponnese

In the Peloponnese, both the iron-reduction and the carbon-black technique were used to create Black-burnished pottery. The two techniques were even used at the same time at a particular site, such as at Franchthi and Asea. For instance, at Asea Holmberg (1944, 35) referred to Black-burnished as “Black Carboniferous Ware,” which, as the name suggests, was produced “not from a slip but from carbon that is then polished.” What he called “Black Monochrome” relied on the iron in the clay and a reducing firing atmosphere. Holmberg used the term “carboniferous” to distinguish the use of the carbon-black technique from iron-reduction. Holmberg (1964a, 343) also separated Black-burnished from Black Monochrome based on morphological differences: the Black Monochrome was less well burnished and had more rounded, rather than carinated, shapes.

At Franchthi, there is an earlier and a later group of Black-burnished pottery. Although the two share similar shapes and surface treatments, they utilize different fabrics. The earlier type uses a calcareous clay, while the latter does not.

The earlier Black-burnished pottery (Phase 3) used the calcareous Low Lime fabric and was fired at over 850°C (the white inclusions have become powdery; Vitelli 1999, 22). The specificity of the individual clay recipe varied, which indicates the work of different potters (Vitelli 1999, 23). Slab and coil construction was used to form the vessels. They may have been partially built upside down, as is indicated by some lop-sided pots and rims with irregular curvature. They were irregularly burnished: this failing may indicate the potters did not work regularly (Vitelli 1999, 23).

Many of these vessel were thickly slipped (and in more than one coat) with iron-oxide so as to fire to a solid black (otherwise they clay would fire blue-gray) using the iron-reduction technique (Vitelli 1999, 23, 25). They were fired at temperatures sufficient for reduction, ca. 800°C, and the cores are uniformly gray. Some pots were fired more than once, as is indicated by variations in their color, texture and hardness (Vitelli 1999, 25). Vitelli (1999, 25) found no evidence (i.e., firing circles or clouds) to indicate that the vessels had been stacked during firing, and she suggested that each pot may have been fired separately, upside-down. Smudging was not used on Low Lime Black-burnished pottery because no layer of carbon soot is found atop the iron-oxide slip (Vitelli 1999, 25).

Overall, Vitelli (1999, 23, 30) remarked that the "wide range of choices exercised in the small sample available make it difficult to describe and procedures as standard. Rather, the potters achieved—and perhaps aimed for—individuality within a broadly defined tradition" when creating Low Lime Pattern Burnished pottery.

Later at the Franchthi Cave (Phase 4), a non-calcareous clay was used. Vitelli (1999) identified this fabric it as "Andesite Burnished Ware," which was exclusively used for the production of Black-burnished pottery in the Late Neolithic. Andesite was locally available: the same source was used for the millstones at Franchthi (Vitelli 1999, 38; Runnels 1981). Cohne (Runnels 1981), the geologist who did the analysis for Runnels, proposed that the andesite had been deliberately crushed and added to temper the clay as the edges of the inclusions were very angular. Vitelli (1999, 39) clearly outlined the production of an Andesite Black-burnished vessel as follows.

In order to attain their thin-walled (3–5 mm), carinated shapes, the vessels were formed by a paddle applied to the exterior (a flat paddle in earlier phases but later a curved paddle) and then scraped from the inside to further refine the walls. At this stage relief decoration was added. Then the vessel was coated on the exterior with an iron oxide-rich slip in several layers and finally so heavily burnished that the burnishing strokes are often visible. Interestingly, Vitelli found that the potters did not consistently turn the pot as they were burnishing it, so giving the burnishing marks a consistent pattern (as they had done earlier with Pattern Burnished Urf from Phase 2), but casually turned the vessel so that the strokes went in various directions.

After burnishing, the vessel could be dried and fired using the iron-reduction technique (essentially with an oxidizing atmosphere, until the final stage when it is reduced); as in the previous phase, vessels were fired upside down and did not touch one another, otherwise mottling would have resulted (Vitelli 1999, 39).

Alternatively, the vessel could first receive painted or pattern-burnished decoration before drying and firing. Painted decoration was done with a fine brush and granular white paint, which was some type of non-calcareous clay-based paint. In this case the pot was fired in an oxidizing atmosphere until the end, at which point it was finally reduced (iron-reduction technique), so turning the slip to black and leaving the white paint white. Pattern burnishing was created by burnishing the pot once it was leather-hard. Vitelli noted that most of the Black-burnished pottery at Franchthi had red-brown cores and that the sherds were fragile, tending to break and scratch more than other harder-fired wares.

Central Greece

At the Sarakenos Cave in Central Greece, it seems that iron-reduction was used, since Sampson (2008a, 89) remarked that the "black paint penetrates into the clay core due to prolonged firing in reduced conditions." Low firing temperatures of 750°C or less were used (Dimou 2008, 140); similar firing temperatures were used on Euboea at the Skoteini Cave and Varka. Experimental reconstruction of this ware has been done (Kilikoglou and Maniatis 1993).

Weinberg (1962, 186) noted that some (but not all) of the Black-burnished vessels at Elateia had a black slip applied before burnishing, because otherwise the clays would fire brown; this implies the use of manganese paint and firing in an oxidizing environment.

The Black-burnished at the Kitsos Cave was generally a heterogeneous group, although for four specimens with altered manganese schist it was suggested that they were imported from the Aegean Volcanic Arc, from either Naxos or Paros (Courtois 1980; Lambert 1981). Phelps (1986, 385), finds this unlikely and suggests closer geological sources were used.

Thessaly

Letsch and Knoll (and Letsch and Noll) scientifically examined Black-burnished pottery from Thessaly (Letsch 1982, Letsch and Knoll 1978; Letsch and Noll 1983) and determined that it was created through painting the vessel with manganese oxide paint, then using the manganese-black technique for firing (in weakly reducing or oxidizing conditions) and finally smudged (iron-reduction may have also been used, see Hauptmann and Milojčić 1969, 20, 50).

Letsch and Knoll (1978; 1982) found that the carbon content deposited on the surface was enriched 2–5% more than the vessel body and when this surface was burnished (post-firing), it produced the characteristic lustrous surface of Black-burnished. They (Letsch and Noll 1983, 138, 259-260) proposed that this superficial enrichment was due to smoking and the reduction of the organic content within the clay itself (i.e., the use of a calcareous clay), since it could be completely removed by firing in an oxidizing atmosphere. They also suggested that an organic substance, such as animal fat, may have been added to the vessel surface. Indeed, most sherds were slipped, and fired in reducing conditions, as is revealed in their cross sections by gray cores and clearly delineated slip lines (Letsch 1982, 95). Wace and Thompson (1912, 17, 28) also noted the use of a slip for Black-burnished pottery at Rachmani and for Γ1α1 (White painted Black-burnished).

Macedonia

Similar to Letsch's (1982, 95) suggestion that an organic substance, such as animal fat, may have been added to the vessel surface, Yiouni (2001, 16) also considered that powdered charcoal and plant extracts could be used to make dark pottery: either by applying them before hand, after firing while the pot is hot or by applying them through a second firing.

Gardner (1978, 112, 116) demonstrated technological evolution at Sitagroi. In Phase II Black-burnished pottery was produced by a short smudging after an oxidizing firing and sintered at 975°C, while in the following phase (Phase III), the clay had been levigated and contained no temper, and the vessels were slipped and had carbon cores, indicating that they were lightly smoked; they sintered at 1050°C. Black-burnished pottery was probably fired in pits, such as the carbon-filled pits attested at Sitagroi (Gardner 1978, 112; 1979, 21).

CHAPTER 7: GRAY-BURNISHED AND GRAY-ON-GRAY PAINTED POTTERY

Gray-burnished and Gray-on-gray Painted Pottery (Figures 54–57)

In the previous chapter on Black-burnished pottery, only examples which were clearly cataloged as truly jet black were discussed. Although some publications (i.e., Weinberg 1937; Sampson 1977; Phelps 2004) differentiate between Gray and Black-burnished, most present gray and black-burnished sherds together (i.e., Weinberg 1962; Douzougli 1994; Hauptmann and Milojčić 1969; Sampson 2008a) either because color was not regarded as a significant criteria or because of the difficulty of assigning a small sherd to a particular class when the material is fragmentary and there exist no great differences in typology.

Whether or not a meaningful distinction between Black and Gray-burnished is valid has yet to be determined. Its affects may anyway only apply to a limited number of sites. For instance, Phelps argued that Gray-burnished pottery constituted a chronological subphase at Corinth belonging to the Late Neolithic Ib, possibly extending to surrounding sites in the Corinthia and Argolid. Similarly, in Thessaly, Gray-burnished pottery was preceded by the transitional "Proto-Gray-on-gray" (defined by light gray interiors and red oxidized exteriors), which dates from the Middle Neolithic to Late Neolithic Ia transition. It was followed by a small related class of painted pottery called "Γ1β Gray-on-gray," (Tsoundas 1908, 243; Wace and Thompson 1912, 17). Gray-on-gray painted pottery has received much attention in the literature for its chronological and technological implications, which are discussed below.

While most scholars (i.e., Demoule, Gallis, and Manolakakis 1988; Letsch and Noll 1983) believe that the gray color was intentional, Vitelli (1984; 1994, 147) raised the important question as to whether Gray-burnished and Gray-on-gray painted pottery were the products "of carefully controlled, sophisticated firing procedures, possibly in the hands of specialists" or the "result of accidental firing conditions in the potter's kiln or some subsequent fire." Vitelli's (1994, 145) point was that the colors seen by archaeologists today represent only the last time a pot was fired.

For instance, Vitelli (1994, 147) pointed out that in describing the funerary ceramics at Plateia Magoula Zarkou Gallis (1982, 28, 59 and plate 1β) cataloged a small "gray" two handled cup (skyphos) as "red" because he thought that was the original color. Vitelli extended this observation to the rest of the gray pots and suggested that all of the Plateia Magoula Zarkou pots had been turned gray from the cremation pyre. Frierman (1969, 43) made similar argument for Graphite-painted pottery, which he suggested was originally fired in reduced conditions to produce a dark surface and that subsequent re-firings in oxidized altered the intended color to a pinkish tan.

In fact, early on, both Wace and Thompson (1912, 17) questioned if gray was the original color of the paint in Gray-on-gray. Heurtley (1939, 67) also thought the Servian examples were really burned Red-on-white, because some Gray-on-gray specimens at Servia were oxidized. Vitelli (1994, 147) again reiterated that the oxidized Servian pots could have be transformed from gray to red in a secondary firing, either accidental or intentional.

Given these uncertainties of color intentionality, and the fact that in much of the scholarship Black and Gray-burnished wares are treated together, the following remarks pertain only to sites in the Peloponnese where Gray-burnished was isolated as a separate ware: the aim is to examine whether or not it is a valid division. Gray-on-gray pottery of Thessaly is discussed after Gray-burnished pottery from the Peloponnese.

A corollary/equivalent type of Gray-burnished pottery did not exist in Northern Greece as a separate class of pottery; Gray-on-gray painted pottery is found only in Western Macedonia at Servia (Heurtley 1939; Wijnen et al. 1979). The idea of gray colored pottery was in play, however, in Eastern Macedonia where a black-surfaced pot was covered with a graphite wash, giving it a lustrous, gray sheen. This type of pottery was defined at Sitagroi as (Keighley 1986) “Gray Lustre Ware” and “Gray Channeled,” and it must not be confused with Gray-burnished. Because these two types are covered in a graphite wash, they are considered together in Chapter 8 on Graphite Painted pottery.

Gray-burnished Pottery of the Peloponnese (Figure 55)

The main shapes used for Gray-burnished pottery in the Peloponnese are similar to those used for Black-burnished; they include fruit-stands, simple open bowls, shouldered bowls, carinated bowls, softly carinated shapes (in which the lower walls are convex; bowls often have waisted handles), collared bowls, occasional piriform or collared jars, concave cups, piriform and collared jars (Phelps 2004, 77-81). Phelps believes that specific shapes are not exclusive to one or the other class, though some shapes are more dominant in Gray-burnished than in Black-burnished, such as bowls (fruit-stands). In the fruit-stand, the rims appear to demonstrate a chronological development from unthickened or slightly thickened to massive Gray-burnished type rims (2004, 70).

Decoration includes incision, grooves, rippling and fluting and more rarely, plastics (Phelps 2004, 81–82). Phelps (2004, 82) defines "grooved" as shallow but well defined furrows made in the surface by a sharp or blunt tool mostly on shouldered bowls, the effect being due as much to the compression of the surface as to the excision of the clay, and again "rippling or fluting" as more subtle and pronounced burnishing. Phelps (2004, 82) also states that rippling, but not fluting, is found in Black-burnished and that fluting is less common than rippling in Gray-burnished. Various shades of gray occur, with a very light silvery-gray tone as the most common.

Vitelli (1999, 43) determined that the Gray-burnished pottery found at Franchthi was intentionally produced, using a particular fabric ("Gray-burnished variety") not found in other wares. She suggested that these examples were imported because other sites like Corinth and Klenia had a greater range of shapes than Franchthi (Vitelli 1999, 43). A few other examples were probably locally made, since they used the same clay as Black-burnished (Andesite Variety) but these could also represent mis-fired sherds. Gray-burnished ware was never present in large quantities (only 33 sherds from Phase 4.2) and the extant shapes paralleled other wares, including Black-burnished. The exceptions are three shapes that are unique to Franchthi: a small carinated bowl with a rounded, offset rim and two small pierced holes in the shoulder, a small jar with a concave-convex profile, and a shouldered jar with concave neck (Vitelli 1999, 52).

Peloponnese: A Late Neolithic Ib Subphase at Corinth?

Although Phelps (2004, 77, 83, 84) acknowledged that Gray-burnished pottery was produced throughout Late Neolithic Ia, he also asserted that in Late Neolithic Ib

Gray-burnished pottery represented a special subphase contemporary with the Late Neolithic Ib Gonia style of Polychrome painted pottery (see Chapter 5). Gray-burnished pottery continued to be produced until just before the beginning of the Final Neolithic (Phelps' Period IV), and some shapes persist into this later period (Phelps 2004, 85). Phelps (2004, 83) admitted to the difficulty of finding exact Thessalian parallels for his Gray Ware, because the shapes in the Peloponnese could not be matched by any one phase in Thessaly.

Gray-burnished is dominant only at Corinth and possibly centers like Argos that were in close contact with Corinth. Phelps (2004, 84) suggests that this is because both Corinth and Argos lie in close proximity of similar calcareous clays which readily fire to gray under certain conditions (described in the technology section below). At sites other than Corinth, such as Prosmyna, Gonia, and the Klenia Cave, where Gray-burnished was not the dominant monochrome ware in Late Neolithic Ib, Black-burnished pottery continued to be produced as the main monochrome pottery (Phelps 2004, 83–84).

Phelps (2004, 83–84) also suggested that the Gray-burnished pottery found at the Corycian Cave (Touchais 1981, 128) was imported from the Peloponnese. If Corinth was a main producer of Gray-burnished pottery that subsequently was circulated within the Peloponnese, the situation would be analogous to the Gray-on-gray production and circulation in Thessaly. But no extensive petrographic analysis has been conducted to either confirm or deny this suggestion. Sampson (2008a, 104) disagrees, however, with Phelps (2004, 82, 84) that Corinth was the center of Gray-burnished production, because it is found at Klenia, Gonia, Prosmyna, Franchthi, Asea, the Alepotrypa Cave, Koufieros, and Nestor's Cave, as well as at Astakos, and Nea Maki in Attica (Holmberg 1964b, 27).

Phelps' emphasis on Gray-burnished pottery at Corinth should be approached with some caution. First, he based his Gray-burnished subphase on one deposit (Temple Hill), and while he may have correctly described this deposit—just as Weinberg did for the "*Bothros*" deposit at Elateia—it may not accurately represent the true picture of the site. That is to say the deposit could be unique or have inverted stratigraphy. In fact, Phelps (2004, 11) even admits that Franchthi is the only stratified site in the Peloponnese during Late Neolithic Ib and Gray-burnished does not appear to be a subphase there (see above).

Furthermore, none of the excavators of Corinth (Weinberg 1937; Walker-Kosmopoulos 1948; Lavezzi 1978) emphasized Gray-burnished pottery as Phelps does. For example, while Weinberg (1937, 504) isolated Gray-burnished as a separate ware at Corinth, he also noted that it was commonly found with Urfirnis, thus dating it earlier rather than later. Secondly, Walker-Kosmopoulos (1948, 51) stated that Gray-burnished (her "Proto-Minyan") began in the Middle Neolithic and continued on in the Late Neolithic along with Urfirnis pottery, although latter eventually died out. Walker-Kosmopoulos (1948, 24) also states that when Gray-burnished first began in the Middle Neolithic, it comprised 7% of the assemblage, and that in the early Late Neolithic it comprised 7–10%, declining later to 1% (as did Black-burnished and Matt-painted pottery).

Lastly, Lavezzi (1978, 423) recovered 140 of 170 Gray-burnished sherds in only four pottery lots (Corinth Pottery Lots 6366, 6368, 6378, 6491). Although it amounted to 10% of those four lots, only one example of Late Neolithic Ib Gonia style Polychrome was found, which may indicate an earlier date for the deposit rather than later as Phelps argues. Sampson (2008a, 104) seems to accept Phelps' subphase, and even suggests that the diffusion of Gray-burnished ware into the Peloponnese might have been delayed since it is known that Black and Gray-burnished begin at the start of Late Neolithic Ia.

Sampson (2008a, 105,107) also suggests, however, that the absence of Gray-burnished ware led many scholars to put it later than Black-burnished, although he concedes such observations could be coincidental because at Elateia and Orchomenos Black-burnished precedes Gray-burnished, while at Eutresis they occur together. Gray-burnished is also found at many sites in Central Greece (and Thessaly), including Orchomenos, Elateia, Nea Makri, Astaks, South Slope of the Acropolis, Euripides' Cave on Salamis, and the Corycian and Kitsos Caves.

Gray-burnished Technology

Based on her observations from the Plateia Magoula Zarkou cemetery material and her own experimental firings, Vitelli (1984; 1994) suggested that if Gray-burnished pottery and Gray-on-gray painted pottery were intentional products, they would have had to have been fired in a kiln using saggars. This was the only way to ensure an even, uniform gray surface without mottling from accidental oxidation, and by limiting the amount of reduction taking place. Firing in a weakly reduced atmosphere was known from the production of Matt-painted pottery using manganese paint (see Chapter 3).

Vitelli (1994, 145) stressed the technological difficulty she had in replicating Gray-burnished pottery; ultimately, she was only once able to successfully produce a gray pot. Her (Vitelli 1994, 145) experiments, however, demonstrated that "Proto-gray Ware" was produced by firing the vessel in an inverted position so that that outside was oxidized red and the interior a reduced gray. Vitelli (1994, 145) suggested that the idea for gray pottery came from experiences made in firings and observing how gray pots were occasionally accidentally produced. As to why a Neolithic potter wanted to produce a gray pot, she suggests that "their specialization might be linked to ceremony more than commerce." More detailed technological comments are found in the section below on Gray-on-gray painted pottery; the process used to produce the two wares is identical.

At Corinth, Weinberg (1937, 504–510) defined Gray-burnished ware as well polished but rarely highly lustrous and without a visible slip; Kilikoglou and Maniatis (1993, 440–441) confirmed the existence of a similarly difficult to discern slip at the Skoteini Cave on Euboea. At the Franchthi Cave, Vitelli (1999, 43) found that Gray-burnished consisted either of imports (Gray-burnished variety) or was made using the same fabric as Black-burnished pottery (Andesite Burnished). The first was probably of calcareous clay since such are easy to fire gray (Schneider et al. 1994, 68, 147-148), while the latter was not. There was not much evidence for the construction, since the vessels had been highly finished, although they were never very lustrous or soapy to the touch (Vitelli 1999, 43). Firings took place in reducing conditions, in kilns, using saggars (Vitelli 1994).

Γ1β Gray-on-gray Painted Pottery (Figure 57)

Gray-on-gray painted pottery is a small class of pottery in Thessaly which began in the late Middle Neolithic and continued into the beginning of Late Neolithic Ia during the Tsangli phase (Andreou et al. 1996, 556). Milojčić (1960, 15) incorrectly assigned it to the Final Neolithic to Early Bronze Age (included in his "Larisa Culture" group).

Hauptmann was skeptical because he saw its typological and technical relations in the late Middle Neolithic and early Late Neolithic (Hauptmann and Milojčić 1969, 44, 47). Similarly, Phelps (2004, 85) had suspected that Gray-on-gray dated to the Tsangli period, but did not update his dissertation. Tsoundas (1908, 243) first identified it as Γ1β (Grey-on-grey ware).

The class is found primarily in Eastern Thessaly (i.e., Tsangli, Tsani, Sesklo, and Dimini) but not eastern Thessaly (Demoule, Gallis, and Manolakakis 1988, 10, 19). This localized distribution is interesting for two reasons. First, because Middle Neolithic A3δ Scraped ware (Wace and Thompson 1912, 17; first called “xesti” by Tsoundas; 1908) was also primarily found in same area of Thessaly: it is often cited as a forerunner in terms of motifs, shapes, and duo-tone appearance to Gray-on-gray painted pottery (Demoule, Gallis, and Manolakakis 1988, 20, 22). Second, contemporary Black-burnished pottery is more common in other areas of Thessaly (mainly Western) which reveals a regional preference for certain wares (Demoule, Perlès, and Manolakakis 1988, 35).

The main shapes consist of deep flared bowls, smaller hemispherical bowls, ribbon-handled parallax cups (bell-shaped mug), handled-jars, fruit-stands; the earlier cups have convex, protruding lower bodies that later become more concave (Demoule, Gallis, and Manolakakis 1988, 22). The bell-shaped mug was also in use in Middle Neolithic Scraped pottery (Demoule, Gallis, and Manolakakis 1988, 22). The decoration is simple and linear. It consists of zones of parallel oblique lines, often with the outer ones as thicker bands, zigzags, dotted bands, and quirks (Demoule, Gallis, and Manolakakis 1988, 22). At Servia, an interesting motif of an anthropomorphic cross-legged seated figure is found on a tumbler. In motifs and their composition, there are parallels with Late Neolithic Ia Matt-painted pottery (B3ε) (Demoule, Gallis, and Manolakakis 1988, 22). Gray-on-gray can be well burnished (Demoule, Gallis, and Manolakakis 1988, 22), although this is not a rule (Wace and Thompson 1912, 17).The surface colors range between red, orange, brown, and pink tones, due to different firing conditions (Demoule, Gallis, and Manolakakis 1988, 22–23).

At the Plateia Magoula Zarkou cemetery, Gray-on-gray painted pottery comprised 60% of funerary assemblage (Demoule, Gallis, and Manolakakis 1988, 22; Gallis 1982). Wace and Thompson (1912, 17, 111) suggested that the ware was highly prized because many fragments have repair holes bored into them. Gallis (1982, 104, 108–109) made a similar observation for the Plateia Magoula Zarkou specimens. Gray-on-gray painted pottery has received special attention in the literature (i.e., Pentedeka 2011; Vitelli 1994; Schneider et al. 1994; 1991a; 1991b; 1990) for its high technical quality, its limited distribution and circulation within Thessaly, and its subsequent chronological contributions when it is found outside of Thessaly (i.e., those from sites in western Macedonia, like Servia, are contemporary with the Thessalian ones; Yiouni 2001, 25). It is believed to be the product of a few specialized workshops in eastern Thessaly (Andreou et al. 1996, 556; Letsch and Noll 1983).

As with Gray-burnished pottery, Vitelli (1994, 148), however, questions the emphasis in the literature placed on Gray-on-gray painted pottery because she correctly points out that the published pieces are biased examples of the ware: it is unclear what un-diagnostic sherds are like and crucial information on what the percentage of Gray-on-gray is in a given assemblage are not published. Similarly, Hitsiou (2003) argued that imported Dimini style Matt-painted sherds at Makryialos in Western Macedonia reveal that long-distance exchange of pottery is not as rare as once thought. The same can also be said of Late Neolithic Ib Black-on-Red painted pottery from Eastern Macedonia that was exported to Pefkakia, or the Adriatic rhyta found at Corinth.

Gray-on-gray Production and Circulation Studies

The production and circulation of Gray-on-gray painted within Thessaly was first examined by Schneider et al. (1991b; 1994) as part of their larger project of the scientific analysis of Neolithic Thessalian ceramics: this embraced 1,000 samples representing 200 styles from 23 sites, primarily in Eastern Thessaly, and 133 clay sources; analysis was performed using X-ray fluorescence (XRF), X-ray diffraction (XDR) and Scanning Electron Microscopy (SEM), and petrographic study. Schneider et al. (1991b) found that Gray-on-gray painted pottery was produced at a limited number of distribution centers in north-west Thessaly: thence the ware circulated within the rest of Thessaly, and occasionally beyond (i.e., Elateia in Central Greece and Corinth in the Peloponnese); they also revealed that in comparison Black-burnished pottery had a less centralized production pattern (Andreou et al. 1996, 556).

Schneider et al. (1994, 68) identified Plateia Magoula Zarkou as the primary production site for Gray-on-gray, since the distinctive clays used to produce the ware are located northwest of the site. Pentedeka (2009; 2011) reexamined 200 pottery and geology thin sections from Schneider et al.'s 1991(b) work that had been analyzed chemically but not published in detail. She also conducted a more intense investigation of six types of pottery (Red Monochrome, Scraped, Black-burnished, Gray-on-gray, Matt-painted and Coarse-ware) from twelve stratified sites through refiring tests, macroscopic analysis, and petrography on 480 sherds and 34 geological samples.

Pentedeka (2011, 111-112) found that each ware circulated within Thessaly but at different levels of intensity, which suggests the movement of pots rather than potters (contra Vitelli 1977). All the Gray ware pottery from Ayia Sofia was imported from Plateia Magoula Zarkou (Pentedeka 2011, 119). Plateia Magoula Zarkou produced Gray-burnished and Gray-on-gray in three different fabrics, which she suggests may represent competition amongst different households (Pentedeka 2011, 121).

Wijnen et al. (1979, 216) believed that the Gray-on-gray painted pottery at Servia was locally made, although macroscopically the vessels are indistinguishable from Thessalian ones; Schneider et al. (1991b, 43) confirmed their hypothesis. Gray-on-gray painted pottery has not been found elsewhere in Macedonia (Lavezzi 1978, 128). The Gray-on-gray sherds found at Elateia (Weinberg 1962, 196) and Corinth (Weinberg 1937, 510; Lavezzi 1978, 148) have not been scientifically tested, but they were interpreted by their excavators as imports. Weinberg (1937, 510), however, thought that the decoration of true Thessalian sherds differed from those at Corinth, which often also feature incision on the shoulder.

Γ1β Gray-on-gray Painted Pottery Technology

Gray-on-gray painted pottery technology has been primarily studied by Letsch (1982), Letsch and Knoll (1983), Schneider et al. (1991a; 1991b; 1994), and Pentedeka (2008; 2011), although Vitelli (1984; 1994) offered some perspectives from an experimental point of view. The delicately painted decoration was applied to the leather-dry ceramic body with a piece of wood, charcoal, or possibly animal fat (Letsch 1982, 114). After firing, Letsch (1982, 114) and Letsch and Knoll (1983, 141) found that the painted designed was more carbon-rich (6%) than the background (2%).

Based on the material from the Plateia Magoula Zarkou, Demoule, Gallis, and Manolakakis (1988, 17–19) argued from a technological perspective that the Middle to Late Neolithic “Zarko transition phase” was defined by a technical progression from “Proto-Gray Ware” (defined by light gray interiors and red oxidized exteriors) through an intermediary black-gray vessel on both the interior and exterior, to fully developed Gray-on-gray Ware. This transitional ware they (Demoule, Gallis, and Manolakakis 1988, 19) consider to be a poorly standardized attempt to produce a gray surface. Theocharis (1973, 122) also noted the relationship between the two. In true Gray-on-gray painted pottery, careful standardization was achieved: a uniform surface gray surface was produced and the cores are solid gray.

Although Schneider et al. (1994, 68) identified Plateia Magoula Zarkou as the main producer of Gray-on-gray, it was also made at a few other sites, including Makrychori 2, Soufli, and Servia; they interpreted these examples as minor local productions that were not as specialized. At Servia, for instance, the same clay was used for Gray-on-gray painted pottery as for Black-burnished, which was not the case in Thessaly. Similarly, Vitelli (1994, 147) found that the Gray-burnished pots in the Plateia Magoula Zarkou cemetery had the same shapes and fabrics as did Red monochrome and Black-burnished: she suggested that the funerary pyres reduced the vessels to a darker color.

Due to their glassy breaks and soapy feel (much like the later Middle Helladic Minyan Ware), Letsch and Knoll (1983, 121) proposed that Gray-on-gray painted pottery was fired at temperatures of ca. 1,000°C. Pieces analyzed by them from both Thessaly and Servia indicated firing temperatures of 900–1,000°C and 800–900°C respectively (Yiouni 2001, 17). High temperatures (1,050–1,080˚C) have also been documented for Late Neolithic Matt-painted pottery at the Skoteini Cave on Euboea (Maniatis and Kilikoglou 1993, 440). Such high temperatures, however, may in time prove to be erroneous; firing temperatures for Graphite painted pottery were once thought to be near ca. 1,000°C, but subsequently dismissed (Gardner 1978; 1979; 1996; 2003). High firing temperatures receive attention because, to some scholars, it implies that kilns must have been used, and indeed Vitelli (1994, 143) proposed that Gray-on-gray pottery was fired in kilns (see below).

Letsch (1982, 113–114) and Letsch and Knoll (1983, 114) proposed that Gray-on-gray vessels were fired in a weakly reducing atmosphere under the conditions of the Boudouard equilibrium, which was facilitated by the use of saggars. This was the only way that they could explain how the potters avoided totally turning the vessels black (with the Carbon-black technique) while also avoiding burning away (in an oxidizing atmosphere) the carbon that was necessary to produce the gray tones. Achieving the Boudouard equilibrium and the use of saggars reflects very advanced ceramic practices.

The theory behind the Boudouard equilibrium is that at around 700°C the endothermic formation of carbon monoxide is the dominant reaction process, whereas at lower temperatures the reaction is exothermic and produces carbon dioxide. This means that in the reaction at the higher temperatures, the carbon monoxide cools—within a confined space such as pottery kiln—as it moves away from the combustion zone: in so doing the carbon monoxide becomes oxidized into carbon dioxide and carbon, which last is subsequently deposited on the surface of the pots (and kiln). The goal of the Neolithic potters would have been to maintain the redox reaction of the Boudouard equilibrium: to ensure the reducing capability of the carbon monoxide by strictly controlling the firing temperatures and conditions. Such a firing would have made sure that there was little circulation of air in order to prevent sudden flare ups that would oxidize the vessel or burn off their organic pigment (see above).

Saggars are ceramic, box-like containers used to protect a pot during firing from direct contact with fuel and sudden changes in temperature; they help maintain the maximum desired firing temperature for longer without having to add more fuel, since the outer vessel provided insulation. They also ensure the reducing conditions needed to produce a uniform gray surface. The challenge is, however, not to over-fire the exterior vessel or under-fire the interior vessel (Vitelli 1993, 200).

While today's ceramic saggars are often custom built to fire a particular pot, Neolithic potters could simply have used other pots to achieve the same effect; Letsch and Noll suggested that this idea derived from their experience with inverted pots used to created Black-topped pottery (although in fact Black-topped dates much later than Gray-on-gray painted pottery), but Black-topped pottery was not created this way (see chapter 6). Similarly, Vitelli (1993, 200) proposed that saggars were used to produce Urfirnis pottery in the Peloponnese, beginning in the Middle Neolithic period.

Although Vitelli (1993, 200), acknowledges that, in a sense, saggars function as individual kilns, she proposed that Gray-on-gray painted pots were fired in kilns proper in order to keep the pots and the fuel separate (and so produce a uniform gray) and to reach high firing temperatures. Vitelli (1993, 145) attempted to recreate a solid gray vessel by experimental archeology using the method proposed by Letsch and Noll (1983) of firing the pot inside a larger, inverted vessel. But she was unable to replicate the process more than once, which suggested to her that more complex ceramic pyrotechnology (namely kilns) were used, possibly in addition to the use of saggars.

Indeed, there are many Gray-on-gray painted examples where the complex firing process failed, which results in mottled pots. Letsch (1982, 114) attributed mottled areas to accidental oxidation during cooling, while Vitelli (1994, 145) also suggested that mottled areas could either be the products of misfiring or the result of a secondary fire. At Servia, Wijnen et al. (1979, 216) noted that sometimes the Gray-on-gray painted vases were more of an orange-on-buff color; this effect they attributed to accidental oxidization during firing. While it is true that many Γ1α2 may not be a true black but rather gray, brown, or greenish in tone, the techniques and shapes used in the two different wares are totally different. Lastly, it should be noted that Sampson (2008a, 99–100) seems to be confusing Γ1α2 Black-burnished sherds displaying pattern burnished decoration with Gray-on-gray painted sherds.

Graphite-painted Pottery (Figures 58–64)

Graphite-painted pottery begins in the early Late Neolithic Ib, although it best characterizes the transition from end Late Neolithic Ib to Final Neolithic in Northern Greek chronology (i.e., "Early Eneolithic Dikili Tash-Slatino culture" Promachon-Topolnica IV, Kryoneri, Vinča C1, and Gradešnica A – Marica I, Sitagroi Phase IIIa; Vajsov 2004, 102, 105; Evans 1986, 404; Demoule 1991), when it gradually replaced Black-on-red and emerged as the dominant painted pottery style (i.e., Sitagroi IIIb; Evans 1986, 406, 412), borrowing motifs from the former (Yiouni 2000, 207, 211).

Graphite-painted pottery is primarily confined to Eastern Macedonia, although it is occasionally found in Central Macedonia (i.e., Vasilika; Grammenos 1984; 1991; 1997; Heurtley 1939, 33). Within Eastern Macedonia, Graphite-painted pottery becomes commoner as one moves east across the Drama plain; at Dimitra it comprised 5–17% of the decorated pottery while at Sitagroi and Dikili Tash it constituted 75% (Yiouni 2000, 207). It is also found in Thrace at Paradeisos and Paradimi in substantial quantities, but was rare at Makri (Yiouni 2000, 208). Weisshaar (1979b) and Evans (1970; 1983; 1986, 408) also identified a few sherds in the National Museum in Athens that were imported to Thessaly.

Painted Graphite pottery was formerly the criterion for the onset of Final Neolithic (i.e., Sitagroi III, Dikili Tash II, Promachon-Topolnica Phase IV), while the all-over graphite wash of "Grey Lustre Ware" and "Gray Channeled Ware" at Sitgaroi (Phases I-II) were considered the earliest use of graphite as a surface treatment in Greece. Recently, however, this picture has changed. The Graphite-painted examples from

Promachon-Topolnica are now considered the earliest documented use of Graphite-painted pottery in Southeastern Europe (Vajsov 2007, 98); these date to the early Late Neolithic Ib. This demonstrates the indigenous development of Graphite-painted pottery some 600 years before its apex at the Late Neolithic to Final Neolithic transition (according to the radiocarbon dates for Sitagroi, Graphite-painted pottery begins there around 4,650 B.C.; Vajsov 2007, 105).

Previously, the appearance of Graphite-painted pottery in Greece was taken to be indicative of external influence from the Gumnelitşa-Karanovo VI cultural complexes of Romania and Bulgaria, which are famous for their Graphite-painted wares (Demoule 1993, 382; Gardner 1979, 23; 2003, 297). In a way, Gardner (1979, 19) is still correct to characterize Graphite-painted pottery as more Balkan than Aegean in character, due to its limited extent it the Aegean.

Late Neolithic Ia Graphite Wash Pottery (Figures 58–59)

Keighley (1986) described the earliest uses of graphite at Sitagroi (beginning in Phase I) as an all-over graphite wash on dark-surfaced vessels which she dubbed, “Gray Lustre Ware.” This all-over graphite wash could also be channeled (Gray Lustre Channeled) or rippled (Rippled Ware). Graphite wash is a preferable name to “Gray Lustre Ware,” which evokes associations with the unrelated Gray Burnished wares of Thessaly, Central and Southern Greece.

Graphite wash pottery was usually simply burnished or channeled. Most of the time, graphite was used on both the interior and exterior of the vessel (Keighley 1986, 347). Channeling (or grooving), rippling, finer impressions, and plastic decoration were also used on Graphite wash vessels. Horizontal or oblique channeling above the carination was used in Phase I, while in Phase II, when a finer fabric was used, curved or angled chevrons were added to the repertoire; grooving on the rims in wide oblique lines (never vertical) was also common (Keighley 1986, 347-348, 351).

A wide range of shapes are attested, including fruit-stands, biconical bowls, carinated bowls, bowls with thickened carnations, shallow plates, hole-mouth jars, and jars with cylindrical, everted, or constricted necks. Bowls with sinuous profiles and thickened carinations were particularly common (Keighley 1986, 345).

As at Sitagroi, the use of graphite as a decorative coating on Black-topped pottery was used from the early Late Neolithic Ia at Promachon-Topolnica (Phase II; Vajsov 2007, 98). Graphite wash on Black-topped vessels is also common along the Strymon (Struma) River in Bulgaria (Vandova 2004). Vajsov (2007, 98) suggests that graphite was first used at this time because the appearance of Black-topped and dark-colored pottery required the use of new paints that would show up on its opaque surface and take a firing in reducing atmosphere.

Promachon-Topolnica: Early Graphite-painted Pottery (Phase III) (Figure 60)

The earliest type of Graphite-painted pottery at Promachon-Topolnica (Phase IIIA) utilized broad bands (0.5–0.2 cm wide). It was contemporaneous with the Strumsko style of Black-on-red painted pottery, which clearly influenced it since many of the motifs and shapes are similar, only the color scheme is inverted (Vajsov 2007, 97-98). IT dates to the early Late Neolithic Ib. This early Graphite-painted pottery with broad bands is characteristic of settlements belonging to the Topolnica-Akropotamos culture

(Promachon-Topolnica IIIA) along the Middle Struma River valley in Bulgaria (Vajsov 2007, 98) and is equated with Graphite-painted in Thrace and the Marica I culture (Vajsov 2007, 98; Todorova 1986, 101).

During the Late Neolithic Ib Graphite-painted decoration was used on two main shapes, carinated bowls with a low ridge and two handles that reach from the rim to the transition point and a sharply carinated piriform jar; two bowls with anthropomorphic lugs were also found (Vajsov 2007, 98).

Motifs include arcs, diagonal lines, wide vertical lines emphasizing the base, and later there emerged compositions of densely placed wavy vertical lines and spirals (Vajsov 2007, 98). Also like the Strumsko style Black-on-red pottery, these early Graphite-painted examples were locally produced (Vajsov 2007, 98). After the early use of broad strokes (Phase IIIA), a combination of broad and thin lines was developed (Phase IIIB), and then only thin lines in the “Dikili Tash-Slatino Stumska Style” (Phase IV) (Vajsov 2007, 82). As a whole Graphite-painted pottery gradually begins to disappear as a technique after its first appearance, a pattern which Vajsov (2007, 98) noted at other sites along the Strymon (Struma) river, such as Damjanica and at the tell site Slatino-Čardako (Čohadziev 1997, 37).

Late Neolithic Ib Dikili Tash-Slatino Stumska style of Graphite-painted Pottery (Figures 61–64)

In the later part of Late Neolithic Ib (Phase IV), Graphite-painted motifs employing thin lines replaced the earlier broad bands and combination of wide-and-narrow bands. This later type of decoration, the Dikili Tash-Slatino Stumska style of

Graphite-painted pottery is diagnostic of the first phase of the Dikili Tash-Slatino culture (i.e., Sitagroi III; Vajsov 2007, 82, 102). At Sitagroi (Phase III, particularly beginning in Phase IIIb), the similarities with Dikili Tash were so strong that the excavators referred to the phase as the "Dikili Tash Phase" (Evans 1986, 397). The main shapes of the later Graphite-painted pottery were large vessels with flaring walls, carinated conical bowls, and smaller closed pots (Yiouni 2000, 208). Graphite-painted pottery could be Black-topped, incised and filled with white paste, combined with red ochre.

At Promachon-Topolnica the Dikili Tash-Slatino Stumska style of Graphite-painted pottery is characterized by positive graphite decoration (all vessels have a dark surface from reduction) on both the interior and exterior of vessels to create an openwork effect (Vajsov 2007, 102). While the utilization of curvilinear motifs, primarily spirals, maeanders, and arcs predominated, angular geometric motifs are also found, either as solid shapes, hatched, or crosshatched (Vajsov 2007, 102). The compositions on bowls are divided into three areas by a band of spiral-form motifs around the vessel's point of maximum diameter (Vajsov 2007, 102).

At Sitagroi, the main shapes of Graphite-painted pottery are flaring bowls, rounded and sometimes slightly inturned bowls, large flaring sinuous bowls, fruit-stands, jars, and "Dikli Tash" and "Kritsana" bowls, with or without pierced lugs (Evan 1986, 398). A pyramidal stand, as well as hemispherical, and square lids are also attested (Evan 1986, 400). The decoration varies from simple lines to a complicated combination of straight or curvilinear motifs including spirals, maeanders, circles, triangles and lozenges and various other positive and negatively executed designs (Evan 1986, 397). Groups of two or three lines of different thicknesses, and in varying combinations with such as spiraling or pendant reserved triangles interposed are also very popular (Evans 1986, 398, 405).

Evans (1986, 398) remarked that “the variation seen in the graphite painting often leads one to think of each design as a unique creation,” although he also acknowledged that there was some correlation between shape and motif. For instance, pedestal bases typically have curvilinear decoration with positive-negative motifs set inside quadrangles created by oblique lines, while on “Kritsana” bowls, the upper part of outer surface usually carries lines from the rim to the carination or just below it (Evans 1986, 398).

Late Neolithic Ib Dikili Tash-Slatino Stumska style of Graphite-painted pottery is contemporary with Marica I Incised style decoration (see Chapter 11), and at times the two decorative techniques can be combined (Figure 59), as at Promachon-Topolnica (Vajsov 2007, 87), Dikili Tash (Demoule 2004), and Sitagroi. Evans remarked that at Sitagroi Phase IIIa these hybrid examples used the fabric of incised ware rather the fabric of the Graphite-painted pottery (Evans 1986, 402). Rounded and straight-sided bowls are most commonly represented; a zone of incised decoration (usually maeanders or oblique lines) was executed around the body of the vessel, while the areas above the base and below the rim are left blank, as with the plain Incised pottery (Evans 1986, 402). The graphite decoration consisted of either a graphite band painted around the rim, in the broad areas between incised decoration, or less frequently in between the incised lines; sometimes red ocher was also used to fill the incised areas (Evans 1986, 402). Yiouni (2001, 17) also adds that Graphite-painted and Graphite-incised pottery is characteristic of Sitagroi III and Dikili Tash II levels, which she dates as a late phase of Late Neolithic.

Graphite-painted Pottery Technology

The technology of Graphite-painted pottery in Greece has primarily been studied by Gardner (1978; 1979; 2003) using petrography, re-firing tests, X-ray diffraction (XDR), Scanning Electron Microscopy (SEM), and Neutron Activation Analysis (NAA) and Yiouni (2000; 2001). Sikalidis et al. (1983) used XRD and DTA on Vasilika local clay and determined that the Graphite-painted pottery was fired at 650–900°C. Outside Greece, few scientific studies on graphite decoration have been conducted (Jones 1986, 786); Frierman's (1969) refiring and chemical tests of a Karanovo IV sherd are an exception.

Graphite

Graphite is a soft, gray, laminar form of pure carbon (its mineral form), which is found in association with high-grade metamorphic rocks as a final product of the carbonization of organic substances (Yiouni 2000, 207–208). Yiouni (2001, 16) considers it organic because it is carbon-based. Evans (1986, 397) pointed out that although the term "graphite-painted pottery" is used widely in the literature, graphite decoration, as at Sitagroi (Gardner 1978, 124; Evans 1986, 397), was not always "painted"—it could have been drawn on as with a crayon or pencil. In order to create the drawn-on decoration, the graphite had to be relatively pure; otherwise it had to be finely crushed, mixed with a binder such as a clay slip and applied to the vessel. In either form, graphite application produces a shiny, silvery-gray surface.

Graphite is readily available in the mountains surrounding the Drama Plain. Yiouni (2000, 212) makes the interesting observation that manganese and graphite are very often found in juxtaposition, which implies that potters were long familiar with where to obtain graphite since they had been earlier using manganese to decorated the vessels. It was only a matter of time before a few intrepid potters began experimenting with the different pigments. Yiouni (2001, 18) also demonstrated through re-firing tests that the graphite used in the eastern Drama plain was rarely pure and that these impurities contributed to the deposition of a white metallic-looking residue on pieces that were over-fired, which occurs at around 850°C; Frierman (1969, 44) suggested a temperature of 725°C or higher.

Graphite crayons have been recovered at sites both in Greece (at Sitagroi; Evans 1973; Gardner 1979; Renfrew 2003) and in Bulgaria (at Karanovo, Mikov 1966 and Popov 1912; at Ruse; Georgiev and Angelov 1957, 54–77; and at Janka, Koža Dermen and Mečkur; Gaul 1948, 98). Of the three locations in the Drama basin where Yiouni (2001, 18) found graphite deposits, two were pure enough to provide crayons, while the other was a graphitic schist consisting of quartz, feldspar, mica, and graphite. This last would have had to have been pulverized and refined before it could be added to a clay slip and painted on a vessel.

Additionally, numerous graphite cones from Stara Zagora in the Balkan Mountains in central Bulgaria were exported thence to Yugoslavia and Czechoslovakia, as Graphite-painted pottery also occurs in the Vinča and Linearbandkeramik (LBK) cultures (Gimbutas 1991, 97). Gimbutas (1991, 118–121) claimed that Bulgarian graphite was a highly valued commodity traded between the Middle Danube region and the Black Sea, evidenced by such as the graphite cone found in a burial at the Varna cemetery and the hoard of ready-to-export, perforated graphite cones found at Azmak. The graphite from these sites probably originated from Stara Zagora. Graphite is found in metamorphic rocks both in the Rhodope and Balkan Mountains (Gaul 1948, 99).

Graphite-painted Pottery Building and Firing Techniques

The production of Graphite-painted pottery required a combination of different ceramic techniques including the allocation and preparation of pigments, incision, painting, burnishing, smudging, and post-firing applications of white paste and ocher (Yiouni 2000, 209). Gardner (1979, 23) originally stated that Graphite-painted pottery was fired at 1,000°C, although she later revised the temperature down to 750°C (Gardner 2003, 289) as subsequent research by other scholars revealed this high temperature to be in error.

Based on published data on Graphite-painted pottery from Dimitra (Kessissoglou and Mirtsou 1997, 89), Dikili Tash (Maniatis and Tite 1981, 69, table 2), Karanovo (Frierman 1969), and Gradešcina in Bulgaria, (Maniatis and Tite 1981, 69, table 2), and her re-firing tests from Dikili Tash, Kalambaki, and Kalliphitos, Promachon-Topolnica, Dimitra, Nea Bafra, and Sitagroi, Yiouni (2001, 18) has definitively proven that firing temperatures were at or lower than 750°C. A low firing temperature of 750°C or less was important to achieve so as not to burn away the organic graphite paint, an event that occurs at 850°C (Yiouni 2001, 18). Graphite that does survive temperatures greater than 850°C indicates its higher purity, and that its silicate content has bonded with the clay surface (Gardner 1979, 23).

Gardner argued that the high silicate content in Greek specimens of Graphite-painted pottery and its thick application enabled it to fuse better to the vessel surface; in some samples, the silica content of the paint was as high as 75% (Gardner 1979, 23). In places, a glassy sheen was created where local reduction of only the carbon in the graphite had occurred (Gardner 1979, 23). Furthermore, Gardner suggested that the iron in the clay acted as a flux (1979, 20, 22-23).

Similarly, in a Karanovo IV sherd, Frierman (1969, 43) found that as much as 16.27 % of the clay was made up of fluxes (MgO, CaO, Na_2I and Fe_2O_3) which enabled the graphite to bond to the surface, and that a high (8.53%) iron oxide content in the clay also enabled the prolonged firing conditions in a reduced environment.

While the use of non-calcareous clays was preferred in order to reduce the temperature required for firing (Maniatis and Tite 1981 61), Yiouni (2001, 18) noted that more than one clay recipe was in use at any given site. Yiouni (2000, 208) also found that some sherds had even vitrified at 850°C, which indicates that they were of non-calcareous clay and were originally fired in a reducing atmosphere (Maniatis and Tite 1981, 61).

The vessels were coil-built out of well- levigated clay (Gardner 2003, 282). Later Graphite-painted pottery (Phase III) was tempered with medium to coarse river-sand (Gardner 2003, 289). Vessel walls were mostly 1–1.5 cm thick (Gardner 1978, 116). Yiouni (2000, 211) found that Graphite-painted vessels often used a medium to coarse-medium fabric (Renfrew et al. 1986, 158), which facilitates the building and drying of large complex forms and can withstand abrupt changes in firing temperatures. Frierman (1969; Jones 1986, 786) believed that the graphite paint was applied to a slipped and burnished surface, and then burnished again. Graphite wash at Sitagroi was usually applied to both surfaces (although some interiors have a buff slip instead) and then lightly burnished (Gardner 1978, 103).

At Sitagroi (Phase I-II) the earlier Graphite wash pottery was incompletely fired in an oxidizing atmosphere with a smoky reduction at the end (Gardner 2003, 286). Gardner remarked on the fact that the majority of Graphite-painted vessels at Sitagroi are red, as are their cores, which indicates an oxidizing firing (Gardner 2003, 297); Evans (1986, 397), however, stated the opposite.

An advantage of the black background for Graphite-painted pottery is that it provides more of a contrast for the subtle, silver decoration (Evans 1986, 397; Seferiades 1983, 653). Both red and black-colored Graphite-painted vessels were probably fired in pits, and carbon-filled pits are even attested at Sitagroi (Gardner 1978, 112; 1979, 21). Yiouni (2000, 209) argues, however, that while pit firings can help create the black, the use of open firing should not be ruled out.

Frierman (1969, 43) suggested that all Graphite-painted vessels were originally black and that subsequent re-firings in an oxidized atmosphere at 725°C or higher (which may also burn off the graphite or turn it white) restored the vessel surface to a pink or tan color; he thought that during the first firing, after reaching 500° or 600°C, the atmosphere was reduced for the rest of the firing, which is evidenced in the cross sections. In order to achieve the sustained period of reduction, Frierman (1969, 44) proposed that some type of kiln may have been used, something resembling the contemporary beehive ovens found on Karanovo IV-Gumnelitşa sites.

According to Frierman (1969; Jones 1986, 786) the vessels were burnished both before and after the application of graphite wash or paint. Incision, rippling, and channeling were done while the vase was still rather plastic. Post-firing decoration included filling incisions and depressions with either red ocher (Gardner 1978, 128; Yiouni 2000, 212) or white paste (Yiouni 2000, 209, 2001, 15). At Sitagroi, Gardner (1978, 128) determined that the white paste was calcium carbonate or kaolin, whereas at Dikili Tash it was either calcium oxide (CaO) and sometimes white mica (Courtois 2004). Gaul (1948, 98–100) suggested for Bulgarian examples that because "negative" (or reserved) designs are so abundant, some sort of batik technique may have been used in which the reserved areas would have been coated with a wax before firing, which subsequently burned away, leaving the silver gray graphite design. Shepard (1976, 206–212) calls it resist painting, and notes that it is usually used with smudged vessels, although the decoration on ethnographically documented examples consists of less complex wavy lines, dots, and blobs. Welsh (1918–19, 46) misidentified Graphite-painted pottery from Dikili Tash as Black-burnished with white paint (Γ2α1) due to the fugitive nature of the graphite.

Graphite-painted Pottery: A Stimulus for Metallurgy?

Gardner (1978, 103; 1979, 20-21) suggested that there was a relationship between the Neolithic potter's experience with Graphite-painted pottery and the invention of metallurgy, based on the fact that the two technologies demanded high firing temperatures and control over oxygen, particularly in achieving and maintaining reducing conditions (little or no oxygen is needed for smelting). Although it is now known that Gardner's (1978; 1979) original firing temperatures are in error, Gardner (2003, 280) still maintains that ceramic technology was a catalyst for metallurgy because the temperatures involved are less important than the reduction process itself—without which the impure ingredients, either in clay or metal, would not be able to combine. The argument that pottery kilns lead to metallurgy, around 5,000 B.C., certainly applies to other areas in the Balkans and Carpathian basin where either copper tools (Early Late Neolithic Slatino; Pernika 1997), pieces of slag (Late Neolithic Hamangia IIB; Pernika and Wagner 1991), or two-level pottery updraft kilns were found dating to ca. 5,500–5,200 B.C. (Anthony 2010, 35).

In fact, Gardner (1979, 20) even stated that "the temperatures required for either pottery manufacture or smelting are not as significant as the reduction process itself because impurities always contain ingredients which lower the actual temperature needed to produce the results." Furthermore, Gardner (2003, 297) argued that both ceramics and metallurgy were produced at low temperatures and without kilns. At 800°C copper can be separated from the mineral ore into tiny beads and at 850°C copper smelting occurs, but in order to liquefy the copper to pour into a mold, a higher temperature of 1083°C must be reached and held (Lazarovici 2010, 134), which is why Gardner initially had emphasized the high firing temperatures.

Metal artifacts, mostly copper and gold, are found sporadically throughout Late Neolithic Greece. Probably all of these artifacts originated from Macedonia where the first metallurgy is well documented in the Late Neolithic (i.e., Sitagroi, Promachon-Topolnica, Dikili Tash). Early mining, ca. 5,000 B.C., is also documented at Rudna Glava near Belgrade (Jovanović 1982), where it was found alongside Black-burnished pottery with channeled decoration as well as with other wares from the early to late Vinča periods. In the middle of the 5th millennium B.C. (Karanovo VI), copper from the Aiburnar mine (Chernykh 1976) near Stara Zagora in Balkan Mountains in central Bulgaria was exported throughout the Balkan region, from Moldavia, the Western Ukraine, and southern Russia in the East, to Slovakia and Hungary in the west (Gimbutas 1991, 118).

According to Gimbutas (1991, 90) at around 5, 500 B.C. elements of Karanovo III penetrated beyond the Rhodope Mountains to the Plains of Drama and Thrace; Graphite-painted pottery is a hallmark of Karanovo IV-Gumnelitşa culture. Around the same time, the earliest copper artifacts are also found in east-Central Europe (i.e., the Hamangia, Boian, Cucuteni- Tripol'ye and Karanovo cultures), and copper sources are abundant in Carpathian, Transylvanian, and Rhodope mountains. Gimbutas (1991, 118) made the acute observation that these first metal items consisted of mostly jewelry and practical tools like chisels and axes, rather than "weapons of war" like swords and daggers.

An interesting connection (as well as being technically intriguing) between early metallurgy and ceramic technology is demonstrated by the existence of gold-painted vessels in the cemetery at Varna in Bulgaria, which use the same motifs as Graphite-painted pottery (Gardner 1979, 21; Evans 1986, 406; Gimbutas 1977, 49). The gold, however, was probably applied post-firing, drawn on using a lump of gold (Gimbutas 1991, 85). Curiously, the gold in the Varna cemetery came from a number of different sources: most items contain platinum, some have none, and twelve show a high copper content (Hartmann 1978). Gold is found in the eastern Balkan Mountains and the Sakar Mountain near the Turkish border (Anthony 2010, 35). Similarly, gold "ring-idols," were also found in the Varna cemetery, as well as throughout Neolithic Greece in various forms (gold, silver, stone) and were also depicted on Classic Dimini style painted pottery (Matt-painted pottery and Black-on-red, see Chapter 3 and 4).

CHAPTER 9: BITUMEN AND BIRCH-BARK PAINTED POTTERY

Birch-Bark and Bitumen-Painted Pottery (Figures 65–66)

Bitumen: Definition and Uses

The use of bitumen has been documented as early as the Middle Paleolithic in Europe (Mania 2004, 191–195; Grünberg et al. 1999), but in Greece the first known instance of its use as a decorative echnique dates from the end of the Middle Neolithic in Western Macedonia at Apsalos (Vouzara 2009; Saridaki 2011 for petrographical analysis of two sherds). The use of bitumen is well documented in the Late Neolithic Balkans.

Bitumen is defined as either a naturally occurring mineral pitch or an artificial product, namely a semi-solid asphalitic residue formed in the distillation of coal tar, wood tar or petroleum (Yiouni 2000, 205). When bitumen is derived from a plant source, it is called pitch: pitch is more solid than tar. The closest naturally occurring deposit of bitumen is in Bulgaria along the Struma River at Damjanitsa and Bălgarcěvo (Yiouni 2000, 206). It has not been proven, however, if these local deposits were used for pottery decoration in this area or if the Neolithic inhabitants were dry-distilling their own bitumen (Wagner and Graf 1993). Although Yiouni (2001, 21) stated that dry-distillation of birch-bark tar had not been demonstrated in Neolithic Greece, Urem-Kotsou, Kotsakis, and Stern (2002a, 964) suggests otherwise. The process of dry distilling birch causes tar and pitch to drip away from the wood; it also leaves behind another valuable resource: charcoal. In their analysis by Urem-Kotsou, Copley, and Evershed (2004, 343) of the Stavropouli material, noted the presence of the degradation product of heated bark tar, which suggested that tar was obtained by pyrolysis (heating it in order to cause chemical decomposition of its compounds) of birch bark.

Manufactured bitumen could have been produced using *Betula pendula* Roth, known as silver birch, the main type of birch tree in Greece. Today, its distribution is limited to mountainous areas near and along the northern borders of Greece. Although the available pollen diagrams do not go back in time to the Neolithic period, they show that during the last 3,000 years the distribution area of birch trees shrank significantly or disappeared altogether (Urem-Kotsou, Kotsakis, and Stern 2002a, 966, 965), in large part due to human activity rather than simply from climate change. Nevertheless, *Betula* birch was determined by gas chromoatographic to have been used as decorative paint at Starvroupouli (Urem-Kotsou, Copley, and Evershed 2004, 341).

Bitumen can be used for many purposes, the primary one as an adhesive glue (i.e., securing stone tools to wooden handles). Other uses of bitumen include chewing gum, caulking, repairing and waterproofing vessels, baskets, stone, and wooden objects (Urem-Kotsou, Kotsakis, and Stern 2002a, 964; Aveling and Heron 1999). In Neolithic Greece, bitumen was used in three main ways: to mend broken pottery, to enhance the performance of ceramic vessels by acting as an antifungal agent or waterproofing, and to provide a substance for painted decoration. The use of bitumen for repairs, waterproofing, and as painted decoration were al documented at Stavropouli (Urem-Kotsou, Copley, and Evershed 2004, 339), but this diversity of uses in not attested at every site.

The use of birch-bark tar to repair a broken pot was first reported by Sampson (1987, 93), but Urem-Kotsou, Kotsakis, and Stern (2002a, 962, 693) were the first to scientifically prove the use of that from birch bark (and not other organic tars such as those from beech, oak or alder) by using Gas chromatography-mass spectrometry (GS-

MS). At Makryialos, they (Urem-Kotsou, Kotsakis, and Stern 2002a, 962, 693) documented the use of bitumen to repair a fracture that had occurred along a coil-join repair on the interior of a black-topped carinated vessel. Bitumen has also been found along the edges of broken sherds in the Sarakenos Cave (Sampson 2008, 115) and at Promachon-Topolnica (Vajsov 2007, 85), where it was additionally used to mend broken anthropomorphic figures as well as to secure stone adzes in wooden shaft-handles.

At Stravropouli, bitumen was also used as an adhesive to mend a broken rim of a jug, which also had numerous repair holes (Urem-Kotsou, Copley, and Evershed 2004, 340). On a mended jug from Stavropouli, Urem-Kotsou, Copley, and Evershed (2004, 342) determined that the bitumen was mixed in animal fat, which would have altered its properties. While it is unclear of the intentionality in this example, Urem-Kotsou, Copley, and Evershed (2004, 342) note that this practice is archaeologically documented in the Roman period.

A second use of bitumen was discovered at Makryialos (Phase I, ca. 5,400–4,900 B.C.). Urem-Kotsou, Kotsakis and Stern (2002a, 962; also in Urem-Kotsou, Kotsaki, and Stern 2002b) analyzed two base sherds belonging to four-handled jugs that preserved black reside on the interior surfaces. While it might seem logical to believe that the birch-bark bitumen was applied to their interiors to help reduce the permeability of the vessel, the authors (Urem-Kotsou, Kotsakis and Stern 2002a, 965) doubted this idea because ethnographic evidence shows that water jars are in fact designed to be porous vessels; the percolation of the water to the exterior and its evaporation there cools the liquid within. Thin section analysis of the vessels anyway confirmed that the jars were made of very fine, non-porous clay, contra the porous fabric more typical of water jars (Urem-Kotsou, Kotsakis, and Stern 2002a, 965).

Instead, they (Urem-Kotsou, Kotsakis, and Stern 2002a, 965) suggest that this coating was added because the vessels contained not water, but fermented beverages; the bitumen aided in controlling and protecting the beverages due to its disinfectant properties (Rajewski 1970) and high resistance to fungal attack (Avelin and Heron 1998; Heron et al. 1999). Furthermore, they (Urem-Kotsou, Kotsakis, and Stern 2002a, 965) point to the small size (ca. 2 and 5 liters respectively) of the containers as holding a special, less common commodity. Urem-Kotsou, Copley, and Evershed (2004, 340), did identify a carinated bowl with bitumen painted all over the exterior surface, which they suggested was indicative of waterproofing.

The third use of bitumen occurs only in a few sites in Neolithic Greece. Here it was used as a peculiar decorative technique, in which bitumen was applied post-firing as a glue for attaching pieces of birch bark which were then subsequently removed by carving (Koukouli-Chyrssanthaki 1996, 114). The "aim was through finely incised lines to highlight the decoration and to provide contrast between the black surface under the bitumen and the lighter surface of the glued on bark"; the bitumen itself was not exclusively used for decoration, but rather as a gluing agent for the birch-bark pieces (Vajsov 2007, 89, 90). Decorated pottery employing this particular use of bitumen is referred to as the Topolnica-type bitumen decorated pottery, named after the site of Promachon-Topolnica on the Greek-Bulgarian border where it is most abundant (Vajsov 2007, 89). This style is discussed at length in the immediately following section.

The use of bitumen merely as paint is also attested to at Stravropouli where it was used on a jug, but also on a bowl in conjunction with inorganic (mineral) paint (Urem-Kotsou, Copley, and Evershed 2004, 339, 340; Urem-Kotsou and Dimitriadis 2002). In the instances with bitumen used solely as paint, it is usually executed on red-surfaced pottery. This practice is also sporadically documented in Eastern Macedonia (Malamidou 2006). Sherds have been identified by Yiouni (2001, 21, 71) at Dikili Tash, Dimitra, and Servia. At the last site, the ware was not identified by the excavators (Heurtley 1931, 74; Wijnen et al. 1979, 216, no. 34, figs. 13, 66-77), but rather deduced by Yiouni (2000; 2001).

Yiouni (2000, 206) emphasizes that the scarcity today of this type of decoration might not reflect the original distribution of this ware. Taphonomic processes or vigorous cleaning of excavated sherds can easily destroy the post-firing application; this may have happened to the sherds from Servia that were overlooked by Heurtley (1939) and Wijnen et al. (1979). Re-firing of the pots will also cause the organic bitumen to disappear (Yiouni 2000, 205).

Topolnica-Type Bitumen Decoration

Topolnica-type bitumen decorated pottery is attested in Greece only at sites in Macedonia. This geographical confinement may reflect the fact this is an environment where birch-trees thrive. In Greece, the most abundant examples have come from Promachon-Topolnica on the Greek-Bulgarian border and belong to the Late Neolithic Ia. Bitumen and birch-bark decorated pottery has also been found at Damjanitsa, Strumsko, Slatino and Bălgarcĕvo on the Struma River in Bulgaria (Grabska-Kulova 1993;

Čohadziev 1997; Grabska-Kulova 1993; Perničeva 1995). Vajsov (2007, 89) points out that this type of pottery is well known in Neolithic cultures of central Europe, in particular, the Šarice-type of bitumen decoration (Jira 1911; Vencl 1961) that occurs in the fourth and last phase of the Linerbandkeramik Culture (1st half of 5th mil. B.C.) in the Czech Republic. It is similar to the Topolnica-type. He (Vajsov 2007, 92, 85) also notes that the style is found on anthropomorphic figurines in the Vinča A-B culture (Garašanin 1951, 35), and that it is one of the most distinctive aspects of the site; it is also diagnostic of the "Topolnica-Akropotamos culture."

While Vajsov (2007, 92) admits that it is currently ambiguous when bitumen was first used as a decorative technique, he suggests that its use spread from western to eastern Neolithic Balkan cultures, arguing from similarities of the material culture of the early levels of the Promachon-Topolnica with the Vinča culture (specifically Vinča B2). For instance, he (Vajsov 2007, 92) cites features shared between the two cultures both in ceramics and in other small finds, such as the flared deep bowls carinated bowls shapes with rounded, smooth transitions between the neck and body of vessels, figurines with triangular heads, and parallels in flint-knapping technology (Kaczanowska and Kozlovski 1991, 24–23). These aspects held in common may reflect the expansion of the Vinča culture.

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Promachon-Topolnica is the only site where sufficient examples of the ware have been preserved and studied. Decoration was limited to the upper parts of the vessel, usually in broad horizontal rows but sometimes rhomboids or squares of bark were applied with large gaps between them; necks and collars were decorated as well as the handles (Vajsov 2007, 89). The transition from the upper to lower body was often marked by a wide (2–3cm) and densely filled band of decoration (Vajsov 2007, 90). Overall, the spiral is the most common incised motif (Vajsov 2007, 85), despite the difficulty involved with curvilinear incision. It should also be noted that this type of spiral really consists of two spirals turning in opposite directions. The spiral is particularly popular in the later phase (Phase II), when imported pottery in the Akropotamos style of Matt-painted begins at the site (Vajsov 2007, 94). The spiral is never found by itself at Promachon-Topolnica: decoration is usually made up of several spirals with arcs and other derivative forms filling the empty fields (Vajsov 2007, 90).

The other main motifs include triangles, wide bands, and zigzags, with herringbone (or running triangles) confined to the interior of vessels (Vajsov 20007, 85, 90). In the later phase, the angularity of the zigzags is lost, and they appear more as wavy lines (Vajsov 2007, 90). The compositions are zonal, generally set in a horizontal plane (Vajsov 2007, 90). While some pieces display "an especially talented hand and the precision of a real artist," mistakes were also made, evidenced by the existence of horizontal or diagonal elements that have no relation to the composition (Vajsov 2007, 90). Rhomboids were used as individual elements or as the main motif, whereas in the Šarice-type small triangles were used for this purpose (Vajsov 2007, 90; Vencl 1961, 120).

An examination of the material from this site reveals that the Topolnica style of bitumen decoration was used on specific forms, such as carinated profiles, vase-like shapes with high necks with one or two handles at the upper body or rim, and these are the same shapes that later came to be used in the locally made Akropotamos style of

Matt-painted pottery (Vajsov 2007, 90). The vessels were made from fine clay containing small sand inclusions and quartz; they were well burnished and fired to a light beige or red color (Vajsov 2007, 89). Petrographic analysis confirmed that the Promachon-Topolnica bitumen pots were made of the same local clay as other classes of pottery (Yiouni, Koukouli-Chryssanthaki, and Ploumis 1994). Due to the limited number of shapes and the fragile, labor-intensive decoration, Vajsov (2007, 90) suggests that the Topolnica-type of bitumen decorated vessels had some symbolic or ritual use, as had Vencl (1961, 120) in his earlier study of the Šarice-type vessels from the Czech Republic. In fact, Vajsov (2007, 90) suggests that the vessels may have been used for the collection and storage of blood and organs from the ritual sacrifice of animals!

The Technology of Topolnica-Type Bitumen Decoration

Contra to Koukouli-Chryssanthaki (1996, 114), birch bark was not first laid on the burnished pot and then fired. Vajsov (2007, 89–90) summarizes the technology for the Topolnica-type of bitumen decoration as follows. First, the vessel was made from a fine clay that contained small amounts of sand and quartz inclusions. The pot was then burnished and fired to a light beige or red color. Meanwhile different rectilinear forms were cut from pieces of birch bark (such as triangles, rows, or vertical rectangles). When the vessel came out of the kiln—and most importantly while it was still warm, the cut-outs were applied to the vessel surface with birch-bark bitumen. The bitumen was applied 0.1–0.2 mm thick; its application seems to have caused a reaction with the vessel surface, changing the color of the vessel from light beige to red (a similar effect happens on the surface of the Šarice-type). After the birch bark had been glued on and the pot cooled, select parts were then cut out using a thin, sharp and pointed tool (probably an acacia thorn). This was done without exerting much pressure so that no traces are left on the original ceramic surface. Lastly, the vessel surface was carefully cleaned: the spaces revealed by the removal of the pieces of birch-part would clearly contrast with the vessel surface.

The result is a black-on-red and tan or a polychrome black-on-white on tan-red effect. Koukouli-Chryssanthaki (1996, 114) suggested that bitumen-painted pottery at Promachon-Topolnica may have served as a prototype for the idea of Black-on-red painted pottery, although the technologies used to produced the two wares differ greatly. Similarly, Malamidou et al. (2006, 582) included the Topolnica style bitumen decoration in their Black-on-red Style Category 2, although they note it can also appear as Polychrome because of the color variations in the surface. It is also interesting to note that pieces of painted birch bark as well as basket fragments have been recovered from Promachon-Topolnica. Their existence serves as a reminder both of the interaction between different material media and that decoration was applied to more than pottery (Koukouli-Chryssanthaki 2007, 55, 57).

Late Neolithic Ia Scoops Including Four-legged "Rhyta" (Figures 67–73)

Rhyta

During the Late Neolithic Ia period a peculiar class of vessels dubbed "rhyta" proliferated throughout Central and Southern Greece and along the Adriatic coast. After 5,600 B.C., Neolithic rhyta are found in both caves and open-air sites, and from the Peloponnese in southern Greece to the Triestine Karst in the northern Italy, Lipari and the Aeolian Islands, to Kosovo and central Bosnia (Mlekuž 2007, 268). In Greece, Late Neolithic rhyta have been found at Servia, Dispilio Olynthos, Tsangli, Otzaki, Elateia, Orchomenos, Raches-Phournos, Corinth, Franchthi cave, Aria Argolidos, Alepotrypa cave, Kophovouno (Peloponnese), Choirospilia Cave on Lefkada, Varka and the Skoteini Caves on Euboea (Douzougli 1998, 82–84). At Dispilio (Sofronidou 2002) and Avgi (Katsikaridis 2012) in Western Macedonia, curious rhyta-like hybrids (collared, carinated Black-burnished or Black-topped bowls on four-legs) were also recovered (Type A1.4. Sophronidou and Tsirtsoni 2007); also unlike rhyta, these vessels are found intact. The distribution for Final Neolithic rhyta is also extensive and includes many Aegean islands.

Their origin and use function remain debated. These four-legged zoo-or-anthropomorphic containers have attracted much attention because of their unique shape, widespread distribution, and fragmentary preservation. Although rhyta may have several different types of decoration, due to their rarity and unique form they are being considered together here as a peculiar eccentricity of the earlier phase of the Late Neolithic period in Greece.

These vessels were termed “rhyta” by Yugoslav archaeologists who first discovered them (i.e., Dujmović, followed by Benać); however, they bear no typological resemblance to rhyta from later prehistoric sites in Greece. The word “rhyton” is often used as both the singular and plural by Balkan scholars, though the plural more correctly is rhyta (Mlekuž 2007, 267). Furthermore, the term “rhyta” is a misnomer, and it is retained merely for convenience without typological implications. “Rhyton” is more correctly applied to a class of vessels that begin in the Bronze Age and have a large and a small opening directly opposite one another to enable liquids to pass through the vessel (“rhyton” in derived from the ancient Greek verb that means to flow). This is why, from a morphological standpoint, Neolithic rhyta are more correctly classified as a type of scoop, an open vessel used to transfer small quantities of dry goods. Similarly shaped scoops exist in Thessaly and Southern Greece, but they are typically monochrome and rest on a ring base rather than feet; they are considered in more detail below.

Weinberg (1962) was the first scholar in Greece to correctly identify these vessels. Previously they had been mistaken for figurines (Sotiriades 1908; Tsoundas 1908), tripod vessels, or phallic-like handles (Walker-Kosmopoulos 1948, 30). The first excavated examples of Neolithic rhyta in Greece were found by Sotiriades during his excavations at Chaeronea in Boeotia (Central Greece) during 1904, 1906, and 1907. At the time, no comparative material was available, which lead Sotiriades to incorrectly restore the pieces he found as figurine legs or legged shallow bowls (*philae*) (Sotiriades 1908, 76). Wace and Thompson also misidentified other pieces, which they thought were legs for a bowl (1912, 98, fig. 50a).

At Corinth, Leslie Walker-Kosmopoulos incorrectly restored one rhyta as handled tripods (1948, 31 figs. 5 and 6; Weinberg 1937, 511 fig. 28). Initially,Weinberg (1937, 507) also misidentified Corinthian examples; he tentatively restored a rhyta leg as part of a tripod, though he admitted it may have had four legs (but ultimately decided the curve of the left side was too broad, probably because he tried to make the rim parallel; additionally, the bottom of a foot was not preserved. Weinberg does not discuss in the text the two rhyta legs he illustrates (Weinberg 1937, 512, fi.30), which he calls incised feet, Neolithic Black Ware.

Weinberg (1962, 193) rectified the true form of these vessels when he showed some of his examples from Elateia to a Serbian archaeologist, Vladmir Milojčić, who in turn brought more complete Balkan examples to his attention. Weinberg blames his interpretation on Frankfort's insistence on an incorrect reconstruction (1962, 192) based on painted legged "altars" and "thrones" known from Thessaly and in the Balkans, in which "the possibility of a vertical mouth seemed so unlikely that the leg was restored horizontally as a handle so that the mouth could be horizontal." Mlekuž (2007, 267) also argues that the Early Neolithic rhyta were connected with other types of zoomorphic and anthropomorphic vessels and altars around 6,000 B.C. Phelps (2004, 86) succinctly describes their canonical features:

> The basic characteristics of the vessel are the four legs supporting a squat asymmetrical body with a wide oval or subrectangular mouth set in a nearly vertical plane, the whole surrounded by a stout basket handle springing vertically from the highest part of the rim. The legs, and sometimes part of the body, are covered with grooved or incised and white-filled decoration, while the deep grooves outlining the leg-body junction, as well as other parts of the body, are red crusted. The inside is also generally red

> crusted, either directly on the dark surface or over a thin white slip.

Phelps (2004, 86) states that this is the earliest known use of crusted (that is, paint applied post-firing) paint in Central and Southern Greece, a feature more commonly thought of as diagnostic of the Final Neolithic (i.e., in the Rachmani phase and in the Cyclades). While Jones (1986, 779) indentified cinnabar, the common ore of mercury, as the vermillion red-crusted paint used at Hvar, the red-crusted pigment on Greek specimens has not been chemically identified, and it is most likely red ocher, an earthy form of hematite mixed with clay. Aside from punctation (*pointillé*) and incision, decorative techniques exemplified include painting (mostly dark-on-light but including light-on-dark) and some polychrome, plastic decoration, pattern burnishing, scribble burnishing, and some possible rippling (Lavezzi 1978, 420).

Details of the handles and legs can vary. The handle sections may vary in shape from round to triangular, or ovular (Weinberg 1962, 194, fig. 13). At Corinth, Lavezzi reports that the legs were constructed either by layering or rolling coils (1978, 420). The Greek examples tend to have all of the legs of the same type and shape, whereas in the more northern Balkans the front two legs may be dramatically shorter than the front such as the frog-shaped rhyton from Obre (Phase I) (Benać 1973, pl. XXVIII, 15) or be more anthropomorphic in nature like the kneeling person from Smilčić (Benać 1979, pl. XCII). Korošec (1964) is the only scholar to emphasize the anthropomorphic nature of the vessels, rather than just their animal aspects. Gimbutas (1974) interprets the legs as bear legs, a description which certainly seems apt for the Greek examples, but not necessarily for the other Balkan and Adriatic examples, which resemble hoofs, teats, frog or human legs.

Chronologically, Neolithic rhyta do not begin in the Late Neolithic Ia. These vessels seem to appear in the Early Neolithic Greece at Achilleion in Thessaly (level IV, ca. 6,000–5,800 B.C.; Gimbutas, Winn, and Shimabuku 1989, 209 fig. 7.68) and endure for a long time. These early examples suggest independent invention on Greek soil, as suggested by Gimbutas (1989, 55) and contrary to Phelps' assertion that they are surely an "alien element" (2004, 86). Equally early dates have been claimed at Starčevo and Impresso sites near Zardar in Croatia such as Smilčić, (Biagi 2003, 16) and Crno vrilo (Marijanović 2007, 64).

The Late Neolithic Ia profusion of these vessels corresponds with a period of proliferation of contemporary cultures in the Balkans. The particular influence of rhyta comes from the Hvar phase (the final stage) of the Danilo culture in Croatia, ca. 5,500–4,800 B.C. In the Danilo-Hvar culture, the rhyta are decorated with the same motifs and techniques as the contemporary pottery: spirals, maeanders, striations (Gimbutas 1991, 55–56: fig. no. 3–5; Rasson 1983 also discusses exchange in the decoration of rhyta and more urbane classes of pottery). The Danilo rhyta have recently be synthesized by Rak (2011). Closer to Greece, Danilo-culture sites with rhyta include Kakanj in Bosnia and Čakran in Albania, and aside from the rhyta recovered at Servia, the Late Neolithic pottery is also cited as having Albanian influence (Ridley and Wardle 1979; 216, 225; Heurtley 1939, fig. 9,I). In these places, rhyta continue in the Butmir culture (Final Neolithic in Greek terms), but in Greece, the shape falls out of use by Late Neolithic Ib when the simpler ring-based scoop types dominate.

Weinberg determined an earlier and later group at Elateia based on differences in fabric and decoration. The earlier group has linear decoration and black surfaces, while the latter group has curvilinear and spiralform decoration with browner surfaces (1962, 192–193). He related the second group to the end of the Late Neolithic material at Elateia, but he erroneously associated this phase with Dimini, which is later than the material at Elateia (1962, 193). Weinberg believed that the rhyta began in the Middle Neolithic, since some examples were found in the "*Bothros*" deposit, but are better assigned to the beginning of the Late Neolithic, since the stratigraphy of the "*Bothros*" has been questioned (see chapter 1).

Biagi (2003, 19) places the rhyta as beginning much earlier than Chapman; apparently neither of them acknowledged Gimbutas' early examples from Achellion. Chapman (1988, 13–15; 2000, 65) dates Neolithic rhyta too late, from 4,800–3,800 B.C.

Origin	Citation
Apulia, Albania or around Vojvodinia	Biagi 2003, 19
Peloponnese or Central Greece	Srejović 1963, 5; Gimbutas 1989, 1991
Central Bosnia	Korošec 1979, 30
Dalmatian coast	Chapman 2000, 65
somewhere in southern or western Balkans	Mlekuž 2007, 267; Phelps 2004, 87

While the exact function of the vessels remains undetermined, numerous scholars have proposed both functional uses and more symbolic ones. Scholars have interpreted the different attributes of the vessels in different ways. For instance, Benać (1964.65–66; 1973.38; 1979.403– 405) interprets ring handles as representations of curved animal horns. Čović (1976, 22–24) proposed that the ovular container represented a uterus, with the legs of the rhyta as teats of udders. Perić (1996) also interpreted the receptacle as a representation of the womb, with udder and teats of different species of animals, especially sheep and goats, pigs and cattle, with cows (common in the Kakanj culture) or sows (in Thessaly). Mlekuž (2007, 275) equates the red crusted paint with blood, but provide a symbolic meaning for blood, as Gimbutas (1974) does: regeneration and life force. Mlekuž (2007, 274) also suggests that the painting of crusted paint must be considered part of the limnal life cycle of the vessel as well as a ritual act.

Some other suggestions, primarily from Balkan examples, have included:

Use/interpretation	Citation
coal scuttle	Dujmović 1952; Weinberg 1965
scoops (Danilo-Hvar)	Ihde 1995
libation, water cult, female symbol	Koršec 1952
lamps, cattle fertility rituals, ancestor worship	Batović 1979
life, fertility cult of animals and fields	Benać 1973
female fertility cult	Čovič 1976
female fertility/ cattle cult	Perić 1996
salt container	Chapman 1988; Montagnari and Crismani 1993
represent bears	Gimbutas 1991,etc.
female or water worship	Vermeule 1964
animistic cult/human-animal agents of interaction	Mlekuž 2007
represent bovines	Benać 1973; Batović 1979, Perić 1996; Čovič 1976

Perhaps the most attractive hypothesis is the use of rhyta as salt-pots. According to Chapman, the overhang of the vessels serves as a focal point for condensation to form, thus keeping the salt below dry. On the one hand, the morphology of the rhyta does not fit with other known salt-pot types from the Neolithic (i.e., the Vinča culture Tulza-type conical vessels; Čovič 1971; Marijanović 2007, 66; Tasić 2000a; 200b) or from later periods (such as the English Middle Age pots (Chapman 1989, 13–15). Marijanović (2007, 66) argues that the elaborate decoration precludes practical use and that salt is not a necessary dietary addition for livestock in the Balkans, but he does not address its addition in the human diet or in the processing of food.

On the other hand, since salt pots and salt mines like Gornja Tulza (in Bosnia) or the production of salt from brine at Provadia (in Bulagria; Nikolov 2008; Tasić 2012) have been documented for other Neolithic Balkan cultures, it is likely that Neolithic Greek populations were also using salt, given other broad cultural similarities and evidence of long-distance trade and contact (i.e., the circulation of *spondylus* shells or ring-idols), and in fact it has been shown that salt was widely traded in the Balkan Neolithic (Chapman and Gaydarska 2003).

As in other places in the Balkans, archaeological sites with salt-related toponyms, such as Halai in East Lokris, Halai Aixonidai, and Halai Arraphenidai in Attica may also reflect this illusive industry (Cavanagh 2007, 115). Cavanagh (2007, 114) also points out that it is not surprising that there is not more evidence for salt production in Neolithic Greece, because it was probably produced near the ocean in salt pans, but the sea has risen and radically altered the coastlines. In fact, Tasić (2000b) demonstrated that as a rule, Neolithic sites, both in the Balkans and the Near East (Levant and Anatolia), correlated the locations of known natural areas of salt (lakes, mashes, pans).

The fact that they proliferate during the Late Neolithic Ia period may strengthen the argument that the vessels were used as salt pots, as a reflection of the changing culinary practices during Late Neolithic (i.e., the "secondary products revolution"; see below, Chapter 12). Salt would have been an essential ingredient to preserve food stuffs either for trade or for long-term storage. Furthermore, white salt inside these dark vessels with crusted red paint and white-filled incision would have had a dynamic impact on the viewer/user.

Adding salt to the human diet was not a new idea in the Late Neolithic period as it was undoubtedly used to cure fish and meats, and Cavanagh (2007, 112, 114) notes that the Late Neolithic-Final Neolithic kill patterns indicated meat production (and he also notes that a lot of salt was necessary for this process). What was new was its use in the creation of new edible products such as yogurt and cheese, perhaps to help make milk-based products more digestible (Di Fraia 2011, 26). Furthermore, salt is used not only for culinary or dietary needs of both humans and animals, but also in tanning hides, dying fabric, and metallurgy (Di Fraia 2011, 27). Salt, for the first time, might have become an exchange medium during the Late Neolithic period. In any case, the fragmentary nature of the Greek examples, combined with the lack of provenance studies and residue analysis, does not presently add anything to their interpretation.

Undoubtedly, Neolithic rhyta had more than one meaning over time and in different geographic areas. They may have also have existed purely at the symbolic level and thus did need to have a specific form, that is, as Marijanović states, “vagueness of form can express its complexity and tendency towards the universal and random elements, by moving towards the common, the pattern, and the essence itself. In such an ideological concept, the idea of phenomena is more important than the exact idea. Manifesting the idea in the material form, therefore, could have been subordinate to displaying the essence” (2007, 67–68; reiterating similar ideas to Čović 1976, 24).

Indeed, most scholars seem to agree that rhyta have intentionally ambiguous attributes belonging to male/female, human/animal, or fertility/nature dichotomies

(Mlekuž 2007, 268). The iconic nature of the vessel is due to the ambiguity of the form coupled with the user's interaction with it. When one looks at the a rhyton straight on, the legs are invisible and only the (empty) receptacle and the handle can be seen, which Mlekuž claims makes it an icon of the concept of "container" whether a vessel or uterus (2007, 271–272). In any case, whether or not the vessels had the same meaning or use throughout such a wide geographic areas is difficult to prove or deny (Mlekuž 2007, 269).

The extent that Neolithic rhyta were either locally made or extensively traded remains to be determined on a larger scale not only within Greece, but throughout the Balkans. The studies of the Karst plateau showed that the rhyta were not traded or brought from elsewhere, not even from coastal villages only a few kilometers away (Mlekuž 2007, 276). Provenance studies on rhyta from two cave sites in Croatia (Edera and Mala Triglavaca) determined that the rhyta were locally produced, only a few kilometers away from each other (Spataro 2002; Biagi and Spataro 2001), an assumption which Gimbutas had already deduced (1991, 56). Benać (1973) says that the Obre I example was imported. Ritual breakage of Late Neolithic vessels is is not unique to rhyta, ceramic material, or even the Neolithic.

Unfortunately, Greek specimens have not been subject to such a study. It, therefore, seems that the idea or technology of rhyta was transmitted over large a geographical distance, as movement of ideas rather than objects; for more clarity we must wait at least until we have more information on the context, manufacture, and date of specific examples (Biagi 2003, 21). If it is true that it is the idea (and/or technology) of the vessels that was being transported rather than the actual objects, questions about why and how this transference took place are relevant.

Several scholars have suggested that the wide dispersal of the rhyta is connected with seasonal population movements of herds, otherwise known as transhumance (Perić 1996; Montagnari and Crismani 1993; Biagi 2003). Clear evidence for transhumance patterns in the Greek Neolithic begins during the Late Neolithic I period, and the concept is based on modern ethnographic parallels of Vlach and Statakatsani populations (Nandris 1999, 91; Greenfield 1999). It ties nicely into the framework of changing lifestyles and culinary habits during this period; the existence of transhumance in earlier periods is a more contested topic (i.e., Cherry 1988 argues against transhumance).

Ultimately, as Di Fraia states, "prehistoric transhumance may have played a role in obtaining consensus and support from different economic dynamics, such as the demand for cheese and wool, the establishment of a regular system of contacts and transportation of raw materials and artifacts, including salt, metals, and symbolic or decorative commodities such as seashells" (2011, 29) .

The last interesting/curious fact regarding this special class of vessels is the fact that few complete examples have been found, either from Greece or the Balkans. This fact, of course, has lead scholars to the conclusion that the vessels were intentionally destroyed (Weinberg 1965; Chapman 2000; Chapman and Gaydarska 2006; Mlekuž 2007) perhaps ritually or as part some sort of receipt for trade or token of participation in a ritual event. Supporting his theory is the association of rhyta with split-leg figurines, a type which were intentionally made in order to break easily (Talalay 1987) and the fact that according to Mlekuž (2007, 276) all rhyta in South-east Europe were probably intentionally broken, even though Biagi (2003, 16) notes that 8.5% of the 117 specimens studied by Perić were complete. Contradicting the ritual interpretation is the fact that, at least in the Balkan examples, the majority of find-spots are clearly domestic.

Chapman (2000, 67) suggests that the intentional breakage of the rhyta (and other objects) was part of "down-the-line" circulation, in which the transferred objects form "enchained relations" between people along their path of exchange. He based this opinion on evidence primarily from material previously studied by Montagnari and Crismani (1993), who examined two different sites in Croatia, the open air sites of Smilčić and the cave site of Caput Adriae. Mlekuž, however, reanalyzed the data from Smilčić and Caput Adriae and found, contra Chapman, that there was equal breakage between the two sites (2007, 276) and that the pieces tend to be broken at weak points, such as at the juncture of the body and leg. The current theory (i.e., Chapman 2006; Chapman and Gaydarska 2006) is that this practice was aimed at neutralizing social stratification rather than affirming it.

Late Neolithic Scoops (Figures 69–72)

Typologically related to Late Neolithic Ia "rhyta" are scoops. Scoops, however, persist into the Final Neolithic. Like the rhyta, scoops, too, are rather rare, yet they are ubiquitous at many sites in Thessaly and Central Greece. They are less common in the Peloponnese and are not found in Macedonia. Sampson identified two types of scoops at the Skoteni Cave near Tharrounia on Euboea, which belong the Late Neolithic Ia and Late Neolithic Ib respectively (1993, 88). While these two types of scoops have distinct morphological and decorative differences, Sampson (1993, 89, 91) explicitly states that these were probably not the exclusive scoop forms, even though other types have not yet been recognized among sherd assemblages. For instance, he points to the existence of three additional kinds of scoops from Corinth (Lavezzi 1978, fig. 6, no. 34), Eutresis (Caskey 1962, fig. 7, 47 II, 43) and the Aidiniotiki Magoula in Thessaly (Weisshaar 1989, pl. 84, no. 12). Sampson's general categorization of two types of scoops, however, is a useful means of discussing this type of vessel since they are found over a large geographic area.

Late Neolithic Ia Scoops (Figures 69–70)

Late Neolithic Ia scoops bear incised and punctuated (*pointillé*) decoration (Sampson's Type 1 incision), stand on ring bases, have oblique mouths and arched basket handles similar to those found on rhyta. Sampson believes that the peculiar handle shape was used as a focal point for elaborate decoration (1993, 89). The incised decoration on the vessel body is not particularly close-packed and is usually linear, although curvilinear motifs also occur. The incised lines are used to border broad areas that are filled with punctuations, which may or may not be evenly distributed. The incised and punctuated areas are filled with white paste, which provides a contrast to their dark black and burnished surface. Curiously, the exterior surfaces are more finely finished than the interiors, despite that fact that they are rather open vessels (Sampson 1993, 89; 2008, 88). The designs are organized into bands, lines, rectangles, triangles, zigzags, and checkerboards around the vessel body (Sampson 1993, 89).

Late Neolithic Ib Scoops (Figures 71–72)

Late Neolithic Ib scoops, while clearly related to their predecessors, do not have punctuation and incision, ring bases, or curving handles. Instead, they rest on flat bases and have stubby upturned lug-like handles (or “horn-handles”). In Thessaly these handles often protrude beyond the rim of the scoop, while in Central Greece they tend to be smaller and shorter.

Holmberg (1964b, 32-33) thought the carintated amphora with “horn-handles” (two crescent shaped pierced lugs) was perhaps indicative of Balkan influence, if not with the Linerbandkeramik Hungarian cultures (i.e., the Bükk and Theiss) as Schachermeyr (1955b) suggested. While Holmberg (1964b, 33–34) correctly recognized these distinctive handles as diagnostic of the Otzaki and Classic Dimini phases, he also stated that their distribution was limited to Thessaly; but it is now known that similar handles are found throughout Central Greece, particularly on Euboea.

Sampson states that while this handle type may seem odd, the vessels could in fact easily be picked up because the scoops are small and lightweight (1993, 91). This type is also reminiscent of the scoop found by Lavezzi at Corinth (1978, fig. 6:34). It is unclear if Hauptmann’s (1981) reconstructions of Late Neolithic Ib rhyta from Otzaki are accurate because he added ring bases to his restorations when they were not actually preserved.

Late Neolithic Ib scoops are more thin-walled than the earlier examples. Red is the dominant surface color, although brown or black surfaces like their predecessors also occur; in either case, both interior and exterior surfaces are usually burnished (Sampson 1993, 91). The Late Neolithic Ib scoops are decorated either with white paint, plastic appliqués, or rope-decoration or bear a different type of incision (Sampson's Type 4 incision) (Sampson 1993, 91). One example from Otzaki Magoula in Thessaly combined incision with the black and red paint that belongs to the Otzaki Group A (Hauptmann 1981, Taf. 31, no. 3).

Neolithic scoops are found in a wide variety of contexts, including settlements, cemeteries, caves, and mines over a wide geographic area, from the Peloponnese through to Thessaly (Nazou 2012). Although their sporadic appearance and peculiar shapes would indicate a ceremonial use, Sampson suggests that the scoops, particularly Late Neolithic Ib examples, were probably every-day items: a suggestion based on their practical design (1993, 94). Tsoundas (1908) also suggested that they were used for handling (or measuring) dry goods like cereals. At the Skoteini Cave, a Late Neolithic Ia scoop was found on top of a hearth (Sampson 1993, 89), which may indicate their use as scuttles or braziers. A symbolic use may have resurfaced in the Final Neolithic period when scoops of yet another morphology and decoration abound in Aegean islands and are found in cemeteries like at Kephala on Keos (Coleman 1977).

While they have not been identified in Northern Greek Macedonian assemblages, Late Neolithic scoops have also been found on many Aegean islands, including Ftelia on Mykonos, Euripides' Cave on Salamis, Kephala on Keos, and Ayios Petros on Kyra-Panayia in the Sporades to name a few (Sampson 1993, 89). On the mainland scoops have been found at the Kitsos Cave, the Cave of Pan, the Athenian Agora, Sesklo, Ayia Sofia, Otzaki, Rachmani, Aidiniotiki Magoula, Corinth, Eutresis, Proskynas, the Corcyian Cave, Thorikos, Elateia, Dimini, Arapi, and Tsangli (Nazou 2012), and on Euboea at the Skoteini and Ayia Triada Caves and Varka at Psachna.

Phelps (2004, 103) included in his “Dot Incised Ware” three sherds from Gonia (Phelps 2004, fig. 47: 29–31 and pl. 83: 26, 29), which belong to Late Neolithic Ia scoops; however he dated them to the Late Neolithic Ib (end of his Period III) based on Late Neolithic Ib-Final Neolithic parallels (i.e., Cave of Pan, Zervos 1962–63, 838, 841, 842; Kitsos Cave, Lambert 1971, figs. 26–27; Skoteini Cave, Sampson 1993, figs. 75–78, Athenian Agora, Immerwhar 1971, pls. 7:69, no. 99), although he acknowledges that Sampson (1993) dates them to the Late Neolithic Ia, based on parallels with eastern Aegean examples from Tigani and Ayio Gala on Samos.

Late Neolithic Askoi (Figure 73)

Like Neolithic rhyta, askoi do not begin in the Late Neolithic. They are low, squat jugs with offset, often oblique openings and a handle on the top from near the opening to the body. By definition, the shape is a skeuomorph of a bird, but it may well be derived from other forms, such as gourds or leather bags. In Macedonia, the details of their form show influence from the neighboring Vinča culture. For instance, at Promachon-Topolnica, askoi began in the Late Neolithic Ia (Phase II) and have both anthropomorphic and zoomorphic traits; some of these were locally produced, while others were imported to the site (Vajsov 2007, 95, 96). Vajsov (2007, 96) notes that in the Vinča culture, the shape has a spiritual meaning, and indeed at Promachon-Topolnica, askoi were found in what the excavators interpreted as a subterranean sanctuary, along with *bucrania*, shallow bowls, fruit-stands, miniature vessels, and figurines (Koukouli-Chryssantaki 2007, 57). Some were incised with Promachon-Topolnica Type A1 Incised Decoration (Vajsov

2007, 81), which is an interesting parallel to the askoi from Dimini that are incised with the Classic Dimini style.

CHAPTER 11: INCISED POTTERY

Incised Pottery (Figures 74–85)

Incised decoration is one of the simplest ceramic techniques in that it does not require much skill to execute and only a little preparation of other materials. In this sense it is a predictable form of ceramic decoration, similar to pattern-burnishing decoration (Vitelli 1993, 196; Phelps 2004, 74). The fabric and surface colors of incised pottery can range: in general they tend toward coarser fabrics than fine ones, and dark surfaces predominate, probably because the incision was often filled with white paste or red ocher.

Incised decoration was used sporadically throughout much of Late Neolithic Ia. Often, however, it appears as a secondary decorative technique, as on Black-burnished pottery, and therefore cannot be addressed as a coherent class of pottery. A few different styles of incision can be determined, mostly at the regional level, but there is also influence from abroad such as in the Čakran style. Perhaps the most recognizable, widespread, and longest-lasting type was a combination of incision and punctation on particular "special" vessels, such as rhyta, tripod altars, offering tables, and lamps — all of which have been interpreted by archaeologists as "ritual" objects. This approach may also show some influence from the Vinča culture to the north. As unique shapes, rhyta, scoops, and askoi are considered in detail in Chapter 10, but their style of incision is considered in this chapter; tripod altars, offering tables, and lamps are not discussed since they fall more into the realm of symbolic ceramics.

In Late Neolithic Ib, several styles of Incised pottery developed, particularly in Thessaly and Macedonia. Some of these are entirely innovations of the Greek Neolithic potters, such as the Classic Dimini style of Incised pottery. As its name suggests, this is contemporaneous with and draws on motifs from the Classic Dimini style of Matt-painted pottery. Other styles of incision, such the Gradešnica style and Marica I types are borrowed from neighboring Balkan Neolithic cultures. Incision during this period was much more common on every-day, utilitarian vessels, although it continued to be used on "ritual" items like offering tables and tripods.

Late Neolithic Ia Incised Pottery (Figures 74–77)

In the Late Neolithic Ia incision was most commonly used on "special" shapes, perhaps of "ritual" function, such as rhyta, scoops, lamps, offering-tables, drum-shaped stands, and anthropomorphic and zoomorphic askoi. In Macedonia, incision on these types of objects continued into the Late Neolithic Ib. Aside from these specialized shapes and its use a subsidiary decoration on other wares such as Black-burnished, minor styles of incision can be identified. These include: Dot Incised Ware (Skoteini Type 1), Skoteini Type 2, Γ2, Fine Incised, Basketry Band, Promachon-Topolnica Type A1, and the Čakran style.

Thessaly, Central Greece and Southern Greece

In Central and Southern Greece, Incised pottery was not common. It was primarily used as a subtype of decoration on another class of pottery; Nea Makri in Attica is an exception, in that it had an incised tradition beginning in the Middle Neolithic (Pandelidou-Gofa 1995). An example of incision as a secondary form of decoration are the incised arcs that are common on late Urfirnis round and shouldered bowls and Black-burnished pottery or as "Scratch-crusted." This use of secondary incision may be rather cursory on simple shapes, or applied more on more elaborate forms, such as on the Late Neolithic Ia Black-burnished and Incised zoomorphic quadruped from Plateia Magoula Zarkou (Gallis 1982). Only two types of Incised pottery have been formally acknowledged as separate classes (Skoteini Types 1 and 2), at the Skoteini Cave near Tharounia on Euboea (Sampson 1993, 94).

Another two styles can be discerned (Fine Incised and Basketry Band) that until now had been lumped together by several scholars, including Wace and Thompson (1912), Kunze (1931), and Phelps (2004) in various ill-defined, confusing, or chromatically incorrect ways. While these two of these may ultimately be related, the details of their technique and style differ, as do their chronology.

Skoteini Type 1 (Dot Incised Ware): Incision and Punctation on Ritual Vessels (Figure 74)

Sampson (1993, 89) defined Skoteini Type 1 as bands of incision that define the main motif, which are infilled with punctated dots. It is used primarily on Late Neolithic Ia and Late Neolithic Ib scoops, rectangular offering tables, and Late Neolithic Ia “rhyta.” Due to the abundant use of pointillé dots as fill, this style could be called “Dot Incised Ware,” as Phelps (2004, 103) suggested.

The Late Neolithic Ia type must not be confused with the later, Late Neolithic Ib version, Skoteini Type 4, a mistake which Phelps seems to make, or at least does not present clearly. Weinberg also suggested that some (1962, pl. 62d 6–9) incised and punctated examples from Elateia may date to later in the Late Neolithic, but that more evidence was needed. He remarked that similar incised sherds were recovered at

Orchomenos, Chaeronea, and Corinth. Earlier in his career, Weinberg (1937, 512, fig. 59, j, k) incorrectly dated the Corinthian sherds to the end of the Final Neolithic, based on Hansen's (1937) work.

While Phelps (2004, 103) correctly dated some examples, such as those from Corinth, to the Late Neolithic Ia, he yet dated others to the end of the Late Neolithic Ib (his Period III), based on parallels with Late Neolithic-Final Neolithic transitional examples. These last include such as the Final Neolithic rhyta from Kephala on Keos, Tigani, and Ayio Gala on Samos; he saw the latter type as an early manifestation of Eastern Aegean influence along with the appearance of cordon-decorated *pithoi* and baking pans. Similar incision and punctation are found in Northern Greece at the end of Late Neolithic Ib (see below).

The difference between the earlier and later versions lies in how the incision and punctation are handled. In the Late Neolithic Ia type, the incision is used to outline a motif which is subsequently filled with deeply impressed pointillé dots; the fill may or may not be regularly arranged. In the Late Neolithic Ib type, the pointillé dots are not so deeply impressed and while they may be used as fill, they may independently be used to form a motif or they may border incised bands. The motifs of Skoteini Type 1/Dot Incised Ware are generally geometric such as triangles, zigzag bands, and checkerboards.

Lastly, it should be noted that punctation is not used in all cases, nor is it limited to explicitly "ritual" shapes. For example, there are two small deep bowls from the Franchthi Cave which are decorated with diamond-shapes filled with punctated dots (Vitelli 1999, fig. 8, e and f). Similarly, at Elateia Weinberg (1962, 189, 198, pl. 62d) recovered nine sherds each belonging to distinctive incurving bowls, some of which were found in association with rhyta (in the "*Bothros*" deposit, pl. 62d 1–3, 4–5), and he noted the clear relationship between them. Weinberg incorrectly dated the specimens found in the "*Bothros*," to the Middle Neolithic, but correctly dated similar pieces (pl. 62d 3, 6–9) from other areas at the site to the early Late Neolithic, based both on the stratigraphy and with parallels from Lerna (Caskey 1958, 137, pl. 36, a-c). In these cases, punctated dots were not used. but instead incised bands create a loosely obliquely banded or linear motif such as zigzags and triangles.

Skoteini Type 2 Incision and Punctation (Figure 74)

Skoteini Type 2 Incision is another variety of Late Neolithic Ia incised-and-punctated pottery. It differs from Skoteini Type 1 (Dot Incised Ware) first in that it is used on every-day shapes like small bowls and medium collared bowls (not "ritual" ones) and then in how the incision and pointillé are handled. In this style, the punctation is not so deep and is executed more as an open, circular depression, rather than a deep narrow cavity. Whatever tool was used was rather blunt and was not pushed into the vessel so far as in Skoteini Type 1. Here the incision is often bordered by a line of evenly spaced dots, or used in alternating bands of incision and dots. It is not used as a dense fill, as in the first style ("Dot Incised Ware"). The circular impressions/depressions may even be used independently of the incision to outline a motif.

Sampson (1993, 89) was the first to isolate this style from "Dot Incised Ware" at the Skoteini Cave (Type 1 Incision). Other scholars had previously incorporated it as a subcategory of Black-burnished decoration (Kunze 1931, pl. VI, a, e), were uncertain how to define it (Tsoundas 1908; Wace and Thompson 1912), or included it with the first style (“Dot Incised Ware”) of incision (Wace and Thompson 1912; Phelps 2004). Sampson (1993, 94) dated Skoteini Type 2 Incision to the earlier part of Late Neolithic Ia. A similar style is found at Nea Makri (Pandelidou-Gofa 1995), but there the excavator assigned them to the Final Neolithic (Phases 11–12), based on parallels with Kephala (Coleman 1972) and under the influence of Phelps’ dissertation (1975).

The vessel shapes consisted of mostly small, open shapes and a few medium-sized ones such as collared vessels. The smaller vessels tended to have their entire surface decorated, while the larger ones had more open space; in both cases the decoration was primarily found on the exterior of the vessels.

The motifs are linear and consist of incised and dotted lines, arranged primarily as zigzags, triangles, and chevrons. Bent lines and curved ones also occur. The punctated dots may outline an incised line, form an independent line, or be used as fill within a rectilinear space (usually a triangle) created by an incised line. Frequently, the decorations hang from the lip of the vessel or are located on the upper body. A few instances preserved white clay used as fill. Sampson (1993, 94) remarked that the incisions were deep and exacted by a steady hand. The fabric was not fine but yet of good quality and light colored; interiors and exteriors have the same reddish-pink hue. Some sherds were covered with thin spreads of diluted (slurry) clay, some were burnished, while others are left unburnished and rough.

According to Sampson (1993, 94) they are the output of some specialized craftsmen, covering a small chronological period. Samopson (1993, 94) believes that when this pottery is recovered at other sites it is probably a local variant of Skoteini Type 2 Incision.

Indeed, similar pottery was found in Boeotia at Orchomenos by Kunze (1931, 21, taf. 6, a, e, and maybe b; he noted that it was also present at Chaeronea). Kunze (1931, 20) puzzled over them, because of the rarity of this technique in Greece and suggested the best parallels were found in the northern Balkans (Vinča, Butmir). The use of the dot-edged band and festoon-arc, however, is also attested in Matt-painted and Polychrome-painted pottery, which also helps in assigning its Late Neolithic Ia date. Some of Phelp's (2004, 103) "Dot Incised Ware" must belong also belong to the Late Neolithic Ia group, such as those from Nea Makri (Middle Neolithic Phase 8, Late Neolithic Phases 9–10; Pandelidou-Gofa 1995).

Lastly, the Central and Southern Greek examples of Skoteini Type 2 seem, at least superficially, to be related to specimens recovered in Thessaly at Tsangli and Larisa, which were included in Wace and Thompson's Γ2 Incised. Wace and Thompson (1912, 18, fig. 36) were not sure how to classify or date a series of incised sherds recovered primarily at Tsangli, Tsani, and Zerelia. They incorrectly assigned Γ2 Incised to the Final Neolithic, and they also incorporated at least three different styles into this group, which are reassigned here to other styles (Basket Band and Skoteini Type 1 Incision).

Γ2 Incised and white filled (Figure 80) main shapes are fruit-stands, shallow conical bowls, and carinated bowls (Wace and Thompson 1912, 18). The patterns consist of lines and dots, usually placed in alternating rows, although dot-edged bands also occur. Rectilinear shapes such as zigzags, lozenges, and triangles are also attested to. These designs cover only a fraction of the surface, which they divide into panels (Wace and Thompson 1912, 111). The surfaces were either Black-burnished or brown, and the incisions were filled with white paste. The designs recall those found in B3γ Polychrome of Late Neolithic Ia (Black and Red Paint on a White Ground or Arapi Ware), and therefore they might span the Late Neolithic Ia to Late Neolithic Ib transition.

Fine Incised Ware of Central Greece (Figure 75)

Phelps (2004, 106) referred to a handful of sherds as “Fine Incised Ware of Central Greece,” and mentioned that from his inspection of museum collections that the ware was actually quite common, although the published examples are few. This style of decoration is characterized by multiple zigzag lines either all over the vase or arranged into panels (Phelps 2004, 106). It has been found at Orchomenos (Kunze 1931, Taf. 5, 1, Taf. 6, c, f, and maybe f, and Taf. 9, 4), Elateia (Weinberg 1962, fig. 62d, 7–9), Corinth (Weinberg 1937, fig. 29 j), and the Kitsos Cave (Lambert 1971/81, fig. 25).

Basketry Band Incised Bowls (Figure 75)

Groups of alternating lines which form a band or a geometric motif are found on shallow hemispherical bowls from Thessaly from Tsangli (Wace and Thompson 1912, fig. 36 4–5 sherds near top), Rini (Wace and Thompson 1912, fig. 79, p), and Otzaki (Hauptmann and Milojčić 1969, Taf. 58, no. 11); from the Peloponnese at Corinth (Weinberg 1937, fig. 29, i, k), and perhaps Orchomenos (Kunze 1931, pl. 6b) in Central Greece. This style of incision may be related to Middle Neolithic types and seems to derive its inspiration from basketry.

Late Neolithic Ia: Macedonia

In Macedonia, as in Thessaly, Central and Southern Greece, Incised decoration was not commonly used in the Late Neolithic Ia. When it was, it was primarily used either as a subcategory of decoration on Black-burnished pottery or to decorate special "ritual" shapes, particularly anthropomorphic and zoomorphic askoi, clay lamps, and the so-called hollow drum-shaped stands.

Promachon-Topolnica Incised Decoration Type A1 (Figure 76)

The incision (Incised Decoration Type A1) used on "ritual" shapes is characteristic of the Topolnica-Akropotamos culture, which began in Late Neolithic Ia (Phase II) and continued into Late Neolithic Ib (Phase III) (Vajsov 2007, 95). In this type, the areas without the incision are the light red or tan of the fabric and those with incisions were infilled in white: as a result the vessels had a polychrome effect. Of particular interest are the lids and lamps with anthropomorphic motifs – an incised representation of interlocked or crossed hands with three or four fingers. This incised motif was once thought (Kalicz and Makkay 1977, 109; Sériadès 1983a, 74, 653; 1983b, 653; Aslanis 1992, 198, 208) to be a direct connection between Macedonia and Thessaly with the area of the Szakálhát culture in Hungary, but Vajsov (2007, 84) suggests it is really more akin to the Vinča B culture than the Szakálhát culture, and that its appearance in Eastern Macedonia at sites like Dikili Tash, Sitagroi, and Promachon-Topolnica indicates the intermediary role of Vinča B culture rather than to direct contacts with Szakálhát. This style continues into the Late Neolithic Ib.

The Čakran Style of Incised Pottery (Figure 77)

The Čakran Style of Incised Pottery has "a curious discontinuous distribution" (Wijnen et al. 1979, 216); it found at the eponymous site of Čakran in Albania (Prendri 1972; Korkuti 1995; Korkuti and Andrea 1972; 1975) and in Greece it has been identified at Servia (Heurtley 1939; Wijnen et al. 1979), Stravropouli (Urem-Kotsou and Ghioura 2004), and Vasilika C (Aslanis 1992, 178). Heurtley (1939, 66) was the first to remark on its peculiarity, but did not identify its exotic source (he simply called it "Early Incised").

At Servia, it was found with Black-burnished and Gray-on-gray painted pottery (Heurtley 1939, 69), thus dating it to the beginning of Late Neolithic Ia (Korkuti 2002). The only identifiable shape was a shallow and handless hemispherical bowl, thick-walled, though made of well sifted clay (Heurtley 1939, 69). The surfaces are brown or black and highly burnished, but red or tan versions also occur (Wijnen et al. 1979, 216). The incision was usually, but not always, executed as "a series of discontinuous strokes or stabs, usually made by some tool with a crescent end, perhaps a split straw, and were then filled with some whitish matter or ordinary clay" (Heurtley 1939, 69). The motifs consist of reduplicated parallel lines, which form bands, loops, chevrons, zigzags or fillets (Heurtley 1939, 69).

Wijnen et al. (1979, 216,217) suggest that the impressions were made with stiff grass stems or straw; they note that such-straw impressed ware was primarily a Balkan technique where concentric circles, spirals, and other curvilinear motifs are used, but these were not documented at Servia. Alternatively, a bead or a similar carved item may have been rolled upon the surface and the design so impressed: this is suggested by the fact that some of the elements seem quite regular and repetitive (this technique is also known as rouletting; Rice 1987, 145).

Late Neolithic Ib Incised Decoration (Figures 78–85)

Incised decoration continued to play a minor role in subsidiary decoration during the early phases of Late Neolithic Ib throughout Neolithic Greece, but later in the period (Classic Dimini phase) Incised pottery with strong regional and cultural affinities appear. In Macedonia, the foreign Marcia I and Gradešnica styles were absorbed, while in Thessaly, the Classic Dimini style of Incision was created. Classic Dimini style Incised pottery was also exported to Western Macedonia (it was also locally imitated) and local imitations are also found in Central Greece at Phthiotic Thebes. Other minor styles of incision were used in Central and Southern Greece, such as the Prosymna Early Incised, Sarakenos Type 1, Skoteini Types 3 and 4. It is interesting to note that it is only in Late Neolithic Ib that coherent “styles” are first established: surprisingly late given the simplicity of the technique and the fact that incision had been used sporadically throughout the Neolithic.

Central and Southern Greece (Figures 78–79)

There is not a dominant style of Late Neolithic Ib incision in Central and Southern Greece. Sampson is primarily responsible for identifying three or four types of minor styles, most of which are confined to one site or to a few within an immediate area. The Late Neolithic Ib styles of Incision defined by Sampson are: Sarakenos Type 1 (Incision on a High Relief Band), Skoteini Type 3 (Sarakenos Type 2/Black-burnished Incision), Skoteini Type 4 (Incision on the vessel body), which may be broken down into subtypes (see below), and Early Prosymna Incised. Sampson rather loosely defined two similar

Late Neolithic Ib styles of incision and morphology at the Skoteini (1993) and Sarakenos Caves (2008a), but these two divisions do not exactly correlate between the sites, and furthermore Sampson does not always specify in the catalog or illustrations to which type a sherd belongs. In fact in some of the plates and illustrations of the same sherds are labeled differently, confusing his Late Neolithic Ia and Ib categories. Zachos' (1987) few illustrations and photographs are equally confusing.

Sarakenos Type 1: Incision on a High Relief Band (Figure 78)

Sarakenos Type 1 is defined by having its incision set on a high relief band, which is usually located just below the rim. The incisions are broad and deep; thin lines are rare and the incisions do not appear to have been filled with white paste (Sampson 2008a, 217). The motifs are simple groups of parallel and oblique lines or groups of vertical, horizontal, or alternating lines, single-lined angular shapes, and curvilinear forms (Sampson 2008a, 217). The incision is limited to the relief band around the rim, although an additional zone of decoration may also be used (Sampson 2008a, 217). This type of incision is more characteristic of the Final Neolithic; but based on the stratigraphy at Sarakenos, Sampson (20008, 214) suggests it begins at the end of Late Neolithic Ib, emphasizing that it is a "ware carrying plastic, incised, and rope-motif decoration, are typically featured by a particularly prolonged use, and, therefore, cannot be attributed to a specific chronological phase." Final Neolithic examples similar to Type 1 incision include material from the Kephala on Keos, Ftelia on Mykonos, Orchomenos, Chaeronea, Euripides' Cave on Salamis, the Alepotrypa Cave, Asea, and the Athenian Agora (Phelps 2008a, 220).

Skoteini Type 3 (Sarakenos Type 2): Black-burnished Incision (Figure 78)

Skoteini Type 3 more or less corresponds with Type 2 Sarakenos; it consists of roughly executed incision below the rim on open vessels with rough surfaces (Sampson 2008a, 220). At the Skoteini Cave, it was rare and used on thin-walled, black-burnished vessels, which Sampson (1993, 97) compared to examples form Emporio on Chios (Hood 1982, pl. 39, 41). It clearly has no relationship with earlier Late Neolithic Ia Black-burnished pottery. The incision-work is deep and sometimes reminiscent of grooves. More rarely the decoration is curvilinear (Sampson 1993, 97). Generally the motifs are groups of lines (or a single line) arranged in a zone around the body under the rim, but they tend to be cut into the vessel body rather than set on a raised relief band; this, however, is not a hard and fast rule (Sampson 1993, 97). Sampson (1993, 97; 1981) dated the type to the end of Late Neolithic Ib, based on its stratigraphic location at Eretria (Seimene Mnima).

In Macedonia, Vajsou (2007) seems to describe a similar ware at Promachon-Topolnica, but it is not well illustrated in his article (Figure 75). He calls it the “Larisa Style” (Incised Decoration Type A2 at Promachon-Topolnica), but it does not appear until the Late Neolithic Ib (Promachon-Topolnica Phase IIIB; Phase III is dated by radiocarbon to 5,070–4,700 B.C.), rather than to Late Neolithic Ia as the name would suggest. In this style, very thin incised lines are used on single-handled bowls and jugs; most of the vessels have a swelling near the rim, which is often anthropomorphic in nature. In one area of the site (Sector Topolnica 23) black anthropomorphic jug rim sherds were found. Zigzag incisions near the rim on these high-necked vessels underscore their anthropomorphic nature. This style belongs late in Late Neolithic Ia (Phase IIIb). A similar type was found at Dispilio (Nikakis 2003).

Skoteini Type 4: Incision on the Vessel Body (Figure 79)

Skoteini Type 4 features incision on the vessel surface below the rim, and more rarely on a subtly raised relief band below the lip, which is unlike the protruding bands found in Type 1 Skoteini and in the Final Neolithic (Sampson 1993, 100). It dates to the end of Late Neolithic Ib (Sampson 1993, 97). This is a peculiar décor, typical of deep and open vessels or those that are slightly waisted (Sampson 1993, 97). Type 4 incision is used on a wide range of vessel shapes and sizes, but primarily on large or medium-sized utilitarian ones that would have been used everyday. The incisions are usually wide/broad but not especially deep on unburnished and unpainted surfaces (Sampson 1993, 97). The clay is gray, light gray, and brown; interiors are usually brown, and the incision is often sloppily executed (Sampson 1993, 97). The decoration begins at the lip or just below it: the majority of the vessel body looks to be undecorated; white-filled incision was found on only one example (Sampson 1993, 97). Some have filled themes; few have decoration that is complex, mostly the decoration is freely executed in bands (Sampson 1993, 100).

Within Type 4 Skoteini, Sampson (1993, 99–100) included a few sherds with incision and punctation. Similar sherds of a late date were also found at Ayios Dimitrious (Zachos 1987, Δ59m fig. 33, pl. 17a), Kephala (Coleman 1977, pl. 44, e, h), the Athenian Agora (Immerwhar 1971, no. 99, 102, and 103), and the Kitsos and Pan Caves (Lambert 1981, pl. XXX, 171–174). The punctated dots are hastily made and can be more oblong than truly circular; they are not as densely used as in the Late Neolithic Ia style found on “ritual” shapes. At Sarakenos some examples of this type were included in Type 1 Sarakenos.

Early Prosymna Incised (Figure 75)

The name Prosymna Earlier Incised pottery is used here to describe the group on the East Yerogalaro Ridge at Prosymna along with Late Neolthic Ib Gonia style Polychrome painted pottery (Blegen 1937, 372, fig. 627): it contrasts with Late Prosymna Incised Ware, which is found on the West Yerogalaro Ridge and dates to the Final Neolithic (Blegen 1937, 375, fig. 633). In passing, Phelps mentions Prosymna Earlier Incised as part of what he called the “Prosymna group II” but otherwise does not acknowledge it in detail in the way he does for the Final Neolithic Incised pottery, which he called “Prosymna Incised Ware”. A few sherds from the Athenian Agora (Immerwhar 1971, no. 101, 104–108) are also similar.

Late Prosymna Incised Ware (not illustrated)

It should be noted that what Phelps (2004, 105) identified as “Prosymna Incised Ware,” he correctly dates as belonging to the Final Neolithic, and not to the Late Neolithic Ib as suggested by Sampson (1993, 100). Perhaps it is also better to call this type “Late Prosymna Incised Ware” to differentiate it from the earlier, Late Neolithic Ib type which was found on the East Yerogalaro Ridge at Prosymna along with Gonia style Polychrome painted pottery (Blegen 1937, 372, fig. 627).

Late Prosymna Incised pottery was found on the West Yerogalaro Ridge with Final Neolithic Pattern-burnished pottery (Blegen 1937, 375, fig. 633), with which the motifs have close affinities, primarily the abundant use of hatched, interlocking triangles ("basketry" motif; Phelps 2004, 106) and the use of margin lines to define the incised zone of decoration. It is found primarily in the northeastern Peloponnese at Prosymna, the Klenia Cave, and Corinth but also at Ayios Dimitrios in the southwestern Peloponnese. Phelps suggests that some specimens from the Skoteini Cave (Type 4) are vaguely similar (Phelps 2004, 106).

Thessaly (Figures 81–82)

The Classic Dimini Style of Incised pottery emerged as the distinctive mode of incised pottery during the latter part of Late Neolithic Ib, primarily in Eastern Thessaly (like Gray-on-gray painted pottery) (Hitsiou 2003, 89). The style is contemporaneous with the Classic Dimini styles of Matt-painted and Black-on-red painted pottery and draws upon these painted varieties for its main decorative elements (Wace and Thompson, 1912, 16; Holmberg 1964b, 32). The compositions, however, tend to be organized into panels rather than around the vase. This is in part due to the presence of two or four large vertical strap handles that predetermine the limits of the compositional space. It was also used on a restricted number of vessel shapes.

As with the painted Classic Dimini style of Matt-painted pottery, both imports and local imitations have been found in Northern Greece at Makryialos in Western Macedonia (Vlachos 2009; Hitsiou 2003), and local imitations were also produced at Phthiotic Thebes. Although the pottery from Dimini remains unpublished, Chourmouziadis (1977; 1978) gave the incised pottery particular attention, both due to its abundance at Dimini, and also because he believed that his findings indicated specialized production of the ware, being fired in what he claimed to be a pottery kiln. Souvatsi (2008) added further details to his argument, although she is more cautious and uses a more neutral vocabulary in describing and interpreting the finds.

The Classic Dimini Style of Incised Pottery (B2 Incised Ware) (Figures 81–82)

Following Tsoundas (1908), Wace and Thompson (1912, 16) simply called the Classic Dimini Style of Incised pottery "B2 Incised Ware." The patterns are made up of combinations of lines of different length, some curvilinear, and the use of dots: as a rule they are filled with white, and more rarely with red (Wace and Thompson 1912, 16). The white fill would have provided a striking contrast to the dark and well-burnished surfaces (Chourmouziadis 1977, 218). Wace and Thompson (1912, 16) described the fabric as usually gray-black, sometimes chestnut, and rarely red. The biconical jar and Dimini bowl are the primary shapes for the ware, although some deep round bowls (Souvatsi 2008, 256) are attested. At Dimini, Souvatsi (2008, 260) found that the Classic Dimini style of Incised ware comprised some 1.9% of the total pottery at the site.

Chourmouziadis (1977, 215) described the decoration of the Classic Dimini Incised vessels on two levels, based on morphology and composition. The biconical globular jars have two or four large, vertical strap handles that divided the vessel surface into panels (Chourmouziadis 1977, 215, 217). Four complete jars of this type were recovered by Chourmouziadis. On these jars, the bold decoration was especially well articulated and emphasized at the belly of the vessel. He (Chourmouziadis 1977, 215), believed that specificity of shape was a new phenomenon in the Late Neolithic and that it implied a particular use (although the use may remain undetermined): the large size of the jars suggested that they were not for personal use, thus strengthening their communal purpose.

On other shapes, too, the incision was divided into panels. This is in interesting contrast to the contemporary painted pottery at Dimini which utilized full-field motifs. Due to the use of panels, several motifs were employed on the same vase (Chourmouziadis 1977, 218). Souvatsi (2008, 120) compared this use of panel decoration with the alternating geometric panels on Polychrome-painted spit stands (see Chapter 5). She (Souvatsi 2008, 258) also called the decoration “highly structured” with vertical or oblique and intersecting parallel lines subdividing the surface into smaller panels defined by the handles: these are filled with alternating geometrical motifs and patterns. Chourmouziadis (1977, 218, 230), however, described the motifs as synthetic due to the use of curvilinear lines and spirals, even though zigzags and angular elements were also used; he noted that although the themes were repetitious, there was enough variation within the details, and they were executed with such skill as to keep the repertoire interesting. Geometric antropomorphic froms also occur (Fig. 81, no. 4).

In Souvatsi’s (2008, 120) brief analysis of the Dimini pottery, she found that the majority of the Classic Dimini Style of Incised pottery consisted of closed vessels (65%), with fine (48 sherds) or medium (50 sherds) fabrics, and only two coarse. This pattern differed from the other decorated wares (such as the Dimini Style of Matt-painted pottery) which tended to use one particular fabric. The fabric was medium gray throughout (Souvatsi 2008, 258), which indicated a prolonged reduced firing. Perhaps surprisingly, in comparison to incised pottery from other regions of Neolithic Greece, the

Classic style of Dimini Incised pottery is not only extremely thin, but also constitutes the thinnest pottery at Dimini itself (only 2–3mm thick) (Souvatsi 2008, 258).

The Classic Dimini Style of Incised Pottery at Makryialos (not illustrated)

Vlachos (2009, 55, fig. 6.2) subdivided the Classic Dimini Style of Incised pottery at Makryialos into simply incised pieces and those with incision and those painted with broad bands. Only 82 sherds of 50, 723 in his study were incised using the Classic Dimini style; 40 sherds (were Classic Dimini Incised sherds and 42 were the subtype of Classic Dimini Incised with broad painted bands (Vlachos 2009, 62).

Vlachos (2009, 86) outlined 15 elements that consisted of the basic motif repertoire (i.e., intersecting lines, parallel lines, punctated lines, triangles). He (Vlachos 2009, 27) noted that the incised patterns are similar to painted motifs and that the most common motif, groups of two to four vertical lines intersected by one or two horizontal lines, may have had its origins in weaving (Gallis 1996, 122; Karatsou 2001; 2004). While Classic Dimini Style Incision was used exclusively on the exterior of vessels (with one exception), Vlachos (2009, 106) found that incision was sometimes used on unidentified open shapes. Lastly, Vlachos (2009, 86) found several instances where the incision had been filled with colored paste (he does not specify white or red).

Hitsiou (2003, 89) petrographically determined that the Classic Dimini Style of Incised pottery was imported from Dimini in Thessaly, some 220 kilometers away. Hitsiou (133, 134) also located two clay sources near Dimini that provided the primary fabrics for incised pottery (i.e., Petrographic Group 12 Epidote, Clinopyroxene, and Metamorphic Rocks and Petrographic Group 13 Micaceous with Quartz-Biotite-

Muscovite Schist). The significance of her findings was that, like Gray-on-Gray painted pottery and Classic Dimini style Black-on-red and Matt-painted pottery, another type of elaborately decorated pottery had been imported over a great distance. As compared to Type II Incision from the site, the Classic Dimini style of Incised pottery received more care in its finishing treatments and firing; the surface was well burnished and homogenous in color (Hitsiou 2003, 170).

Although the Classic Dimini style incised vessels had thin walls, the clay tended to be coarse (Fabric Groups 12 and 13) or medium-coarse in Makrygialos (Fabric Groups 17 and 18); but at both Dimini and Makryialos, the same clay recipes are employed in the production of a wider range of wares. At Makryialos, however, there is an observed variation in the surface treatment and firing technology of the Incised vessels from the two clay groups used; elaborate surfaces, well burnished and homogeneous in color that are also linked with larger shapes were actually associated with the coarse clays (Fabric Groups 12–13).

The Classic Dimini Style of Incised Pottery at Phthiotic Thebes (Figure 83)

At Thebes in Central Greece (Phthiotis), Arvanitopoullos (1907; 1908) excavated four strata of Late Neolithic material (including Black-burnished, Classic Dimini Style Red-on-black, Matt-Painted, Incised, and White-on-red pottery, as well as a contracted burial in a cist-like tomb). Only the incised pottery was illustrated and subsequently reproduced by Wace and Thompson (1912, fig. 113). The illustrated shapes belong mostly to small and medium-sized bowls. The style of incision features prominent use of zigzag lines as fill within incised bands that outline the main geometric or curvilinear motif. Theocharis (1973, 102) suggested that the carving style derived from wood carving.

Macedonia (Figures 83–84)

During the Late Neolithic Ib in Macedonia, several types of incision were used at different times. Some of the new styles demonstrate contact with neighboring cultures, such as the Gradešnica and Marcia I styles (both are sites in Bulgaria). Indigenous styles of incision were also used, such as the Late Neolithic Ib continuation of Type A1 at Promachon-Topolnica, but they did not constitute a significant part of the assemblage, which is also true for the rest of Greece.

The Gradešnica Style of Incised Pottery (Figure 84)

Promachon-Topolnica offers a good illustration of the influence of different incised styles and their relation to contemporary painted pottery. The first manifestation of a foreign style of incision at the site is the Gradešnica Style of Incision (Incised Decoration Type A3). It is named after the site of Gradešnica in the Republic of Macedonia. Vajsov (2004, 84) notes that its appearance is a chronological marker for the Late Neolithic-Early Eneolithic Gradešnica culture in the Central Balkans (Nikolov 1974; Tordova 1986, 123–126, Perničeva 1995, 128).

This type of incision, along with the appearance of Graphite-painted pottery and other ceramic trends such as an increasing amount of dark-surface pottery and conical bowls with button finials, is evidence of the Early Eneolithic Dikili Tash-Slatino culture (Promachon-Topolnica IV), which is contemporary with Kryoneri, Vinča C1, and

Gradešnica A – Marica I (Vajsov 2004, 102, 105). Yiouni (2001, 17) also adds that Graphite-painted and Graphite-incised are characteristic of Sitagroi III and Dikili Tash II levels, which she dates as a late phase of Late Neolithic.

The Gradešnica Style of Incised pottery is characterized by two or three parallel incised lines (0.2–0.3 cm wide) filled with white paste, even though the surface of the clay body is usually light brown (Vajsov 2004, 102). Within Greece, the Gradešnica Style of Incised pottery is found primarily in Eastern Macedonia, in the Drama plain (Evans 1986, 408). The fabric may contain sand-like grains (Vajsov 2004, 102). The motifs are similar to those used in Graphite-painted pottery: spirals, maeander-like motifs, metopes, hatched ellipses or triangles, and maeanders (Vajsov 2004, 84, 102). In the spiral-form decoration, the spiral band is divided in two by an extra line, which also occurs in the Marica I Style of Incision (Vajsov 2004, 102). While the compositions can be arranged around the vessel, they can also be organized into metopes, which are usually hatched (Vajsov 2004, 102). It was used mostly for coarse thick-walled vessels (Vajsov 2004, 102).

As at Promachon-Topolnica, the Gradešnica Style of Incised pottery at Sitagroi was rather limited and fragmentary. It was noted that the areas immediately below the rim and above the base were left undecorated, as was the interior of the vessel (Evans 1986, 102). The main types of decorative motifs were simple linear and curvilinear ones of triangles, lozenges, maeanders, circles, and quadrangles. One deep bowl had an anthropomorphic design of two arms, similar to the earlier Late Neolithic Ia Type A1 at Promachon-Topolnica: such had previously been attributed to the Szakâlhât culture in Hungary (see above). The incision seemed to rarely be filled with white paste, except for the vessels with anthropomorphic decoration or forms and other “ritual” artifacts like triangular tripod offering-tables.

At Sitagroi, the Gradešnica Style of Incised pottery was mostly used on bowls and occasionally on jars (Evans 1986, 402).

The Marcia I Style of Incised Pottery (Figure 85)

The Marica I style of Incised pottery (Incised Decoration Type A4 at Promachon-Topolnica) was used at the same time as the Gradešnica style (Phase IV Promachon-Topolnica). It is named after the Marica (or Maritsa) river in Bulgaria. The Marcia I Style of Incision is composed of parallel lines (usually three or more) that are connected by dense hatching to make spiraliform motifs; the hatching is referred to as a ladder motif in the professional literature (Vajsov 2004, 84; Tordova 1986, 98–101). Hatching (ladder motif) can also be used for fill in broader fields (Vajsov 2004, 102). The characteristic ladder motif is also used in the Struma Style of Graphite-painted pottery (Vajsov 2004, 102). Vajsov (2007, 96, 100) emphasizes that while the use of parallel, hatched bands of the “ladder type” (two parallel lines with hatching in between) — as well as small, obliquely hatched ellipses — were first attested to in the Akropotamos style of Matt-painted and the Strumsko style of Black-on-red painted pottery (Phases II-IIIb) and the earlier styles have no relation to the much later (Phase IV) type. The former type, Vasjov (2007, 100) suggests, was inspired by the Dimini style of Matt-painted pottery, while the latter is clearly a derivate of the Marcia I style Incised pottery. The majority of Marica I style Incised pots are black, and the ladder-type decoration is almost always filled with white paste (Vajsov 2004, 102). The incision is thinner (0.1–0.2 cm) than that of the

Gradešnica Style (Vajsov 2004, 102). As in the Gradešnica style, the spiral-form decoration is divided in two by an extra line.

Incised and Graphite Painted (Figure 59)

Graphite-painted pottery with incisions is characteristic of Sitagroi IIIa ("Excised with Graphite," Evans 1986, 402) and Dikili Tash II levels, which Yiouni (2001, 17) dates as a late phase of Late Neolithic. The graphite may either be used independently as a broad on non-incised areas or it may be applied over them, as in the Marica I style.

As with the incised vessels, the area directly below the rim and above the base was generally reserved and left blank (Evans 1986, 402). These empty fields can also be filled with hatched rhomboids, depressions, or stab marks (Vajsov 2004, 102; Evans 1986, 402). Evans (1986, 409) notes that this type of fine incision found a wider distribution than the purely Marica I style Incised; in Macedonia it is found from Eastern Macedonia to Thrace (i.e., at Dimitra, Dikili Tash, Paradimi).

Sometimes at Sitagori, red ocher was also used to fill the incised areas (Evans 1986, 402). Rounded and straight-sided bowls are best represented; the primary motifs consisted of patterns of straight lines, curvilinear maeanders, maze motifs, oblique lines in zones, and curvilinear maeanders, sometimes in fine incised lines (Evans 1986, 402).

Heurtley's Later Incised (not illustrated)

Heurtley's (1939, 74) Later Incised category consisted of several sub-varieties, including dishes with flat or beveled rims and a simple combination of wavy and straight lines and chevrons, carinated bowls with a zone of incised triangles, fragments from a large vessel with spirals, returning spirals, and concentric circles which can be filled with white or pink matter, a pyxis lid, and zoomorphic lugs with roughly cut parallel grooves. Some of these pieces are reminiscent of the Late Neolithic Ib Type 4 Skoteini (Sampson 1993) examples that feature a few sherds with incision and punctation and that have a wide distribution in Late Neolithic-Final Neolithic Greece.

Incised Pottery Technology and Terminology

The technology of Incised pottery in its own right has not been much considered. There are some remarks on the fabrics and firing of the vessels; observations on how the incision was executed are but few (Vitelli (1999) and Phelps (2004) are exceptions), and are often superficial and even misleading. For instance, at Sitagroi, what Evans (1986) calls “Excised Ware” should more properly be termed “Incised Ware” from a technological point of view (see below).

Incised, impressed, and punctated decorations all involve the displacement of clay particles from their original position on the vessel body in a number of ways: pushing particles of clay further into the vessel wall (punctation and impression), “cutting” (incising) into the clay, or by physically removing clay from the vessel (carving and excision). Rice (1987, 145) defines “cutting” as incising, carving, and perforating.

Carving is defined as a series of cuts or gouges by which the potter removes clay from the vessel to create a design; it is usually done when the vase is wet or leather hard (Rice 1987, 146). In carving proper, the motif is viewed as lower than the pot surface, whereas with low-relif carving, champlevé, and excising, the motifs are left in low relief and are executed when the vessel is dry (Rice 1987, 146). Today the clay would be removed by a wire-loop tool, but in the Neolithic era stiff grass or a piece of wood could have been used. On Classic Dimini style Incised vessels, it can clearly be seen in the large step-motifs that the potter first outlined and impressed the area to be removed before scooping it out (Chourmouziadis 1977, 213, image 7), and again for creating the triangular motifs (Chourmouziadis 1977, 210, image 3). These large areas were undoubtedly once filled with white paste or red ocher.

Excision usually falls into the category of carving, but Rice notes (1987, 146) that "excision is sometimes distinguished as involving only shallow scraping," and it is apparently in this sense that the term was used by Evans (1986, 402) at Sitagroi ("simply the result of scratching the surface of the pottery vessel with a sharp tool before firing"). Vlachos (2009, 86) refers to incision as a subtractive technique, although he describes it as lines cut into the surface of the vessels with various pointed tools such as small wooden sticks, bone, and stone tools, which is really the displacement of clay particles rather than their removal. The vertical dividing lines of Classic Dimini pottery were, however, created by removing clay from the vessel; this can be seen in the small ridges of the clay left when the tool was dragged upwards (Chourmouziadis 1977, images 3–7).

Incising consists of "cutting" lines into the surface of a vessel with a pointed implement. That is, the tool is drawn through the clay, moving along rather than being pressed down into it (Rice 1987, 145). Fine incision is created with a sharp-pointed instrument and makes lines that are narrow, generally deep, and have a V-shaped cross section (Rice 1987, 145); this is evident on some Classic style Dimini incised pots, particularly on diagonal or horizontal lines around the vessel (Chourmouziadis 1977 image 3-7). Chourmouziadis (1977, 218) described this incision as being executed with a triangular or rectilinear-sectioned tool, and performed while the pot was rather damp.

Incision is one of the most variable of decorative techniques used in ceramics because as Rice (1987, 146; after Shepard 1976, 195–203) states: the appearance of incised decoration depends on the state of the clay (wet, leather-hard, dry, fired), the texture of the paste, the size and shape of the instrument, the angle at which the implement is held, the pressure used, and the direction the tool is moved. In describing incised decoration as a technique, it can be approached either by the type of tool used (i.e., Early Neolithic "fingernail" or "cardium-shell impressed") or when the incision was done (i.e., late in the process of the pot's creation, as Sgraffito).

Impressions, however, can only be made while the clay is wet, as opposed to cutting and incision that can be done at anytime, even post-firing (Rice 1987, 144). Rice (1987, 144) defines impressing as the simple imprint of a tool pressed into damp clay and stamping as the repetition of such elements so as to create a pattern. Punctation depressions (or pointillé) are punched into wet clay, usually with a sharp end of pointed instrument, such as a stick, reed, or awl (Rice 1987, 145). Wace and Thompson (1912, 18) remarked that the impression and incision on Γ2 (Incised and Filled) were "rendered by lines and irregular round holes made by pressing a blunt instrument into the clay." Perforating and piercing refer to cutting though the entire vessel wall and perhaps removing portions of the clay in creating a series of holes (Rice 1987, 147); this technique was not used on incised pottery but is seen on other types of Late Neolithic pottery such as sieves, strainers, and "cheese-pots."

White paste could have been applied as a fill before or after firing; in instances where red ocher was also used, Yiouni (2001, 16) suggests that the two were added together, post-firing. At Sitagroi (Phase III) calcium carbonate, kaolin and red ocher were used (Evans 1986, 402) on incised pottery, while at Dikili Tash, Marica I style Incised and Graphite-painted ware from Dikili Tash infilling was achieved with a paste rich in calcium oxide (CaO), which sometimes contained white mica (Courtois 2004).

It seems that most Late Neolithic vessels were incised when the clay was relatively plastic, and so traces of the types of tools and their manner of manipulation are often visible on the exterior surfaces. The interiors are often finished later so that no evidence of incision or punctation remains on the inside, even on vessels with thin walls, such as the Classic Dimini style incised pots. It seems that in general, the vessels were slipped, incised, and then burnished when the vessel was leather-hard.

While it is often difficult to identify which methods and tools were used —often more than one on the same pot (Rice 1987, 145) —it is worth considering the details of exactly how Late Neolithic Incised pottery was executed both because it reflects on the choices and sophistication of the potting tradition and also since the nature of Neolithic potting tools (of wood, bone, obsidian or flint, etc.) has simply not been much considered. Special tools would certainly have been deliberately fashioned for this purpose. For instance, a tool of an “H” shape was repeatedly impressed to create the fill on some Classic Dimini Style of Incised pots (Chourmouziadis 1977, 213, images 3–7).

The Classic Dimini Style of Incised Pottery: Specialization?

While it may seem somewhat contradictory that the simple technique of incision could somehow be elevated to the realm of specialization, Chourmouziadis (1977) made this claim for the Classic Dimini Style of Incised pottery for two main reasons. First, he recovered large concentrations of the ware in an area where he also believed he had unearthed a pottery kiln. According to Souvatsi's (2008, 129) estimate, 70% of the incised pottery from Dimini came from this area (see chapter 11). Second, Chourmouziadis (1977, 221–222) thought the mastery of a limited number of forms —used only for incised pottery—and the skillful execution of the incision indicated that the vessels were the products of well-practiced specialists.

Importantly, although he believed in specialization, Chourmouziadis (1977, 220-225) did not believe that it implied the existence of a professional hierarchy, but rather it had come about because a few potters chose to develop the technique, as the needs of the community demanded. Similarly, the use of the decoration was also socially determined by the community, since the incised shapes, if left undecorated, operate functionally also as containers. The idea of specialized potters and firing techniques in the Greek Neolithic has been both suggested and contested by several scholars: the topic is considered in more detail in the conclusion (chapter 15).

CHAPTER 12. TRADITIONAL STUDIES OF MONOCHROME, UNDECORATED, AND SPARSELY DECORATED POTTERY

(Figures 85–105)

Former Studies of Undecorated Pottery

Traditionally, undecorated pottery consists of “Monochrome and Coarse ware.” These types of pottery have not received attention equal to their painted counterparts, which more readily provided information on dating both at the site and intra-site level, although these two wares typically make up the bulk of pottery from Neolithic sites (around 90% of the material; Katsarou 2000). Aside from chronological concerns, Monochrome *burnished* wares do occasionally receive more attention, as is the case with Black-burnished and Gray-burnished. Similarly, Red-burnished and Brown-burnished are sometimes identified as intentionally produced “wares” (Hauptmann and Milojčić 1969), but more often they are considered together as simply Monochrome, because they more often than not use the same shapes as painted wares (Sampson 2008a, 82).

“Monochrome,” however, is also commonly applied to vessels or sherds with gradations in surface color and kiln mottling, and in this sense the vessels are not strictly one-color as the name implies. Additionally, “monochrome” may be applied either to burnished or unburnished sherds; but generally if burnished such vases are assigned to some other “ware.” Lastly, “Monochrome and Coarse” wares have not always been distinguished from one another during the Late Neolithic (i.e., Hauptmann and Milojčić 1969; Sampson 1993; 2008).

Coarse ware is an antiquated term in some sense; it was traditionally used to define undecorated vessels, which may or may not have thicker walls and a coarse fabric.

Sometimes these coarse-fabric speciemens may also be decorated either with painted or plastic decoration. For these reasons, the terms “Monochrome and Coarse” ware are abandoned here, in favor of the more neutral, although broader, class of “Undecorated” pottery; “Coarse ware” is used only when identified such by the excavator.

Recent studies (such as Tsirtsoni 2000; 2001 or Urem-Kotsou 2006), have begun to consider undecorated and decorated pottery on equal terms, since they focus more on modes of lifecycle of pottery: its modes of production, function, consumption, circulation, and discard. These recent studies integrate “Monochrome and Coarse” ware into the same functional categories as decorated ones based on vessel shape, use-wear alteration, and residue analysis.

With these new, integrative approaches, the emphasis shifts from the decoration and different styles of pottery and its symbolic implications to the presumed role of ceramic vessels in everyday life, with particular regard to storing, processing, cooking, serving, and eating food. Thus, the role of eating (how and what) with its cultural implications, are taken into account to see if these activities were done at the individual, household, or communal level.

Such studies have yielded some interesting findings about the changing nature of Neolithic society and are the subject of chapter 13. This is the case primarily in Macedonia, primarily from work by Urem-Kotsou and Tsirtsoni where the studies also ingrate information from paleobotany and analysis of faunal and human remains. To a lesser extent it has been applied to the Peloponnese by Mee (2007). These types of research reiterate the fact that “coarse wares” are not necessarily gross and un-aesthetic;

in fact the surfaces are generally slipped and smoothed, if not burnished and painted; they also demonstrate that decorated pottery was also used on a daily basis.

It is not a coincidence that these new trends focus on the utilitarian roles of pottery, because it is currently believed (Vitelli 1989, Perlès 2001, Björk 1995) that in the Early and Middle Neolithic periods pottery was not used for processing and storing food. Only in the Late Neolithic were everyday cooking, storing, serving, and eating vessels produced, which in turn implies that new ways of preparing food were introduced, perhaps in response to the introduction of new foods (Hansen 2000). The absence of clearly identifiable utilitarian vessels is in stark contrast the neighboring Balkan Neolithic cultures (Urem-Kotsou, Kotsakis, and Stern 2002, 110).

Undoubtedly, a major trend in the Late Neolithic period is the steady increase in the volume and range of Late Neolithic pottery (Demoule, Perlès, and Manolokakis 1988, 55; Perlès and Vitelli 1999, 98). The gradual increase in the amount of Coarse Ware begins with the appearance of Matt-painted pottery (Lavezzi 2003, 68; Phelps 2004, 102). This phenomenon is particularly evident toward Late Neolithic Ib when both plastic decoration (including rope or cordons) and larger vessels begin to be used. Some scholars (Halstead 1995a; 1999; 2004; Hayden 2001) interpreted this increase in storage capacity as reflecting hoarding of any surplus as part of the competition for social hierarchy, but there is also ample evidence to the contrary (see chapter 13).

Similarly, the validity of the “secondary products revolution,” as envisioned by Sherratt (1981), has been questioned (Vlachos 2002; Demoule and Perlès 1993, 389, 400). The lack of large *pithoi* in the Late Neolithic also argues against hoarding, although bulk storage could have been facilitated in a number of other ways including baskets, wooden containers, pits, clay bins such as the ones recovered at Makri (Phase II) or even in unfired vessels, such as the ones from Dikili Tash (and possibly Elateia).

Coinciding with the development of more “utilitarian” vessels is the use of quartz-tempered fabrics which permit lower firing temperatures (Kilikoglou, Venkinis, and Maniatis 1995; Kilikoglou et al. 1998; Maniatis and Tite 1981). Lowering the firing temperature of pottery was probably not the primary concern, however, since other contemporaneous wares were fired at higher temperatures, but rather the new fabric recipe reflects a thermal consideration for the pot to be used in cooking over a fire. Other comparable fabrics such as calcite-tempered and vegetable-tempered also came into use.

Although Sampson (2008a, 82) believes that “comparisons with parallel finds from other regions is unattainable [sic]” in the realm of Undecorated pottery because it is has traditionally been understudied, some regional and chronological variations can, in fact, be detected. For instance, tripod cooking pots and baking pans are characteristic of Late Neolithic Ia in Eastern Macedonia, while “cheese-pots” do not appear until the end of Late Neolithic Ib and have a much wider distribution.

Therefore, as in the proceeding chapters, the aim of this one is to provide an overview of the Undecorated pottery. However, it cannot be approached with the same amount of acuity given the discrepancies of the level of existing scholarship; the more recent scholarship is addressed in chapter 13. A few sites from each geographical area are mentioned, namely those that have the most published information, in order to provide a concise impression of the material.

Late Neolithic Undecorated Pottery: Regional Overview

Central Greece (Figures 86–91)

At Elateia, Weinberg (1962, 199) observed “a notable feature of the Late Neolithic Ia pottery is the vast increase in the amount of undecorated household pottery, sometimes of good quality but usually rather coarse, often of much larger size than was encountered in earlier levels.” The clays were usually well fired and of the same color throughout and brown-firing clays were preferred (Weinberg 1962, 199). Often the surface is well smoothed, frequently with plainly visible burnishing or paring strokes, but it was rarely highly lustrous (Weinberg 1962, 199). None of the “Coarse ware” was painted, but the mottling during firing seems to be for intentional variegated effect, and plastic pellets were used for decoration (Weinberg 1962, 190).

The main “Coarse ware” shape at Elateia was a deep bowl with large ledge handles or lugs at the widest diameter of the vase, with surface colors light to dark brown, gray brown or black in places (Weinberg 1962, 195). The shape of the lugs varied from knob-like protrusions to large semi-circular ledges (Weinberg 1962, 195).

Collared jars and hole-mouth jars were also common. Weinberg (1962, 190) noted that although hole-mouth jars were known in earlier periods, they are much more common in the Late Neolithic. Bottoms were mostly flat although a few ring bases were attested to. All in all, Weinberg (1962, 195) concluded that “they all have the characteristics of standard kitchen pottery,” although he does not explicitly say that the pots were used directly over a fire (and they probably were not)

According to Sampson (1993, 43) “Monochrome and Coarse ware” from the Late Neolithic Ia and Ib at the Skoteini Cave, wares used the same shapes and did not change much over time, which meant that they were not particularly useful for establishing chronology; therefore, Sampson presented the two together as Undecorated pottery. Sampson (1993, 43) noted that in the Late Neolithic Ia the surface colors tended to be lighter, while later in the Late Neolithic Ib they tended toward black, grays, and browns; while some were well burnished, most were self-slipped (Sampson 1993, 53).

Similarly, at the Sarakenos Cave, Sampson (2008a, 160) typologically considered Late Neolithic Ia and Ib Undecorated pottery together, but as at the Skotieni Cave, some distinctions can be made between the earlier and later phases of the Late Neolithic.

For instance, Sampson (2008a, 8) remarked of the earlier Late Neolithic Ia material, that the vessels tended to be made of well-cleaned fabrics, but often had gray cores, and their surfaces were either burnished, smoothed, or left rough; the main shapes were fruit-stands, deep bowls with straight walls, biconical cups, "S"-shaped bowls, necked jars, and carinated bowls.

Belonging to the Late Neolithic Ib are the jugs with two high-swung handles, "cheese-pots," and the fruit-stand with a deep bowl (which Sampson calls either *psykers* or *réchaurds*; for residue analysis proposed uses for this Final Neolithic shape see Aloupi 2002; Sampson 2006; Mastrogiannopoulou nd,). Spur or "horned" handles are particularly indicative of Late Neolithic Ib and continue into the Final Neolithic. They also have a broad distribution: Dimini and Sesklo (Tsoundas 1908, figs.109, 123, 216), Arapi (Hauptman 1981, pl. 17, no. 4), Ayia Triada at Karystos on Euboea, the Corycian Cave (Tochais 1980, fig. 16, no. 155), Asea (Holmberg 1944, fig. 370); in Eastern Macedonia at Sitagroi (Renfrew et al. 1986, fig. 7:14.17) and Kritsana (Heurtley 1939, fig. 19 A-C), as well as in the Aegean islands (Ftelia on Mykonos, Emborio on Chios, Kalmnos, and Samos, etc.). Sampson (2008a, 160) also noted that the majority of the fragments belong to small and medium sized "Coarse ware" vessels, rather than large *pithoi*, which indicates that long-term bulk storage, was not facilitated by pottery containers.

Additionally, Sampson (2008a, 214) argued that plastic decoration, both cordon (rope-motif) and other added appliqué shapes, begins at the end of Late Neolithic Ib, based on the stratigraphy at the Skoteini and Sarakenos Caves (and Ftelia on Mykonos), although these decorations are more common and characteristic of the Final Neolithic on *pithoi*. The same is true for incision on "Coarse ware" (i.e., Sarakenos Type 1 Incision on a high relief band, see Chapter 11).

The Peloponnese (Figures 92–94)

At Corinth, the "Coarse ware" accounted for 26% of the Late Neolithic pottery (more by weight; Lavezzi 1978, 422). While there were some "ill-made and poorly compacted examples, plus those with gross inclusions (grit, mudstone, etc.)," there were also heavy thick-walled examples (1.5–2.3 cm thick) which may be relatively well made and well fired (Lavezzi 1978, 422). Surface colors ranged from light tones like buff and red to darker grays and blacks; decoration was rare (Lavezzi 1978, 422). Lavezzi (1978, 422) noted mending holes on "Coarse ware" sherds, which indicated that they were just as valued as painted wares (although this may not have been true at every Peloponnesian site, at least in comparison with sites in Macedonia, such as at Dispilio; see Urem-Kotsou, Kotsakis, and Stern 2002b).

Although no complete profiles were recovered, the recognizable shapes were the same as at Elateia: deep bowls with a lug, collared and hole-mouth jars. In addition to lugs, there were also used ribbon, strap, band, tab, knobs, and loop handles (Lavezzi 178, 422). Lavezzi (1978, 422) had "no doubt" that some of these vessels were used in cooking as many were burnt and fire-darkened.

At the Franchthi Cave, Vitelli (1999) showed a change in the use of "Coarse-ware" fabrics between the Late Neolithic Ia and Ib. Vitelli (1999, 30) found that "Coarse ware" from the Late Neolithic Ia tended to be made out of clays low in lime ("Low Lime Coarse Variety Phases 3), which was high fired at around 800°C in an open fire and for a short duration: the lime near the surface was white and powdery, but rarely spalled or "popped," while the lime within the vessel walls was unaffected. The lime inclusions (Phase 3) may be as large as 7-8 mm, and they were poorly distributed, indicating that the clay was not well worked or wedged before using. Vitelli (1999, 30) suggested that these medium-large vessels were coil-built in sections and scraped as they were being constructed, especially on the interior, with a convex scraping tool: this was done to create the strong convex curve of the body walls. The lugs were securely attached when wet because there are no examples of detached ones. Some vessels received a perfunctory burnish before firing, and other had a thin iron-oxide slip.

In the later phases of the Late Neolithic Ib (Phases 4.2–4.3) intentionally crushed (3–4 mm size pieces) and added calcite was added as a temper (Vitelli 1999, 55); yet at the same time, lime-free fabrics were used (No Lime, Coarse Variety), which is curious, since both lime and calcite are calcareous. Perhaps it is an indication that the potters unaware that both lime and calcite are calcareous, or that either the act or adding or removing inclusions to a particular fabric held some type of significance. The potters fired the crushed-calcite pieces at low temperatures, at 700°C or less because the fabric was soft and crumbling, and the calcite unaltered, and usually remained red throughout (Vitelli 1999, 55). Deep bowls with lugs were the dominant shape in this ware, and the surface was usually treated with a cursory burnish.

The Late Neolithic Ib lime-free examples were similar in form to the low-lime ones; were up to 1 cm thick and made up 21% of the assemblage by weight, although Vitelli (1999, 48) suggested some pieces might be intrusive from Final Neolithic levels.

Strainers and medium-sized bowls with lugs ("saucers") were also first documented in the Late Neolithic Ib (Phase 4.2; Vitelli 1999, 54). Vitelli (1999, 54) described some of the "Coarse ware" lugs as "lugs with cupping," meaning that they had concave depressions on their undersides; this allowed for ergonomic gripping as well permitting rocks to be used to move the vessel around in hot coals or ashes.

Lastly, Vitelli (1999, 48) suggested that some of the thick burnt sherds could have been altered after the pot was broken: perhaps when they were reused as a support within a hearth — and indeed they are found in association with carbon and ash. But tellingly, no "Coarse ware" sherds had carbon exclusively deposited on the exterior to show that they were used over or in the fire for cooking. Alternatively, the pots could have either been placed near the fire or in an oven, in which cases sooting would not take place (Betancourt, per. comm.).

Thessaly (Figures 95–100)

At the Theopetra Cave, in Thessaly, Katsarou (2000) studied the "Monochrome and Coarse" ware sherds from the Middle Neolithic to the early Final Neolithic. Of the 38,000 pot sherds in her study, 90% fall into the Monochrome and Coarse ware category and of these, 65% constituted open shapes (Katsarou 2000). The Late Neolithic Ia pottery was 35% of the assemblage and characterized by a group of small *pithoid*-forms with a distinctive fabric (well sorted, light brown surface, and gray core). The Late Neolithic Ib pottery consisted of 50% of assemblage: the fabrics were not as well sorted, were coarser, and dark colored (brown to red-brown) surface colors predominated.

Katsarou (2000) noted the proliferation of applied elements, whether functional (lugs and handles) or decorative (pellets, relief bands or decoration) on "Coarse ware." In both phases of the Late Neolithic, it was observed that shapes were related to consuming, storage, and transportation of foodstuffs and that the new diversity of shapes and substantial increase in the amount of pottery produced implied new roles or functions of pottery. Additionally, changes in manufacturing and firing techniques also point to the new uses of pottery, "which should be regarded as part of a broader change in the sedentary community life" (Katsarou 2000, 252).

Big and medium pithoi were used for storage, "cheesepots" for drying fruit, and strainers for some other type of food preparation, cooking pots and tripod cooking pots for boiling or stewing, fruit-stands, drinking cups and bowls for serving and eating — all are attested to within the Theopetra Cave, although they were distributed differently (Katsarou 2000, 252). Katsarou (2000) remarked that the Theopetra shapes reflect a wide variety with parallels from Thrace (Makri, Paradimi), Macedonia (Sitagori, Dikili Tash, Makryialos), Thessaly (Otzaki), Central and Southern Greece (the Sarakenos, Skoteini, Kitsos, Corycian and Franchthi Caves) to the Aegean islands (Emporio on Chios, Ftelia on Mykonos), but suggested that the pottery was of local production and that the pots themselves were probably made at the cave rather than being vessels carried to it.

In the Thessalian lowlands proper, similar observations can be made, but Hauptman and Milojčić 1969 and Hauptmann 1981 did not so explicitly detail the possible functions for "Monochrome and Coarse" wares, although they did distinguish between Red-burnished, Brown-burnished, and Coarse ware. The Monochrome and Coarse ware pottery shapes are perhaps more similar to those of Central and Southern Greece than to those used in Northern Greece. Carinated bowls, shallow conical bowls, deep hemispherical bowls, fruit-stands, jars, jugs, basins, strainers, and "cheese-pots" are all attested, as are additional morphological features indicative of the Late Neolithic Ib such as the increased use of handles of all sorts, particularly lugs, knobs, "horn" handles, spur handles, two-handles, etc. Schneider et al. (1991a, 50; 1994, 69) demonstrated chemically and petrographically that "Coarse wares" in Late Neokithic Ia Thessaly hardly circulated in comparison to painted varieties (and especially in stark contrast to Gray-on-gray painted pottery which was not produced at every site but was widely traded).

Macedonia (Figures 101–105)

Late Neolithic Ia Makryialos (Figures 101–102)

The ceramic studies by Urem-Kotsou (Urem-Kotsou 2002a; Urem-Kotsou 2006; Urem-Kotsou and Kotsakis 2007; Urem-Kotsou, Kotsakis, and Stern 2002a; 2000b) at

Late Neolithic Ia Makryialos (Makryialos I, ca. 5,200–4,900 B.C.) incorporated analysis of vessel morphology, residue analysis, and to a lesser degree a consideration of seed remains, human bones and animal bones. The ceramics of Late Neolithic Ia Makryialos are significant because the vast majority recovered from the site comes from a large pit, some 30 m in diameter (Pit Pi/Pit 212), which is interpreted by the excavators (Pappa et al. 2004) as the remains of either a single (or several closely-spaced) ritual feasting event; over 600 individual domesticated animals were slaughtered for the occasion (Urem-Kotsou and Kotsakis 2007, 241). Other pottery from the site comes from inside and outside of houses, and in smaller pits outside houses, but others (like Pit Xi) may also reflect ritual deposition. Ritual connotations aside, the types of vessels represented are similar to those from Makri and Stavropouli (Urem-Kotsou and Kotsakis 2007, 239).

Within Urem-Kotsou's four categories (see chapter 13) of serving and storing liquids, long-term storage, cooking vessels, and tableware, technological, morphological and stylistic analysis revealed an uneven degree of variability within each functional group, the most, unsurprisingly, concerning table-wares (Urem-Kotsou and Kotsakis 2007, 226). For example, medium-sized serving bowls were highly standardized in terms of their fabric, shape, and surface treatment, were the most decorated of all four categories, and their capacities indicated that they were used by more than one person (Urem-Kotsou and Kotsakis 2007, 226).

In contrast to the homogeneity displayed by the serving vessels used by several people, small bowls and cups were used by individuals and were much more heterogeneous in terms of the range of fabrics (from coarse shell, sand and quartz-tempered to fine), different surface colors and treatments, and other features such as the presences of zoomorphic handles (Urem-Kotsou and Kotsakis 2007, 230). Urem-Kotsou and Kotsakis (2007, 228) argue that this variability is not due to any chronological factor because it is found in the two feasting pits (Pits Pi and Xi). They also observe that it demonstrates the communal potential of these ceramics, which if they had been found elsewhere in the settlement might have been taken to signify particular groups or households.

In fact, Urem-Kotsou, Kotsakis, and Stern (2002, 113) demonstrate that the types of cooking pots (closed vs. open and deep jars and shallow trays) were not homogenously distributed throughout the site, which may indicate that the different cooking practices of baking, boiling, stewing were not all conducted in the same place. Rather, baking took place outdoors, not connected to a pit, while boiling and stewing happened indoors and were linked to individual pits.

Based on the evidence at Makryialos, the nature of the feast does not fit with current theories of competition, conspicuous consumption, and status (i.e., Wright 2004; Dietler and Hayden 2001) propagated by Aegean archaeologists. In fact, just the opposite is implied; “the serving of food in this communal context bore a strong sense of communality and of equality between households or groups” (Urem-Kotsou and Kotsakis 2007, 242). This is evidenced by technological and stylistic homogeneity of the vessels found (Urem-Kotsou and Kotsakis 2007, 242). Even the personal cups, though all different, were not created as unique pieces, but rather conform to a broad, culturally defined notion of what one’s personal vessel should be.

All in all, the ceramic assemblage does not indicate hierarchy. Nor does the faunal assemblage, since it consists of domesticates rather than wild animals, which would have represented personal achievement though hunting (Urem-Kotsou and Kotsakis 2007, 243). Perhaps it is better to consider the emphasis on events such as feasts, the intentional destruction of property (private or communal?), and other features of Late Neolithic society (such as enclosure walls or ditches) as social events aimed at negating social tensions and maintaining equality, as is suggested by Balkan Neolithic specialists.

Lastly, while in Late Neolithic Ia Makryialos (Makryialos I), ovens and hearths were located outside each house, in the Late Neolithic Ib (Makryialos II), they were situated in communal areas, which counters arguments for increasing privatization in the Late Neolithic (i.e., contra Halstead 1999; Theocharis 1973; Chourmouziadis 1979; Kotsakis 1983; Demoule and Perlès 1993; Tompkins 2004). In either phase, food preparation, cooking, and ceramic vessels were a highly visible part of Neolithic life (Urem-Kotsou and Kotsakis 2007, 243).

Late Neolithic Ib Makryialos (not illustrated)

In Late Neolithic Ib Makryialos (Makryialos II, ca. 4,900–4,500 B.C.), there are changes in the nature of the settlement (more densely packed and a shift from pit dwellings to later apsidal houses; Pappa and Besios 1999b, 180). There appears to be a period of abandonment in between the two phases (Vlachos 2002, 119–120). Similar to the Late Neolithic Ia phase, the majority of the pottery recovered came from one pit (Pit 24) on northeast side of the site (Sector Eta). The excavators (Pappa and Besios 1999b, 188) suggested that this large deposition of pottery was eroded from the slope above, but Vlachos (2002, 121–122) disagrees because while there were thin layers of soil separating some distinctive pottery layers, he finds it odd that the sherds are of particular types and in too good a condition to have eroded from somewhere else. Instead, Vlachos (2002, 122) proposes that the area is a primary locus of discard from a particular activity, perhaps of a ritual nature.

Following Urem-Kotsou, Vlachos (2002, 121) identified tableware (flat-based "Dimini" bowls, straight-sided open bowls, carinated bowls, fruit-stands), vessels for serving, storing and transferring liquids (jugs and jars with vertical handles), cooking pots, and containers for long- term storage (pithoi and other small storage pots). The majority of the pottery recovered in this area was Classic Dimini style pottery of Matt-painted, Black-on-red, and Incised flat-based "Dimini" bowls, straight-sided open bowls, fruit-stands, and incised jars; few other types of pottery were found (Vlachos 2002, 121). In fact 90% of the Classic Dimini style pottery from the site was recovered from this pit (the other 10% was found in a subterranean pit dwelling, and some from pits outside the enclosure ditch; Vlachos 2002, 121).

Vlachos (2002, 122) also suggests that the distribution of cooking pots (rarely encountered on the site) strengthens his suggestion that the large deposition of Classic Dimini style pottery was the result of human activity rather than natural processes or chronological variation. Additionally, in the pit (Sector Eta) there were many shell-tempered cooking vessels and pots with evidence of fire as well as a large number of storage pots, which were not found elsewhere in abundance on the site (Vlachos 2002, 122). The pottery recovered from the other areas of the site consisted of a few impressed and incised carinated bowls used for tableware, but the rest of the cups, bowls, pithoi, jars, and jugs found inside pits and outside houses were undecorated (Vlachos 2002, 123). The ceramic material from Makryialos was analyzed by Aulonitou (2010) using XRD, μ-XRF, and SEM-EDS.

Late Neolithic Ia and Ib Sitagroi (Figures 104–105)

Monochrome and Coarse pottery were not evenly addressed at Sitagroi between the Late Neolithic Ia (Phases I-II) and Late Neolithic Ib (Phase III). Many of Keighley's "Rusticated Ware," Heavy Brown-on-Buff Ware, and Smooth Ware pieces could probably be classified as "Coarse or Monochrome pottery". Keighley (1986, 350, 361) did include a Coarse Ware category, which she defined as having a rough, coarse, brown-buff appearance, a gritty texture, and was perfunctorily burnished. The main shapes were rounded bowls with thick flaring rims and jars (hole-mouth, beaded-rim, and constricted neck), whilst jugs with spouts, and perforated sherds were also attested to; rounded, biconical, slightly incurved and open, straight-sided bowls were later added to the repertoire (Phase II). Some of these vessels were also decorated with incision, added plastic pellets or cordons.

Evans (1986) did not discuss "Monochrome and Coarse" ware pottery since his study was aimed at painted pottery in order to establish a chronology and to ascertain parallels or contacts with neighboring Balkan Neolithic cultures. Some of his shapes, based on Tsirtsoni and Urem-Kotsou's typologies, could easily be considered utilitarian shape, although Evans did not present the material in this way. Evans (1986, 403) did, however, note the "crucible" shape, which is conical with thick walls coming to a blunt point, often thickening from top to bottom, and with a large, downward-turning ledge rim— similar to modern ones. He (Evans 1986, 403) noted that similar ones were also recovered from sites in Bulgaria with early metallurgical evidence. This is yet another good example of the changing role of ceramics in the Late Neolithic; as with painted pottery, this case relates ceramic pyrotechnology with that of the metallurgists.

Three Late Neolithic Undecorated Shapes of Particular Function and Interest: Perforated Vessels, Tripod Cooking Pots and Baking Trays

Perforated vessels (namely "cheese-pots"), tripod cooking pots, and baking trays are three shapes that appear first the Late Neolithic and for this reason they are highlighted here. Tripod cooking pots and baking trays have a limited geographical and chronological distribution in the Late Neolithic Ia and are found primarily in Eastern Macedonia. Tripod cooking pots (Type 16 "marmites") and baking trays (Type 15 "plateaux") were the two main shapes in Tsirtsoni's (2000; 2001) classification system that morphologically and technologically looked to have been used in preparing and cooking food (Tsirtsoni and Yiouni 2002, 103). Perforated sherds, which may have belonged to sieves, strainers, braziers or beehives belong to both periods and are more widespread. "Cheese-pots," a particular type of perforated vessel, appear at the end of Late Neolithic Ib. Residue and use-wear analysis on these vessels revealed some unanticipated results (see below).

Perforated Sherds (Sieves, Strainers, Braziers, Bee-hives?) (Figures 90, 93-94, 97, 104)

Various types of perforated sherds are found in the Late Neolithic; they seem to increase in number in the Late Neolithic Ib. Although whole vessels are rarely preserved, there are clearly different types of perforated vessels involved, based on the size, density, and location of the holes (Decavallas 2007, 149). The proposed functions of these vessels might be to strain vegetables (Treuil et al. 1989), to preserve fruit (Schliemann 1881), to act as sieves (Sampson 1993, 53), strainers, (Sampson 2008a 189), to sift flour, or to drain honey from the honeycomb (Bogucki 1984), or to be used in manipulating fire as flame-covers, braziers (also Zachos 1987), ember-holders, chafing dishes (Bogucki 1984) or for burning incense (Rutter 1995).

Kalorgirou (1994, 158) suggested that the conical, perforated vessels without bottoms found at Paradimi (Phase Ib; Bakalakais and Sakellariou 1981, pl. 21a, nos. 1, 2 and pl. 70, nos. 7–8) and Sitagroi (Phase III and maybe II; Renfrew et al. 1986, pl. XCIII, and fig. 12.10, no. 6) might be a separate lid or cover, on one of the ends or to be used inside or on top of another pot.

Based on ethnographic parallels, Kalorgirou (1994, 158) also suggested that perforated vessels could have been used as coal burners, for producing brine, or for sprouting seeds. Kalorgirou (1994, 154, 156) also noted at Meglo Nisi Galanis that the perforations were made by inserting a stick from the outside, because the perforations have raised edges on the interior. Some perforations did not even penetrate the vessel wall, which may suggest that it was the very act of poking the holes that was significant. None of the sherds preserved use-wear alteration marks or any hint of the function (Kalorgirou 1994, 157).

Strainers with broad perforations have been found at the Sarakenos Cave (Sampson 2008a 189), Ayios Dimitrios (Zachos 1987, drawing 21, no. 32), the Kitsos (Lambert 1981, 355, fig. 244), Corycian (Touchais 1981, fig. 11, no. 66), and Alepotrypa Caves (Phelps 2004, 115, fig. 54, no. 6). These may be related to the type found in

Macedonia (i.e., Dikili Tash, Sitagroi), which is discussed in the section below on residue analysis.

"Cheese-pots" (Figures 90, 94, no.4)

"Cheese-pots" are another type of Late Neolithic vessel with a distinctive morphology and distribution. They appear at a number of sites on mainland Greece toward the end of the Late Neolithic Ib (Sampson 2008a, 188), but they are more characteristic of the Final Neolithic, particularly in the Aegean islands and usually in coastal settlements (i.e., Ftelia on Mykonos, Sampson 2002; Partheni on Leros, Sampson 1987; and Yali on Nisyros, Sampson 1988).

Bogucki (1984; 1986) first suggested that shallow basins with a row of perforations around the vessel below the rim were "cheese-pots"; he drew mostly on Central European cultures Linearbandkeramik (LBK) rather than Aegean ones. In temperate Neolithic Europe such were used to separate the curd from the whey (by attaching gauze through the holes and letting the whey drip from the curds). They begin to be made in the late 5th millennium B.C. The significance of Bogucki's suggestion was first that it pushed dairying practices to a much earlier date, and second that it began in Europe rather than Asia.

Sherratt (1981; 1983) had proposed that this "secondary products revolution" began in the Near East at the end of the 4th millennium B.C. The third implication of cheese production is that it is not only a way of preserving surplus food (with possible implications for trade) but it also made dairy products easier for people to digest, since many population are lactose intolerant.

Decavallas (2007, 149) points out that the term “cheese-pot” has proliferated in the literature on Neolithic Greece (Sampson 1988; Gouin 1990): the identifications are either based on ethnographic parallels or contextual evidence, or made without any further explanation. This functional proposition has but rarely been followed through with residue analysis (Bourgeois and Gouin 1995). Parallel conclusions were reached by Hendrickson (1990) on morphologically similar basins with perforated rims from later Chalcolithic Seh Gabi is Iraq (ca. 3,800–3,400 B.C.), based on use-wear analysis.

In fact, few scholars today consider them to be used for the production of cheese (Kalogirou 1994; Sampson 20008a). Additionally, the concept of the “secondary products revolution” is also doubted (Demoule and Perlès 1993, 389, 400); it is suggested that meat production was still emphasized over that of milk (Halstead 1992). Similarly, arguments in favor of transhumance beginning in the Middle Neolithic (Jacobsen 1984) or in the Late Neolithic (Diamant 1974, 357–367; Sampson 1992; Zachos 1999; Greenfield and Fowler 2000), during which time the increased use of caves in relation to transhumance has also been questioned (Cavanagh 2007, 115; see Sampson 1992; Zachos 1995 for proposed uses of caves in the Late and Final Neolithic).

Be that as it may, the specificity of form yet implies a particular function, perhaps for use near a fire for baking or drying fruits or grains. Sampson (1988, 115–163) on the other hand suggested that the holes were to attach basketry to the outside of the vase. Bogucki (1984, 17) made the interesting suggestion that the perforations were not made by straightforward poking something through, because such an action would affect the structural stability of the pot; instead small twigs or straw were inserted while the pot was being formed, which, of course, burned away when the pot was fired.

Tripod Cooking Pots (Figure103, no. 3)

Tripod cooking pots (Type 16 “marmites”; Tsirtsoni 2000; 2001) are peculiar because they are not represented at all sites in Macedonia and because they have a limited chronological duration; they appear at the start of Late Neolithic Ia but disappear in the Late Neolithic Ib (Tsirtsoni 2001, 38–39; ca. 5,500–4,500/44300; Sophronidou and Tsirtsoni 2007, 255). Unlike in other areas of the Aegean, they do not reappear in the Bronze Age (Sophronidou and Tsirtsoni 2007, 255). Whether or not the absence of tripod cooking vessels and baking pans is actual or perceived (Tsirtsoni and Yiouni believe it is the first), the real significance is that their brief chronological appearance implies either that culinary practices changed though time or that whatever the need that the two vessels were originally designed to meet was subsequently fulfilled by other vessels (Tsirtsoni and Yiouni 2002, 106).

Tripod cooking pots are open, deep hemispherical vessels with diameters of 18–28 cm and heights of 15–20 cm (or 22–30 cm including the legs), two horizontal handles (lugs) diametrically opposed, and three cylindrical feet (Tsirtsoni 2001, 16). Occasionally vegetable temper was used and as a rule the surfaces are smoothed or summarily burnished but they are never lustrous (Tsirtsoni 2001, 16). The wide mouth would have allowed easy access into the pot, the handles its manipulation, and the three feet a stable balance on or near a fire. Additionally, Tsirtsoni noted that the walls were often of even thickness (1–1.5 cm) which would have ensured an even cooking (2001, 29).

Sophronidou and Tsirtsoni (2007, 261) suggest that while specific lids for these cooking pots have not been recovered, they may have been made out of some other material like wood, stone, or leather. Sophronidou and Tsirtsoni (2007, 261) also argue that some tripod cooking pots were slipped and burnished for technical functions, like making the pot easier to clean or reducing the porosity.

Lastly, Tsirtsoni and Yiouni (2002, 104) do not consider blackened areas on tripods as indicative of use over a fire, since Dikili Tash was destroyed by fire; Sophronidou and Tsirtsoni (2007, 261) point out the difficulty in discerning any use-wear marks on Neolithic sherds (as opposed to whole pots).

The legs were coil-made and attached while the vessel was wet. At least at Dispilio, tripod cooking pots were not restored using mending holes (Sophronidou and Tsirtsoni 2007, 260). A broken leg, of course, did not mean that the vessel was unusable. Indeed at Dikili Tash, a tripod cooking pot with only one leg was found *in situ*, buried in the ashes of an open hearth of a house and behind an oven (Darcque et al. 1992, 440 and fig. 6; Tsirstoni and Yiouni 2002, fig. 3), next to one pot half-full of carbonized barely grains (Darque, Touchais, and Treuil 1992, 717, and 1994, 440, fig. 6). Fragments from two other tripods were located next to ovens in this same area. Large jars, small painted collared pots, bowls, cups, and other items were also found around the ovens/heaths (Tsirtsoni and Yiouni 2002, 104).

Baking Pans (Figures 89, no. 6–19, 97, no. 5, 101, no. 111, 103, no. 1–2)

There are three kinds of these vessels: thin plates (also known as baking plates), thicker basins or deep basins, and the shallow four-legged bowls: each has particular geographical and chronological boundaries. Baking pans or trays (Type 15, “plateaux”; Tsirtsoni 2000; 2001) are another particular shape with limited chronological in Late

Neolithic Ia. They are large, shallow, roughly round or ellipsoidal vessels, with diameters up to 60 cm (smaller plates average ca. 30 cm) with inverted lips, and they may or may not have two lugs (Tsirtsoni 2001, 26); at Avgi the lugs were triangular shaped (Katsikaridis 2012). They are often silica-rich and sometimes tempered with chaff. While their inner surfaces display careful smoothing or burnishing, the outer surfaces remain rough and untreated (Tsirtsoni 2001, 29).

Tsirtsoni (2001, 27) suggests that they could have been used for kneading or sieving materials into, in preparation for cooking breads and cakes, or for roasting grain in; this is probably why the inside was carefully burnished. Their thin walls and the refractory properties of silica-rich fabric (especially if including mica) would have enabled an even baking if placed near at fire.

At Dikili Tash, two nearly complete examples were found in pieces next to two ovens; one in association with many other objects such as a mill stone, a polished stone, a necked cup and two other vessels; while the other was found partially buried in the ground (Tsirtsoni 2001, 27). Tsirtsoni (2001, 27) suggests that they were placed on a bed of embers or ashes that had been removed from the oven, and were not often moved. Tsirtsoni (2001, 28) identified baking trays found at Promachon-Topolnica, Dikili Tash, and Sitagroi, to which Avgi (Katsikaridis 2012) and Makryialos can be added (Urem-Kotsou 2006, 70-74, Tsirtsoni and Yiouni 2002, 103-110). Like the tripod-cooking pots, the baking trays made a short chronological appearance in Late Neolithic Ia and disappear in Late Neolithic Ib (Tsirtsoni and Yiouni 2002, 103).

Baking pans are attested in Central Greece (Sampson 1993), but they are more characteristic of the Final Neolithic and Early Bronze Age (Cavanagh 2007, 116);

Holemberg's (1944) baking pan at Asea belongs to the Early Bronze Age and not the Neolithic. The Late Neolithic Ib examples are thicker than the ones from Eastern Macedonia, and perhaps they were placed more closely to the fire when in use. Lastly, in Thrace and Eastern Macedonia in the Late Neolithic Ib there exist shallow bowls on four high legs that could have been used for drying, frying, or baking (Types A2.6, Paradimi type; Sophronidou and Tsirtsoni 2007).

CHAPTER 13: NEW APPROACHES TO THE STUDY OF MONOCHROME, UNDECORATED, AND SPARSELY DECORATED POTTERY

Current Studies of Undecorated Pottery: Macedonia

New approaches to the study of Undecorated pottery ("Monochrome and Coarse ware") are part of recent trends in pottery studies that focus more on the lifecycle of pottery, such as the modes of production, the function, consumption, circulation, and discard of ceramic vessels (such as Liritzis, Orphianidis-Georgiadis, and Efstratiou 1991; Malamidou 2002; Thomas 2002; Rondiri 1994). In order to complete such studies, however, excellent data is needed and this rarely exists for Neolithic Greece. The excavations at Dikili Tash and the rescue excavations at Makryialos are two exceptions. These sites have wide horizontal exposures that allow for more thorough ceramic analysis than other sites. For these reasons, these two sites are explored in the following sections in more detail (see below). Similar analyses are not available elsewhere in Greece, although Mee (2007) made a preliminary case for Kouphovouno in the Peloponnese.

Tsirtsoni (2000) proposed a new typology for Late Neolithic Macedonia because she felt that existing typologies focused only on sherds rather than whole vessels (see also Voulgari, Sofronidou, and Touloumis 1997), which had resulted in chronological and other analyses to merely describing the surface treatments of sherds as they were the primary aims of the potter. Tsirtsoni (2000, 8–9) concentrated instead on 710 complete or restorable vessels from twelve stratified excavations and published material from ten different sites to establish her new classification system.

Like Vitelli (1993; 1999; 2007), Tsirtsoni (2000, 10) began her analysis from a consideration of the fabrics, establishing six broad categories (Categories A-F) based on factors such as the presence or absence of particular inclusions (siliceous, calcareous, vegetable temper, etc.). Next the surface treatment was considered (rough, slipped, burnished, etc.) to determine whether such improved either the physical qualities or the appearance of the pot and, next, what the nature of the slips and surface treatments were (channeled, painted, Black-topped, etc.; Tsirtsoni 2000, 15). Finally, the shapes are considered. Her resulting typology of nineteen “types” of vessels is thus based upon a combination of fabric, shape, and surface treatment.

Tsirtsoni (2000, 50, 51) avoids the general classification of open, closed, or even carinated as descriptors of shapes because she finds them too vague. She also argues that line thickness should not be used a criteria to distinguish between painted styles because thick and thin lines may have simply been used on two different parts of the vase. Within these nineteen “types,” three broad classes can be perceived: fine-ware with dark paint, Black-topped or gray-black burnished pottery, and “coarse” undecorated pottery (Yiouni 2000, 50). This type of classification (at least superficially) makes the ceramic assemblage appear much more complex and diverse than previously believed.

Tsirtsoni (2001) subsequently tested her proposed typology and the theory that “form follows function” (that is, she believed that there is a direct relationship between the conception, fabrication, and function of Late Neolithic vessels) using an analytical scheme to determine the most probable use for each type of vessel both through a process of evaluation and elimination.

By a process of elimination Tsirtsoni (2001, 3) considered: fabric and form, the context in which the vessels was used (such as painted vessels for display), the functional restraints operating on the vessel (including shape, decoration, and surface treatment), and the archaeological context. Of course, come containers are multifunctional and cannot be assigned simply to one "type" – such are plates and bowls with handles, which can be used in the preparation, cooking, presentation and storage of food (Tsirtsoni 2001, 37).

In some cases her hypothesis proved correct, with others not. Her analysis revealed five main functional categories of vessels, all of which were used in the preparing, cooking, serving, eating, and storing of food; there was considerable overlap in vessel function and use between these categories. For instance, vessels coated with Graphite wash (Type 11) such as basins, deep and shallow bowls do not have specific restraints on their use because they are painted (Tsirtsoni 2001, 21). In fact, Tsirtsoni (2001, 21) argues that since the temperatures reached in routine cooking in an oven rarely exceed 700°C, the point at which graphite paint decomposes, and given the fact that the surfaces are not subject to sooting or dark mottled areas because already black, that their painted surface did not exclude their use in cooking. Tsirtsoni (2001, 22) does not mean to imply that the primary function of the Graphite wash vessels was cooking, but rather that such should not be excluded from their function.

Importantly, Tsirtsoni (2001, 2–3) distinguishes between the use of a vessel and its function. The function is the original intention of the vessel's use, but the actual use may or may not coincide with the intended function. For instance, while a jug's function may be to store and pour liquids, it can also be used to hold dry foodstuffs, like grain. These two concepts are important to keep in mind, since it is probable that a vessel-type's use changed over time (Tsirtsoni 2001, 3).

Urem-Kotsou took a similar approach in the ceramic analysis at Makri in Thrace (Urem-Kotsou and Efstratiou 1993; Urem-Kotsou 1998), Thermi B (Urem-Kotsou 2002b) and (to a lesser extent) Stavropouli (Urem-Kotsou and Dimitriadis. 2002; Urem-Kotsou and Ghioura 2004), and Makryialos in Central Macedonia (Urem-Kotsou 2002a; 2006; Urem-Kotsou and Kotsakis 2007; Urem-Kotsou, Kotsakis, and Stern 2002b), utilizing a morphological-functional approach and through residue analysis (see also Mitkidou et al. 2008 and Dimitrakoudi 2009).

Here, vessel function was determined by morphology, use alteration (soot deposition, charred organic remains, oxidation discoloration, pitting on interior), physical and mechanical repair of vessels (fabric composition-temper, thermal resistance etc.), preserved contents, chemical analysis of residue, and archaeological context (Urem-Kotsou, Kotsakis, and Stern 2002, 110). In her scheme, there exist four functional categories for the Late Neolithic household: the serving and storing of liquids, long-term storage, cooking vessels, and tableware (Figures 101–102).

Thus, Urem-Kotsou suggests that closed deep vessels were used for boiling while deep open ones were used for stewing, and shallow open vessels were used for baking. Medium-sized bowls were used for serving since their capacities exceed the amount of an individual portion; these tend to be the most elaborately decorated vessels. As a rule, they are burnished, made of a fine-fabric, and usually Black-topped; from a technological point of view, they are highly standardized. Personal tableware consisted of smaller bowls and cups. In contrast to the serving bowls, these tended to be high variable in their fabric, surface color and treatment and range from undecorated but smoothed cups to burnished and painted ones with zoomorphic handles. Cooking vessels and long-term storage jars tended to be undecorated.

Current Studies of Undecorated Pottery: The Peloponnese

In the Peloponnese at Kouphovouno, Mee (2007a; 2007b) conducted a case study based on recent excavations at the site and comparisons with published material in order to understand the diachronic changes in the production and consumption of pottery in the Peloponnese from the Early to Final Neolithic. In the Late Neolithic period, the average sherd weight increases, due to the greater amount of coarse ware pottery produced: from 8.9g to 17.5g (per sherd), with the coarse ware constituting 28% by count and 62% by weight.

Using Vitelli's method of estimating the number of vessels produced based on the average weight of a Neolithic vessel at a site with a recovery rate of 25–30%, Mee (2007a, 201) showed that a much larger number of vessels were in circulation that previously estimated either by weight (Vitelli 1993) or based on the average surface area of a pot (Pyke and Yiouni 1996; Yiouni 2004) if the recovery rate is calculated at 100%. For instance in the Middle Neolithic at Franchthi, Vitelli (1989, 21–22) estimated that 150–175 pots were produced a year, but Mee (2007, 210) calculated 1,875–2,500 vessels a year at Kouphovouno, and 6,250–10,000 a year at Nea Nikomedia. Mee (2007a, 210) also postulated on how long a given vessel was in circulation, and suggested that a cooking pot had a life-span of two years, a storage jar four, while bowls and cups lasted only a year and a half.

Mee (2007a) noted that "Coarse ware" was still not used over a fire or for bulk storage (Vitelli 1992a, 97), as was the case in contemporary Macedonia as with tripod-cooking pots or baking pans (Tsirtsoni 2001, 26–35). Since pottery was not exposed to direct cooking, Mee (2007a, 201) suggests instead that either the vessels were placed near fire to receive radiant heat, or that boiling by adding hot stones could have taken place inside the ceramic vessels, or indeed within baskets, skins, wooden boxes, or even stone bowls. In Mee's (2007a, 212) calculation of the capacities of 53 whole or almost complete Late Neolithic vases illustrated by Phelps (2004), he found that most of the bowls could hold individual rather than family portions (which contrasted with the more communal vessels of the Middle Neolithic, if a capacity of 1.5 liters is indicative of communal usage; Tsirtsoni 2001, 12; Mee 2007a, 304).

Importantly, Mee (2007a, 212) noted that while there is more coarse pottery, yet the vessel size is smaller, which might indicate that pottery was more used and thus needed to be more durable, rather than denoting any lack of skill. Decoration, however, was not dispensed with on serving pots: such ornamentation was used to covey social meanings but also had functional aspects such as reducing porosity and making vessels easier to clean (Mee 2007, 205).

The functions of vessels were determined by Mee (2007a, 204–205) depending on their shape and particular morphological details such as the form of the lip. For instance, he suggested that with their low center of gravity, piriform jars were suited to short-term storage of liquids, although pouring from these vessels would be cumbersome if they had an inturning lip, whereas an everted rim on deep bowls would allow for the contents to be slowly decanted (Mee 2007a, 205). The keeled-bowl on a ring base, Mee notes (2007a, 205), was suggested by Hendrickson and McDonald (1983, 637–638) to have been a yogurt pot, based on Near Eastern parallels. Jacobsen (1984) argued for transhumance as a factor in the trade of Middle Neolithic Urfirnis vessels of a similar shape. Covers could easily be fitted over collar-necked jars, which are good for short-term storage of dry goods (Mee 2007, 204; Rice 1987, 241). Significantly, Mee (2007a, 212) remarked that the "range of shapes was made in a range of wares – there is no correlation between particular shapes and particular wares."

The underlying theme in these approaches is to attempt to reveal the multiple social functions and meanings associated with the consumption of food and drink, since such activities gave structure to daily social intercourse and reinforced cultural values (Urem-Kotsou and Kotsakis 2007, 225). Such integrative approaches are a relatively recent introduction into Greek Neolithic pottery (i.e., Perlès 2001, 196–197, 216–218; Valamoti 2004; Halstead and Barrett 2004). Most publications discuss matters at the regional level and over broad chronological periods comprising both the Neolithic and Bronze Age; individual contexts of food consumption are not considered.

Contributions of Residue Analysis to Undecorated Pottery

Residue analysis (gas chromatography-mass spectrography) on a number of purported "cooking" vessels of different periods and shapes from Makryialos and Dikili Tash have been performed and yielded some rather surprising results; more often than not, they did not contain food remains.

Makryialos

The main Late Neolithic Ia Makryialos cooking pot shapes included large shallow basins, conical and hemispherical bowls, and necked spherical pots rims; all of these were either tempered with shell or medium/fine quartz (Urem-Kotsou, Kotsakis, and Stern 2002b, 112). These so-called cooking pots, however, had no visible evidence of being used over a fire since the exterior bases were oxidized (although the belly to the rim could be sooted), and charred organic remains were found on the inside (Urem-Kotsou, Kotsakis, and Stern 2002b, 112). The choice between these two tempers could be related to technique of cooking: the quartz-tempered fabric is less porous and coarse than the shell-tempered one, which makes the quartz one more appropriate for boiling food, and the shell tempered one for cooking more solid foodstuffs (Urem-Kotsou, Kotsakis, and Stern 2002b, 112)

Urem-Kotsou, Kotsakis, and Stern (2002b) analyzed nineteen sherds from various vessel types (four-handled jars; large, deep conical bowls; and jars of undetermined shape) from ritual Pits Pi and Xi. Only the four-handled jars had visible remains on the interior, which in fact turned out not to be food, but rather bitumen (Urem-Kotsou, Kotsakis, and Stern 2002a; 2002b). This substance was suggested to have been added in order to prevent fermented beverages from spoiling, although there was no evidence that the jars had contained alcohol. This specimen in discussed in more detail in chapter 9.

The deep conical bowls yielded traces of organic material (ketones) but more detailed analysis was not possible. Since the traces of ketones were found on both the interior and the exterior of the bowls, Urem-Kotsou, Kotsakis, and Stern (2002b, 114) suggested that the ketones either migrated through the vessel walls when the pots were used to process food, or that the vases were contaminated post-depositionally by the soil. The jars of indeterminate shape did not produce any results (Urem-Kotsou, Kotsakis, and Stern 2002b, 113). Thus, Urem-Kotsou, Kotsakis, and Stern (2002b, 114) conceded that their “chemical analysis cannot fully support the use of large bowls for cooking,” and that the contributions of residue analysis to the study of Neolithic pottery is not as straightforward as had been hoped for.

In subsequent analysis, it was determined that twelve of the sixteen cooking pots had animal fat from both wild and domesticates, three with only non-ruminant (pig) fat and one with only ruminant (cattle, sheep, or goat); no dairy products were detected (Urem-Kotsou and Kotsakis 2007, 237, 239). It is unclear if this differentiation was due to personal preference or to something required for the feasting event. Baking pans, however, contained only vegetable remains.

Dikili Tash

There are three interesting test cases of residue analysis from Late Neolithic Ia Dikili Tash. First, the tripod cooking pot with only one leg found *in situ* (see above) was sampled for residue analysis, but nothing was identified since the temperature of the fire which destroyed the house that the pot was in was too intense. There are no chemical analyses for any legged Neolithic vessels (Sophronidou and Tsirtsoni 2007, 261–262).

Second, a shattered carinated bowl (presumed to have fallen) contained some material and preserved a thick black crust at the bottom which was thought to be the remains of foodstuff (Maniatis, Treuil, and Tsirtsoni 2001; Maniatis and Tsirtsoni 2002). It was subjected to FTIR (Fourier transform infra-red) spectroscopy to determine if the residue was organic, and (scanning electron microscopy) SEM to determine the morphology of the residue and its state of preservation (Maniatis, Treuil, and Tsirtsoni 2001, 590). This bowl was found next to two intact vessels and a molded *bucrania*, which were *in situ* in a Late Neolithic Ia house ca. 5, 500 B.C. (Darcque and Treuil 1998). Interestingly, of the two complete vessels, one was an empty closed-neck jar and the other was an open bowl which surprisingly contained stone and bone tools as well as perforated shells.

The broken carinated bowl turned out to contain a specific mineral, namely pure iron oxide (Fe_2O_3), although it is impossible to determine if it was hematite (Fe_2O_3 or red ocher) or if it had originally been goethite (FeO [OH], yellow ocher) which had been transformed in the destruction fire (Maniatis, Treuil, and Tsirtsoni 2001, 590). This discovery was the first documented instance of a raw material (Maniatis, Treuil, and Tsirtsoni 2001, 591), one which was locally available in the Lekani Mountains. It was probably used to decorate pottery, but equally possibly walls and bodies (Maniatis, Treuil, and Tsirtsoni 2001, 591).

Lastly, Decavallas (2007) performed organic residue analysis on perforated Late Neolithic Ia (dated to ca. 5,400–4,700) sherds from Dikili Tash, and one from Limenaria on Thassos in the hopes of shedding light on their function. The Limenaria sherd was curved, 1 cm thick with 1–2 mm perforations (ca. 20), but the original vessel shape could not be inferred, while the Dikili Tash sherd belong to the base of a bowl with 3–4 mm perforations in a row (Decavallas 2007, 148, 150). Neither sample had any visible traces of residue.

In both cases, the residue analysis indicated the presence of beeswax (Decavallas 2007, 153, 154), and in particular of heat-altered beeswax, which may imply that the vessels were used as lamps; alternatively, the wax could have been altered in some secondary fire. Decavallas (2007, 154) notes that beeswax is an excellent fuel source, whose use has been confirmed elsewhere in the European Neolithic (at Bercy, Paris in France at 4,600–3,600 B.C., Regert et al. 2001); it has also been confimed on two Final Neolithic *réchaurds* (fruit-stands with deep bowls) from Ftelia on Mykonos (Sampson 2006). Alternatively, based on Vitelli's (1993) suggestion, Decavallas (2007, 153) also proposes that the perforated sherds could have been from beehives.

Petrographic and Experimental Contributions to the Study of Undecorated Pottery

In their attempts to redefine Late Neolithic ceramic classification in Macedonia based on form and function, Tsirtsoni (at Dikili Tash) and Urem-Kotsou (at Makri) also examined what they believed were cooking pots in order to determine if their fabric was suitable to the task and if there was an intentionally selected cooking fabric. Their results are as ambiguous as their respective residue analyses, but many interesting observations on the manufacture of the vessels were made.

Dikli Tash

Tsirtsoni and Yiouni (2002, 104) conducted new petrographic analysis on five baking plates (plateaux), five tripod cooking pots (marmites) and a dozen other vessels (including large jars, medium to large-sized globular or biconical pots, large bowls with handles and two medium-sized pots with painted decoration) in order to determine whether any fabrics were more suitable for cooking; all but two sherds belonging to jars were from vessels belonging to the Late Neolithic Ia (Dikili Tash I). Tsirtsoni and Yiouni (2002, 104) also re-examined fifty-four old thin sections for comparison that were studied by L. Courtois (2004), but at the time of their writing had not yet been published.

Both the baking plates and the tripod cooking pots were made of medium to coarse micaceous or igneous-tempered fabric and contained metamorphic inclusions. But these fabrics were not exclusively used for baking pans and tripod cooking pots; they were also employed for Graphite-painted, Graphite and Incised, and undecorated pottery; the micaceous fabric was also used for jars, a globular pot and large bowls (Tsirtsoni and Yiouni 2002, 105). One plate of medium to coarse fabric contained quartz and no mica, and in another plate only vegetable temper was used (Tsirtsoni and Yiouni 2002, 105, 106). In all cases except for the vegetable-temper, the non-plastics were abundant (20-40%) and ranged from very fine to very coarse. The micaceous fabric was similarly also used for jars, a globular pot and large bowls (Tsirtsoni and Yiouni 2002, 105)

From their analysis, Tsirtsoni and Yiouni (2002, 106) concluded that there was no obvious “cooking” fabric, and that the raw material choices were related to the manufacturing of the pots, not their intended function. They (Tsirtsoni and Yiouni 2002, 106) also remarked on the rare use of calcareous clays, which were used only for a few painted wares, even though calcareous clay deposits are abundant around the site.

Makri

Markri is the only systematically excavated site in Aegean Thrace. No radio carbon dates are available, but its two phases rough correlate to Late Neolithic Ia and Ib.

Urem-Kotsou (1998) studied the pottery with the view of recognizing phases within the site, use of space, and to consider how the pottery was produced. Yiouni (1995) examined the technology of the pottery from the second phase (Makri II).

Urem-Kotsou's work (1998, 30) was based on vase-shape, temper (what and how much), and surface (color, decoration, and treatment). These were analyzed macroscopically, and microscopically. The technology and production of the vessels were also explored through experimental reconstructions.

The pottery from the earlier phase (Makri I) was mostly dark-faced and mostly undecorated, although incision, impression and some painted sherds were recovered. An interesting feature was that many of the pots were found to have short legs (Urem-Kotsou 1998, 30), which may reveal connections with Karanovo in Bulgaria, as Keighley (1986) suggested for the Sitagroi examples.

The pottery from the later phase (Makri II) was essentially the same as the preceding, although the number of decorated sherds increased, and include Black-on-red and Graphite-painted. Several new elements were also introduced, such as sharply carinated shapes, plates with thickened rims, high-legged vessels, Black-and-red-topped vessels, incised pedestals with white paste infill, horn handles, and channeled and raised plastic decoration (Urem-Kotsou 1998, 32). Urem-Kotsou (1998, 32) remarked that the vast majority of the shapes were open, which goes against the notions of increased personal storage in the Late Neolithic. She (Urem-Kotsou 1998, 32) considered the majority of the pottery to be tableware, since there was no evidence of pots used for cooking on an open flame, although the fabrics used would have allowed any pot to be employed for this purpose.

Thirty thin sections were examined by Yiouni (1995) on the pottery from this later phase. Six petrographic groups were recognized. There was no noted relationship between fabric and shape, with the exception of a chaff-tempered fabric (Type A), which was used on large vessels with relief decoration (Yiouni 1995, 612). Yiouni (1995, 612) notes that the use of chaff temper is interesting because it is not regularly documented in Eastern Macedonia (or elsewhere in Neolithic Greece during the Late Neolithic, Treuil 1983, 191; Yiouni 1991, 156), with only a few sporadic examples reported, such as at Sitagroi. In the Balkans, the practice is more widespread (Tringham 1971, 171).

Yiouni (1995, 620) concluded that while ethnoarchaeological and technological research suggests that fabric and shapes have a relationship which may imply a particular usage, this hypothesis was not substantiated by the finds at Makri. Here, rather, any fabrics could be used to make any shapes. The only noted correlation was the chaff-tempered fabric for large vessels with relief decoration. Similarly, while some fabrics (B, C, D, and E) were suitable for cooking, there was no use-wear alteration (like sooting) or use of other morphological elements (string holes for suspension over a fire, lugs, or legs to support the vessels; Yiouni 1995, 620).

The vessels were fired at 750–800°C. Many of their sherds were mottled, which indicates that they were fired with the fuel (Yiouni 1995, 617). In the experimental firings, a domed oven was built (modeled from an example from Stara Zagora in Bulgaria): the firings had a 50% success rate due to the fact that many vessels cracked from not having been dried enough (Urem-Kotsou 1998, 34).

Yiouni (1995, 614) made some interesting observations on the coil construction of the vessels. She noted that the coils were not placed on top of on another but instead were attached using a diagonal overlapping or tongue-and-groove technique, the latter being more common. The use of diagonal coiling-technique is attested elsewhere in Early and Middle Neolithic (i.e., at Sesklo, Wijnen 1981; Vans As and Jacobs 1988; Kotsakis 1981; Franchthi and Lerna, Vitelli 1984). Carinated shapes often had an additional coil added at the carination, making the transition thicker, and an additional coil may have been used at the rim.

In a similar way, some bases were thickened by an additional disk, and often preserve impressions of the mat on which the vessel sat either while it was being worked or while it was drying. Handles were thrust (or “locked”) into the vessel wall, with wet clay smeared on the exterior to cover the join; in theory this is a good idea, but in fact the handles break off at the point of attachment, which indicates that they were applied when they were rather too dry (Yiouni 1995, 616). Red-burnished sherds were determined to be coated with a self-slip (with added pigment).

CHAPTER 14: MINOR PAINTED STYLES: WHITE-ON-RED, RED-ON-WHITE, AND URFIRNIS

Red-on-white and White-on-red Painted Pottery (Figures 106–107)

Red-on-white continued to be produced in some areas like Central Greece into the Late Neolithic Ia. It has not yet been established when Red-on-white pottery of the Middle Neoithic tradtion (Red-on-white painted ware, Wace and Thompson 1912, 14) ceases to be produced (Sampson 2008b); sporadic and unrelated Red-on-white sherd are also found in Macedonia, such as at Sitagroi (Phases II, Keighley 1986, 356).

Conversly, White-on-red painted pottery of the Early and Middle Neolithic (A3β and A3γ, Wace and Thompson 1912, 14) were no long produced, but continued to experimented with in the Late Neolithic. The most distinctive instance begins and ends in the middle of Late Neolithic Ib, just before the Classic Dimini phase and is found only in north-eastern Thessaly (Holmberg 1964b, 31). Wace and Thompson (1912, 16) classified it as "B3α White on red polished ware," the first type of painted ware in the Classic Dimini Style; however, like Polychrome Arapi ware (B3γ), it ceased to be produced before the Classic Dimini style was produced (Holmberg 1964b, 32), similar to Black-on-red (B3α2) with which it has stylistic and morphological similarities.

The motifs include ones from earlier painted styles like Black-burnished and Arapi Polychrome, such as isolated zig-zags, checkerboards, broad areas filled with cross-hatching, ladder motifs, hatched zig-zags, solid flames, and herring bone, but arcs an spirals are also used. The main shapes are Dimini-type bowls, deep bowls, fruit-stands, and collared jars. As a rule it is burnished and made of a rather thick fabric (Wace and Thompson 1912, 16). Wace and Thompson (1912, 16) noted that the surface varied from red to yellow-buff and concluded that some specimens were fired in a oxidized environment and that at times a red slip was used.

Urfirnis (Figure 108)

Urfirnis was first produced in the Middle Neolithic in the Northeastern Peloponnese, but at the end of the Middle Neolithic spread northwards into Akarnania, Central Greece, Attica, and Euboea and in these areas, it should be considered a transitional ware between the Middle and Late Neolithic, rather than a delay introduction of the ware (Phelps 1986, 372; Sampson 2008a, 107). It has no relationship with the Near Eastern Halaf or Ubaid cultures, as suggested by Weinberg (1965, 285).

This late Urfirnis ware rarely utilizes patterns and instead is applied as an overall wash. For instance, at Franchthi, Jacobsen (1969, 363, 369, 342) stated that the later pieces resemble the earlier thin slipped "inferior" versions, and that at Corinth, too, nearly all the examples were monochrome. Late Neolithic Urfirnis motifs are more limited than Peloponnese, mostly broad bands, washes, and zigzags, and the shapes are standard Late Neolithic Ia: fruit-stands, open bowls, wide mouth, round shoulder bowls, etc. (Sampson 2008a, 108).

These late Urfirnis variations probably relate to its relationship with Late Neolithic Matt Black-on-red painted pottery, which Weinberg (1965; 40), Lavezzi (1978; 418, 422–423) and Phelps (2004; 17, 64) see as a transitional ware to Matt Paint pottery. In fact, in all of the publications there is confusion is assigning pieces to the various categories painted Urfirnis, Black-on-red, Matt-painted, or Polychrome (see chapters 3, 4, and 5).

Urfirnis technology was a hallmark of Middle Neolithic ceramic pyrotechnology. It uses a fine, well-levigated iron-oxide slip which sinters during firing to create a glassy, pseudo-glaze (Farnsworth and Simmon 1963; Nnoll, Holm, and Born 1975, 606). Urfirnis vessels were fired using the iron reduction technique, and based on refiring tests, at temperatures no higher than 800–850°C (Vitelli 1974). The advantage of the Urfirnis slip is that is eliminated the laborious step of burnishing in order to produce a lustrous vessel with reduced porosity.

It should be noted that the name "Urfirnis" is problematic for several reasons. First, the term was created by Furtwaengler and Bulle at Orchomenos (1907) to describe Helladic pottery in Central Greece, and Kunze (1931) distinguished Neolithic Urfirnis from the later version. Second, from a technological standpoint it is not a glaze, though it is often referred to as such. Third, the name "Urfirnis" is applied to both Neolithic and Early Helladic pottery. Fourth, in attempts to avoid confusion with its later counterpart, many scholars invent their own terms to describe their ware, which leads not only to a profusion of terminology but also results in differences in how the ware is defined.

Even Vitelli (1993;11), who is best known for her extensive study of "Urfirnis" pottery did not call it "Urfirnis" and she explicitly stated that the designation of "Urf" was intended to clarify and differentiate from the confusion of past scholarship. An instance of her application of this is that Jacobsen (1969, 363, 369, 342) describes Late Neolithic Urfirnis, while Vitelli (1999a, 35) says that Urf did not continue to be produced at Franchthi after the Middle Neolithic (perhaps because there was a gap in occupation between the two periods).

Some other names for Urfirnis include: Πρωτομένους γανώματος (Sotiriades 1910; 11), Black Lustre Ware (Wace and Thompson 1912, 21), Corinthian Brown (Walker-Kosmopoulos 1948; 3–4, 36–37), Corinthian Urfirnis (French 1972; 8), Red-brown glazed ware (Caskey and Caskey 1960; 131), Glazed Ware (Jacobsen 1969; 236), Glaze Patterned Ware (1944; 49–54), and Céramique a Englobe Orange Lustré (Touchais et al. 1981; 143–144). In Central Greece, French (1972; 8–9, 14–15) suggested re-naming it "Brown Wash**"** to distinguish it from the earlier versions. Lavezzi (1978; 2003) provides the clearest presentation and definition of these Urfirnis variants and their evolution.

Late Neolithic Urfirnis is found at Lerna (Caskey 1957, 161), Skoteini Cave (Sampson 1993, 62), Sarakenos Cave (Sampson 2008a, 107), Kitsos Cave (Lambert 1981, 317; Lambert 1970, 758), Orchomenos (Kunze 1931, 31) and Elateia (Weinberg 1962), Varka (Sampson 1977, 21), Corinth (Lavezzi 1978, 423; 2003, 68–69), Kouveleiki Cave at Alepochori in Laconia (Koumouzeli 1989, 143), Kouphovouno (Mee 2007a, 210), Eutresis (Goldman 1931; Caskey and Caskey 1960) and the Corycian Cave (Touchais 980, 771), and Nea Makri (Theocharis 1956, 20). Sampson (2008a, 209) states that the claims of imported Urfirnis at Pryasos (Theocharis 1959b, 52–54, fig. 21) and Ithaca (Dörpfield 1927) are probably in error, and that Theocharis (1959a, 287) Late Neolithic Urfirnis at Varka really belongs to the Middle Neolithic. Phelps (1986, 372) also notes that the "imported" Urfirnis at Servia Ridley and Wardle (1979, 210) was not definitively proved using chemical analysis.

During the 1,000 years of the Late Neolithic period in Greece, the ceramic repertoire expanded greatly in every way. New shapes were created—some intended for special functions, ceramic vessels circulated further distances than ever before, and many different technologies were embraced for the first time such as the use of graphite paint, selective smudging (Black-topped), and possibly the use saggars. Some technologies, like the use of the iron reduction technique in Macedonia, were new to a one geographic area, whereas they had been used earlier in the Neolithic elsewhere in Greece. This is an interesting observation because it shows that clearly certain types of pottery were thought necessary to produce, such as Black-burnished pottery, but were done so using different technologies in order to create the same effect. It also demonstrates that ceramic pyrotechnology did not develop in a linear fashion from less to more complex techniques.

Letsch and Noll (1983, 110) suggested that the multiplicities of methods were occasionally stimulated by external influences; this hypothesis is difficult to prove and perhaps overly complicated. Clear stylistic (but not technological) interaction from neighboring cultures, however, is attested to in the ceramic repertoire of the Late Neolithic Greece with Čakran, Danilo-Hvar, and Vinča A during the Late Neolithic Ia and Veselinovo-Karanovo III, Gradešnica A, Marica I, and Vinča B-C in the Late Neolithic Ib, but these foreign stylistic attributes never dominated the ceramic assemblage.

Rather than being dependent on foreign inspiration, Greek Neolithic potters were independently highly inventive and not as conservative as portrayed in much of the literature. There were able to create an extremely wide variety of shapes and decorative styles using a rather restricted set of materials and pryotechnologies available to them. For instance, Neolithic potters experimented stylistically with a limited color palette of black, white, red, and tan-brown; these colors were often executed not only by using different technologies (sometimes at the same time), but also on a range shapes. This versatility is the mark of true crafts(wo)men. While specialization of potters and potting techniques—including the use of ceramic kilns—may have existed in the Late Neolithic, it has not been definitively proven. It is interesting to note, however, that specialization has been suggested for nearly every class of Late Neolithic pottery.

Looking at one site, such as Late Neolithic Ia Skoteini Cave, for instance, shows that a diversity of painted, incised, and monochrome wares and special shapes were produced at the same time, including: Urfirnis, Matt-painted, Matt-painted Polychrome, Black-burnished, Gray-burnished, Type 1 and 2 Incision, rhyta and scoops. Each of these types of pottery was made by a different technical process, which reflects great skill, expertise, and flexibility on behalf of a Neolithic potter. It also reveals an awareness and contact with more distant Neolithic communities, as in the case of rhyta from the Adriatic and Urfirnis from the Peloponnese.

While the patchiness of past scholarship and the small scale of excavated sites do not allow for an equal comparison with recent work from Macedonia in terms of contextual analysis of Late Neolithic pottery, two things are clear. First, Late Neolithic pottery was used in many locations, from pits, houses, hearths, open spaces, caves, to burials. Second, ceramics were used for not only for more than one purpose, but that the ceramics remained in circulation even when broken.

For instance, repairs were attempted on all types of broken pottery, either through drilling holes and tying the pieces with string or leather, or by gluing them with an adhesive such as bitumen. If a pot could not be mended, the pieces could be reused in a number of other ways, such as burnishers, spindle whorls, awls, as lids or plates (as in Linearbandkeramik culture; Modderman 1977), in the substructure of clay floors (Souvatzi 2008, 118), or for more symbolic uses, such as tokens of exchange or *tangas* (pubic covers; Banks 1977).

Some types of pottery, like rhyta and Black-burnished, seem to have been intentionally destroyed (i.e., Vitelli 1989; Walker-Kosmopoulos 1948; Weinberg 1962; 1965 Jacobsen 1964; 1989); similar arguments have also been made for some Neolithic figure types (Talatay 1987; 1993). It is suggested (Chapman 1981; 2000; Chapman and Gaydarska 2006) that ritual destruction of ceramic objects in the Balkan Neolithic is an integral part of society because the vessels were embedded in a cycle of interaction between individuals, groups, and other material objects through their production, exchange, and consumption; thus, the vessels were not merely passive utilitarian containers but rather highly charged with social meaning ("agency"). In these cases, deliberate breakage is interpreted as an innovative social mechanism aimed at neutralizing growing social stratification (based on material accumulation), rather than affirming it. Similarly, ritual feasting at sites like Promachon-Topolnica (the Phase I b, communal subterranean building) and Late Neolithic Ia Makryialos (Phase I, Pit Pi/Pit 212) are suggested to be a mechanism for maintaining equality and not aggrandization.

What is interesting about these proposals is that it reflects the "major historical moment of transformation" (Demoule, Gallis, and Manolakakis 1988) of the Late

Neolithic throughout the Balkan Peninsula, which is marked by the proliferation of individualization (Vajsov 2007, 93; Todorova 1993, 79–83). Indeed, the salient feature of Late Neolithic pottery is both the coexistence of well-defined classes (i.e., Polychrome, Matt-painted, Black-burnished) and vessel types (i.e., convex bowls, carintated bowls, and fruit-stands) that existed over broad geographic areas, yet within each smaller region, highly localized firing techniques and stylistic distributions were used (Phelps 1986, 373; Souvatzi 2008, 127; Perlès and Vitelli 1999; Urem-Kotsou and Dimitirades 2004, 319; Vlachos 2009, 27). .

This coexistence undoubtedly reflects the status of pottery as symbols of both individual and group identity. To some extent, the visibility of pottery contributed to maintaining the broader uniformity of material culture and in facilitating interactions; yet it also allowed for enough specificity and individuality to expresses a particular social identity (Souvatzi 2008, 225), which may also be reflected in attempts to "personalize" particular pot, such as with added-plastic "potter's marks" (Vitelli 1977) or through rippling (Kalogirou 1994).

Recent work has shown that Late Neolithic vessels were used as containers not only for foodstuffs, as is commonly assumed, but as containers for tools, raw materials, and burials (both as containers for the dead and as offerings). Pottery was, of course, also used for processing/preparing, cooking, presenting/serving, and consuming food. While it seems that most vessels were not placed directly over a fire, some—like baking pans and tripod cooking pots—were used to cook food with indirect heat by placing the vessels near a fire, in an oven, or into a bed of ashes or hot coals. Other containers, such as leather bags, wooden bowls, or baskets coated with bitumen could have also facilitated that preparation and cooking of food.

While the absence of large *pithoi* initially seems to indicate a lack of surplus or bulk storage, there is no reason why it could not have been facilitated by several smaller and medium-sized containers, which is perhaps manifest in the vast increase in the amount of pottery produced in the Late Neolithic as compared to the Early and Middle Neolithic. Similarly, the current lack of definitive evidence for manufacturing dairy products in the Greek Late Neolithic based on a few residue studies should not rule out their production. Both primary and secondary food stuffs could have been stored in ceramic containers or preserved either with salt, brine, vinegar, or honey (Betancourt 2008, 98). In any case, the advantage of ceramic containers is that they are impervious to vermin, insects, and decay (unlike baskets, wooden boxes, or leather sacks) and were thus a vast improvement in assisting the Late Neolithic people to survive off of stored surplus from one harvest to the next (Betancourt 2008, 108).

The extent to which people and objects of were circulating cannot be quantitatively determined for the Late Neolithic period, since few studies examine more than one class of artifact (Perlès 1992; Vitelli 1993; Perlès and Vitelli 1999 are exceptions). Well documented items of long distance trade such as *spondylus*, ring idols, and obsidian suggest that other items, including perishable ones like salt, spices, and cloth may have also traveled long distances. At times, Late Neolithic also traversed vast geographic regions, such as with Black-on-red imports from Eastern Macedonia found in Thessaly, the circulation of Thessalian Gray-on-gray painted pottery, and the Classic Dimini style of Matt-painted pottery in Central Macedonia and at Phthiotic Thebes. What is most interesting, however, is that valued items of trade such as ring idols, *spondylus*, and salt have relationships with ceramics; not only in providing a container but also in providing inspiration for the decoration and shape.

The interaction between ceramic and non-ceramic objects in Late Neolithic pottery is striking. First there is the varied range of materials used to make the pot; beginning with the clay, several types of clay were used at one time, as were added plastic inclusions, and different mineral pigments were ground and added to slips. The tools used to decorate the pottery consisted of stone, bone, wood, bark, grass, and leather. Many shapes appear to be skeuomorphs of forms found in stone, wood, basketry, and metal. Similarly, the motifs are also inspired by these media, as well as by objects from daily life, and they also feature zoomorphic or anthropomorphic aspects.

CONCORDANCE OF IMAGES

I redrew images from published sites in an attempt to present the material is a standardized way; the only shortcut I took was in flipping Phelps's (2004) images so that his sherds are now backwards, but the profiles on the correct side. Most are at a 1:3 scale, any discrepancies are noted.

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(Figures 1–6 are my own)

Fig. 7	SITE	CITATION
1	Dimini	Tsoundas 1908, pl. 23, no. 3
2	Dimini	Tsoundas 1908, pl. 23, no. 4
3	Sesklo	Tsoundas 1908, pl. 23, no. 5
4	Tsangli	Wace and Thompson 1912, fig. 54, b
5	Sarakenos Cave	Sampson 2008a, fig. 65, no. 743
6	Alepotrypa Cave	Papathanassopoulos 2011, fig. 186
7	Elateia	Theocharis 1979, fig. 199

Fig. 8	SITE	CITATION
1	Corinth	Phelps 2007, fig. 38, no. 8
2	Corinth	Phelps 2007, fig.39, no. 16
3	Aria Argolidos	Douzougli 1994, fig. 41, no. 147

4	Alepotrypa Cave	Papathanassopoulos 2011, fig. 134
5	Tsangli	Hauptmann and Milojčić 1969, fig. 21, no. 4
6	Tsangli	Hauptmann and Milojčić 1969, fig. 22, no. 5
7	Corinth	Phelps 2007, fig. 38, no. 32
8	Otzaki	Hauptmann 1981, fig. 73, no. 10

Fig. 9	**SITE**	**CITATION**
1	Franchthi Cave	Vitelli 1999, fig. 31, f
2	Skoteini Cave	Alram-Stern 1996, fig. 20, a
3	Sarakenos Cave	Sampson 2008a, fig. 66, no. 797
4	Sarakenos Cave	Sampson 2008a, fig.80, 970
5	Skoteini Cave	Sampson 1993, fig. 64, no. 40
6	Otzaki	Hauptmann and Milojčić 1969, fig. 21, no. 2
7	Sarakenos Cave	Sampson 2008a, fig. 71, no. 998
8	Tsangli	Wace and Thompson 1912, fig. 53, a
9	Skoteini Cave	Sampson 1993, fig. 70, no. 818
10	Rachmani	Hauptmann 1981, fig. 93, no. 1
11	Skoteini Cave	Sampson 1993, fig.66, no. 76
12	Sarakenos Cave	Sampson 2008a, fig. 70, no. 835

Fig. 10	**SITE**	**CITATION**
1	Aria Argolidos	Douzougli 1994, fig. 21, no. 157
2	Otzaki	Hauptmann 1981, fig. 32, no. 6
3	Tsangli	Hauptmann and Milojčić 1969, fig. 22, no. 9
4	Aria Argolidos	Douzougli 1994, fig. 42, no. 158
5	Otzaki	Hauptmann 1981, fig.73, no. 9
6	Otzaki	Hauptmann 1981, fig. 17, no. 9

7	Franchthi Cave	Vitelli 1999, fig. 36, h
8	Sarakenos Cave	Sampson 2008a, fig. 64, no. 744
9	Skoteini Cave	Sampson 1993, fig. 70, no. 184
10	Sarakenos Cave	Sampson 2008a, fig.70, no. 838

Fig. 11	**SITE**	**CITATION**
1	Alepotrypa Cave	Papathanassopoulos 2011, fig. 138
2	Otzaki	Hauptmann and Milojčić 1969, fig. 21, no. 8
3	Skoteni Cave	Sampson 1993, fig. 72, no. 215
4	Arapi	Hauptmann and Milojčić 1969, fig. 24, no. 4
5	Sarakenos Cave	Sampson 2008a, fig. 65, no.1585
6	Sarakenos Cave	Sampson 2008a, fig. 80, no. 967
7	Sarakenos Cave	Sampson 2008a, fig. 80, no. 142

Fig. 12	**SITE**	**CITATION**
1	Aria Argolidos	Douzougli 1994, fig. 36, no. 119
2	Sarakenos Cave	Sampson 2008a, fig. 69, no. 810
3	Franchthi Cave	Vitelli 1999, fig.23, b
4	Tsangli	Hauptmann and Milojčić 1969, fig. 22, no.7
5	Franchthi Cave	Vitelli 1999, fig. 37, f
6	Tsangli	Hauptmann and Milojčić 1969, fig. 22, no. 8
7	Skoteini Cave	Sampson 1993, fig. 65, no. 51
8	Sarakenos Cave	Sampson 2008a, fig. 80, no. 988

Fig. 13	**SITE**	**CITATION**
1	Sarakenos Cave	Sampson 2008a, fig. 77, no. 1260
2	Franchthi Cave	Vitelli 1999, fig. 34, k

3	Franchthi Cave	Vitelli 1999, fig. 13, d
4	Sarakenos Cave	Sampson 2008a, fig. 75, 1259
5	Skoteini Cave	Sampson 1993, fig. 63, no. 19
6	Sarakenos Cave	Sampson 2008a, fig. 75, no. 1085
7	Alpeotrypa Cave	Papathanassopoulos 2011, fig. 140
8	Tsangli	Hauptmann and Milojčić 1969, fig. 21, no. 9
9	Sarakenos Cave	Sampson 2008a, fig. 84, no. 1085

Fig. 14	**SITE**	**CITATION**
1	Skoteini Cave	Sampson 1993, fig. 72, no. 216
2	Aria Argolidos	Douzougli 1994, fig. 44, no. 167
3	Dikili Tash	Tsirtoni 2001, fig. 2
4	Sarakenos Cave	Sampson 2008a, fig. 78, no. 1562
5	Phthiotic Thebes	Hauptmann and Milojčić 1969, fig. 8, no. 23
6	Tsangli	Hauptmann and Milojčić 1969, fig. 21, no. 5
7	Elateia	Kunze 1931, pl. II, no. 2

Fig. 15	**SITE**	**CITATION**
1	Dimini	Tsoundas 1908, pl. 1, a,b
2	Dimini	Tsoundas 1908, pl. 9
3	Sesklo	Tsoundas 1908, pl. 20, no. 2
4	Tsangli	Tsoundas 1908, pl. 26, no. 1
5	Dimini	Tsoundas 1908, pl. 21, no. 4

Fig. 16	**SITE**	**CITATION**
1	Sesklo	Tsoundas 1908, pl. 24, no. 5
2	Dimini	Tsoundas 1908, pl. 24, no. 1
3	Dimini	Tsoundas 1908, pl. 24, no. 2

4	Sesklo	Tsoundas 1908, pl. 21, no. 2
5	Dimini	Tsoundas 1908, pl. 23, no. 4
6	Sesklo	Tsoundas 1908, pl. 28, no. 3
7	Sesklo	Tsoundas 1908, pl. 29, no. 1
8	Dimini	Tsoundas 1908, pl. 26, , no. 6
9	Sesklo	Tsoundas 1908, pl. 27, no. 3
10	Dimini	Tsoundas 1908, pl. 25, no. 4
11	Dimini	Tsoundas 1908, pl. 28, no. 2

Fig. 17	SITE	CITATION
1	Dimini	Hauptmann 1981, fig. 93, no. 9
2	Phthiotic Thebes	Hauptmann 1981, fig. 93, no. 8
3	Phthiotic Thebes	Hauptmann 1981, fig. 93, no. 4
4a	Agrissa	Hauptmann 1981, fig. 88, no. 14a
4b	Agrissa	Hauptmann 1981, fig. 88, no. 12b

Fig. 18	SITE	CITATION
1	Akropotamos	Mylonas 1941, fig. 3, no. 2
2	Akropotamos	Mylonas 1941, fig. 3, no. 3
3	Promachon-Topolnica	Vajsov 2007, fig. 9, no. 8
4	Promachon-Topolnica	Vajsov 2007, fig. 9, no. 7
5	Akropotamos	Mylonas 1941, fig. 3, no. 5
6	Akropotamos	Mylonas 1941, fig. 3, no. 4
7	Promachon-Topolnica	Vajsov 2007, fig. 9, no. 1
8	Promachon-Topolnica	Vajsov 2007, fig. 9, no. 5
9	Promachon-Topolnica	Vajsov 2007, fig. 22, no. 1
10	Promachon-Topolnica	Vajsov 2007, fig. 22, no. 4
11	Promachon-Topolnica	Vajsov 2007, fig. 22, no. 2

12	Promachon-Topolnica	Vajsov 2007, fig. 26A, no. 14
13	Promachon-Topolnica	Vajsov 2007, fig. 26A, no. 18
14	Promachon-Topolnica	Vajsov 2007, fig. 26A, no. 12
15	Promachon-Topolnica	Vajsov 2007, fig. 26A, no. 2
16	Promachon-Topolnica	Vajsov 2007, fig. 26A, no. 7

Fig. 19	**SITE**	**CITATION**
1	Promachon-Topolnica	Vajsov 2007, fig. 26A, no. 6
2	Promachon-Topolnica	Vajsov 2007, fig. 26B, no. 2b
3	Promachon-Topolnica	Vajsov 2007, fig. 26B, no. 6b
4	Promachon-Topolnica	Vajsov 2007, fig. 26B, no. 3
5	Promachon-Topolnica	Vajsov 2007, fig. 26B, no. 9

Fig. 20	**SITE**	**CITATION**
1	Promachon-Topolnica	Vajsov 2007, fig. 24, no. 12
2	Promachon-Topolnica	Vajsov 2007, fig. 14, no. 9
3	Promachon-Topolnica	Vajsov 2007, fig. 24, 11
4	Dikili Tash	Tsirtsoni 2001, fig. 2, no. 4
5	Promachon-Topolnica	Vajsov 2007, fig. 14, no. 3
6	Promachon-Topolnica	Vajsov 2007, fig. 14, no. 3
7	Promachon-Topolnica	Vajsov 2007, fig. 14, no. 10
8	Promachon-Topolnica	Vajsov 2007, fig. 14, no. 11
12	Akropotamos	Mylonas 1941, fig. 3, no. 5
13	Akropotamos	Mylonas 1941, fig. 3, no. 6
14	Akropotamos	Mylonas 1941, fig. 3, no. 7
15	Akropotamos	Mylonas 1941, fig. 2, no. 10

Fig. 21	**SITE**	**CITATION**

1	Corinth	Phelps 2007, fig. 36, no. 6
2	Corinth	Phelps 2007, fig. 36, no. 15
3	Corinth	Phelps 2007, fig. 36, no. 4
4	Corinth	Phelps 2007, fig. 36, no. 7
5	Elateia	Weinberg 1962, fig. 9

Fig. 22	SITE	CITATION
1	Cave of the Cyclops	Sampson 2008b, fig. 4.4 no. 7999
2	Franchthi Cave	Vitelli 1999, fig. 12, no. 9
3	Cave of the Cyclops	Sampson 2008b, fig. 4.3, no. 798
4	Cave of the Cyclops	Sampson 2008b, fig. 4.3, no. 796
5	Franchthi Cave	Vitelli 1999, fig. 12, b
6	Franchthi Cave	Vitelli 1999, fig. 12, c
7	Corcyian Cave	Touchais et al. 1981, fig. 25, no. 346
8	Corcyian Cave	Touchais et al. 1981, fig. 25, no. 348b
9	Cave of the Cyclops	Sampson 2008b, fig. 4.3, no. 796.1
10	Corcyian Cave	Touchais et al. 1981, fig. 36, no. 16
11	Sarakenos Cave	Sampson 2008a, fig. 67, no. 980
12	Sarakenos Cave	Sampson 2008a, fig. 74, no. 1316
13	Sarakenos Cave	Sampson 2008a, fig. 74, 1064

Fig. 23	SITE	CITATION
1	Sesklo	Tsoundas 1908, pl. 8, no. 1
2	Dimini	Tsoundas 1908, pl. 25, no. 3
3	Sesklo	Tsoundas 1908, pl. 8, no. 2
4	Dimini	Tsoundas 1908, pl. 25, no. 5
5	Sesklo	Tsoundas 1908, pl. 25, no. 2
6	Sesklo	Tsoundas 1908, pl. 24, no. 9

7	Dimini	Tsoundas 1908, pl. 28, no. 5
8	Tsangli	Wace and Thompson 1912, fig.57, f
9	Sesklo	Tsoundas 1908, pl. 12
10	Sesklo	Tsoundas 1908, fig. 22
11	Otzaki	Hauptmann 1981, pl. B, no. 2
12	Rachmani	Wace and Thompson 1912, pl. 1
13	Sesklo	Tsoundas 1908, fig. 118

Fig. 24	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 77, no. 5
2	Agrissa	Hauptmann 1981, fig. 86, no. 3
3	Otzaki	Hauptmann 1981, fig. 19, no. 5
4	Otzaki	Hauptmann 1981, fig. 24, no. 9
5	Arapi	Hauptmann and Milojčić 1969, fig. 6, no. 1a,b

Fig. 25	**SITE**	**CITATION**
1	Rachmani	Hauptmann and Milojčić 1969, no. 23, no. 6
2	Rachmani	Wace and Thompson 1912, fig. 11, b
3	Otzaki	Hauptmann 1981, fig. 15, no. 12

Fig. 26	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 19, no. 2
2	Otzaki	Hauptmann 1981, fig.78, no. 9a, b
3	Otzaki	Hauptmann 1981, fig. 16, no. 5
4	Otzaki	Hauptmann 1981, fig. 67, no. 5
5	Otzaki	Hauptmann 1981, fig. 67, no. 6

Fig. 27	**SITE**	**CITATION**

1	Sitagroi	Evans 1986, fig. 12.10, no. 4
2	Sitagroi	Evans 1986, fig. 12.8, no. 4
3	Sitagroi	Evans 1986, fig. 12.10, no. 3
4	Sitagroi	Evans 1986, fig. 12.8, no.8
5	Dimitra	Grammenos 1997a, fig. 29, no. 251
6	Dimitra	Grammenos 1997a, fig. 29, no. 255
7	Sitagroi	Evans 1986, fig. 12. 18, no. 2

Fig. 28	**SITE**	**CITATION**
1	Dimitra	Grammenos 1997a, fig.30, no. 457
2	Kryoneri	Tsirtsoni et al. 2007, fig. 1
3	Sitagroi	Evans 1986, fig. 12.19, no. 3
4	Sitagroi	Evans 1986, fig. 12.10, no. 1

Fig. 29	**SITE**	**CITATION**
1	Dikili Tash	Welsch 1918–1919, fig. 1, a-b
2	Dikili Tash	Welsch 1918–1919, fig. 1, d
3	Dikili Tash	Welsch 1918–1919, fig. 1, h
4	Dikili Tash	Welsch 1918–1919, fig. 1, j
5	Dikili Tash	Welsch 1918–1919, fig. 1, i
6	Dikili Tash	Welsch 1918–1919, fig. 1, k
7	Dikili Tash	Welsch 1918–1919, fig. 1, l
8	Dikili Tash	Welsch 1918–1919, fig. 1, e
9	Dikili Tash	Welsch 1918–1919, fig. 1, f
10	Dikili Tash	Welsch 1918–1919, fig. 1, m
11	Dikili Tash	Welsch 1918–1919, fig. 1, n

12	Dikili Tash	Welsch 1918–1919, fig. 1, q
13	Dikili Tash	Welsch 1918–1919, fig. 1, o
14	Dikili Tash	Welsch 1918–1919, fig. 1, s
15	Dikili Tash	Welsch 1918–1919, fig. 1, p

Fig. 30	**SITE**	**CITATION**
1	Promachon-Topolnica	Vajsov 2007, fig. 24, no. 8
2	Promachon-Topolnica	Vajsov 2007, fig. 24, no. 15
3	Promachon-Topolnica	Vajsov 2007, fig. 24, no. 9
4	Promachon-Topolnica	Vajsov 2007, fig. 24, no. 3
5	Promachon-Topolnica	Vajsov 2007, fig. 24, no. 16
6	Promachon-Topolnica	Vajsov 2007, fig. 24, no. 4
7	Promachon-Topolnica	Vajsov 2007, fig. 24, no. 1
8	Promachon-Topolnica	Vajsov 2007, fig. 24, no. 6
9	Promachon-Topolnica	Vajsov 2007, fig. 24, no. 5
10	Promachon-Topolnica	Vajsov 2007, fig. 12, no. 20
11	Promachon-Topolnica	Vajsov 2007, fig. 12, no. 12
12	Promachon-Topolnica	Vajsov 2007, fig. 12, no. 27

Fig. 31	**SITE**	**CITATION**
1	Sarakenos Cave	Sampson 2008a, fig. 73, no. 239
2	Sarakenos Cave	Sampson 2008a, fig.61, no. 785
3	Franchthi Cave	Vitelli 1999, fig. 14, c
4	Sarakenos Cave	Sampson 2008a, fig. 81, no. 856
5	Skoteini Cave	Sampson 1993, fig.67, m98
6	Skoteini Cave	Sampson 1993, fig. 73, no. 237
7	Sarakenos Cave	Sampson 2008a, fig. 83, 854
8	Skoteini Cave	Sampson 1993, fig.65, no. 157

9	Franchthi Cave	Vitelli 1999, fig.14, d
10	Sarakenos Cave	Sampson 2008a, fig. 83, no. 1009

Fig. 32	**SITE**	**CITATION**
1	Sarakenos Cave	Sampson 2008a, fig. 6665, no. 783
2	Sarakenos Cave	Sampson 2008a, fig. 61, no. 784
3	Sarakenos Cave	Sampson 2008a, fig. 73, no. 1002
4	Sarakenos Cave	Sampson 2008a, fig. 66, no. 801
5	Sarakenos Cave	Sampson 2008a, fig. 66, no. 802
7	Sarakenos Cave	Sampson 2008a, fig. 64, no. 782
6	Sarakenos Cave	Sampson 2008a, fig. 79, no. 1567
8	Sarakenos Cave	Sampson 2008a, fig. 65, no. 783
9	Sarakenos Cave	Sampson 2008a, fig. 61, no. 788
10	Skoteini Cave	Sampson 1992, fig. 65, no. 44

Fig. 33	**SITE**	**CITATION**
1	Sarakenos Cave	Sampson 2008a, fig. 81, no. 878
2	Skoteini Cave	Sampson 1993, fig. 74, no. 240
3	Sarakenos Cave	Sampson 2008a, fig. 67, no. 657
4	Sarakenos Cave	Sampson 2008a, fig. 74, no. 1098
5	Sarakenos Cave	Sampson 2008a, fig. 60, no. 4

Fig. 34	**SITE**	**CITATION**
1	Franchthi Cave	Vitelli 1999, fig. 12, d
2	Corinth	Phelps 2004, fig. 44, no. 1
3	Corinth	Phelps 2004, fig. 44, no. 6
4	Corinth	Phelps 2004, fig. 45, no. 28

5	Corinth	Phelps 2004, fig. 45, no. 3
6	Franchthi Cave	Vitelli 1999, fig. 12, g
7	Franchthi Cave	Vitelli 1999, fig. 14, a
8	Franchthi Cave	Vitelli 1999, fig. 12, c
9	Franchthi Cave	Vitelli 1999, fig. 18, e

Fig. 35	**SITE**	**CITATION**
1	Klenia Cave	Phelps 2004, fig. 44, no. 10
2	Klenia Cave	Phelps 2004, fig. 45, no. 1
3	Klenia Cave	Phelps 2004, fig. 44, no. 15
4	Klenia Cave	Phelps 2004, fig. 44, no. 9
5	Klenia Cave	Phelps 2004, fig. 44, no. 14
6	Klenia Cave	Phelps 2004, fig. 44, no. 16
7	Lerna	Vitelli 2007, fig. 75, g
8	Lerna	Vitelli 2007, fig. 75, d
9	Lerna	Vitelli 2007, fig. 75, b
10	Gonia	Phelps 2004, fig. 44, no. 17
11	Gonia	Phelps 2004, fig. 44, no. 19
12	Gonia	Phelps 2004, fig. 45, no. 13
13	Gonia	Phelps 2004, fig. 44, no. 20
14	Gonia	Phelps 2004, fig. 44, no. 21

Fig. 36	**SITE**	**CITATION**
1	Sarakenos Cave	Sampson 2008a, fig. 1051, no. 505
2	Sarakenos Cave	Sampson 2008a, fig. 111, no. 488
3	Sarakenos Cave	Sampson 2008a, fig. 114, no. 959
4	Sarakenos Cave	Sampson 2008a, fig. 108, no. 341

5	Sarakenos Cave	Sampson 2008a, fig. 112, no. 155
6	Sarakenos Cave	Sampson 2008a, fig. 114, no. 1557
7	Sarakenos Cave	Sampson 2008a, fig. 115, no. 1851
8	Sarakenos Cave	Sampson 2008a, fig. 114, no. 960
9	Sarakenos Cave	Sampson 2008a, fig. 109, no. 302
10	Sarakenos Cave	Sampson 2008a, fig. 106, no. 1546
11	Sarakenos Cave	Sampson 2008a, fig. 110, no. 196
12	Sarakenos Cave	Sampson 2008a, fig. 105, no. 531
13	Sarakenos Cave	Sampson 2008a, fig. 105, no. 537

Fig. 37	**SITE**	**CITATION**
1	Tsangli	Hauptman and Milojčić 1969, fig. 23, no. 2
2a	Tsangli	Wace and Thompson 1912, pl. III, no. 1
2b	Tsangli	Hauptman and Milojčić 1969, fig. 22, no. 1
3	Tsangli	Wace and Thompson 1912 fig. 50, j
4	Tsangli	Wace and Thompson 1912 pl. III, no.2
5	Tsangli	Wace and Thompson 1912 pl. III, no.5
6	Tsangli	Wace and Thompson 1912 pl. III, no. 3
7	Tsangli	Wace and Thompson 1912 pl. III, no. 4

Fig. 38	**SITE**	**CITATION**
1	Tsangli	Wace and Thompson 1912, pl. 2, no. 4
2	Arapi	Hauptmann and Milojčić 1969, fig. 13, no. 18
3	Arapi	Hauptmann and Milojčić 1969, fig. 13, no. 19
4	Tsangli	Wace and Thompson 1912, fig. 51

5	Tsangli	Wace and Thompson 1912, pl. III, no. 5
6	Dimini	Tsoundas 1908, pl. 11
7	Arapi	Hauptmann and Milojčić 1969, fig. 13, no. 21
8	Sesklo	Tsoundas 1908, pl. 6, no. 3
9	Tsangli	Hauptmann and Milojčić 1969, fig.50, no. f
10	Rachmani	Wace and Thompson 1912, fig. 6
11a	Tsangli	Wace and Thompson 1912, pl. III, no. 1
11b	Tsangli	Hauptmann and Milojčić 1969, fig. 22, no. 1

Fig. 39	**SITE**	**CITATION**
1	Sesklo	Tsoundas 1908 pl. 30, no. 1
2	Sesklo	Tsoundas 1908 fig. 120
3	Sesklo	Tsoundas 1908 fig. 121
4	Sesklo	Tsoundas 1908 pl.10, no. 2
5	Otzaki	Hauptmann 1981, fig. 40 no. 18
6	Otzaki	Hauptmann 1981, fig. 20, no. 3
7	Sesklo	Tsoundas 1908 pl.10, no. 1
8	Tsani	Wace and Thompson 1912, fig. 87
9	Tsani	Wace and Thompson 1912, pl. II, no. 2
10	Tsani	Wace and Thompson 1912, pl. II, no. 1
11	Tsani	Wace and Thompson 1912, pl. II, no. 3
12	Sesklo	Tsoundas 1908, pl. 8, no. 6
13	Seklo	Tsoundas 1908, pl. 8, no. 4
14	Sesklo	Tsoundas 1908, pl. 8, no. 5
15	Sesklo	Tsoundas 1908, pl. 8, no. 3

Fig. 40	**SITE**	**CITATION**
1	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 7

2	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 8
3	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 4
4	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 10
5	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 6
6	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 12
7	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 7
8	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 13
9	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 15
10	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 2
11	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 3
12	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 14
13	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 5
14	Promachon-Topolnica	Vajsov 2007, fig. 25, no. 11

Fig. 41	**SITE**	**CITATION**
1	Corinth	Phelps 2004, fig. 26, no 14
2	Corinth	Phelps 2004, fig. 26, no. 13
3	Corinth	Phelps 2004, fig. 26, no. 6
4	Corinth	Phelps 2004, fig. 26, no. 11
5	Franchthi Cave	Vitelli 1999, fig. 35, b
6	Franchthi Cave	Vitelli 1999, fig. 1, b
7	Franchthi Cave	Vitelli 1999, fig. 5, f
8	Franchthi Cave	Vitelli 1999, fig. 11, b
9	Franchthi Cave	Vitelli 1999, fig. 6, c
10	Franchthi Cave	Vitelli 1999, fig. 35, b
11	Corinth	Phelps 2004, fig. 28, no. 2
12	Corinth	Phelps 2004, fig. 29, no. 1
13	Corinth	Phelps 2004, fig. 29, no. 4

14	Franchthi Cave	Vitelli 1999, fig. 1, a
15	Corinth	Phelps 2004, fig. 28, no. 11

Fig. 42	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 60, no. 10
2	Tsangli	Hauptmann and Milojčić 1969, fig. 20, no. 9
3	Otzaki	Hauptmann 1981, fig. 59, no. 8
4	Tsangli	Hauptmann and Milojčić 1969, fig. 20, no. 8
5	Otzaki	Hauptmann 1981, fig. 82, no. 2
6	Otzaki	Hauptmann 1981, fig. 66, no. 7
7	Otzaki	Hauptmann 1981, fig. 82, no. 3
8	Otzaki	Hauptmann 1981, fig. 59, no. 16
9	Otzaki	Hauptmann 1981, fig. 65, no. 15
10	Otzaki	Hauptmann 1981, fig. 72, no. 14
11	Tsangli	Hauptmann and Milojčić 1969, fig. 20, no. 6
12	Otzaki	Hauptmann 1981, fig. 65, no. 10
13	Arapi	Hauptmann and Milojčić 1969, fig. 12, no. 3

Fig. 44	**SITE**	**CITATION**
1	Tsangli	Tsoundas 1908, no. 157
2	Arapi	Hauptmann and Milojčić 1969, fig. 9, no. 18
3	Tsangli	Wace and Thompson 1908, fig. 55, f
4	Tsangli	Wace and Thompson 1908, fig. 55, a
5	Tsangli	Wace and Thompson 1908, fig 55, l
6	Tsangli	Wace and Thompson 1908, fig 55, b
7	Tsangli	Tsoundas 1908, no. 138
8	Tsangli	Wace and Thompson 1908, fig, 55, g

9	Tsangli	Wace and Thompson 1908, fig 55, c
10	Tsangli	Wace and Thompson 1908, fig 55, k
11	Tsangli	Wace and Thompson 1908, fig 55, j
12	Tsangli	Wace and Thompson 1908, fig 55c
13	Tsangli	Wace and Thompson 1908, fig 55, h
14	Tsangli	Tsoundas 1908, no. 134
15	Tsangli	Hauptmann 1981, fig. 94, no. 8
16	Otzaki	Hauptmann 1981, fig. 15, no. 5
17	Tsangli	Wace and Thompson 1908, fig. 50, e
18	Otzaki	Hauptmann 198, fig. 15, no. 6
19	Tsangli	Tsoundas 1908, no. 142

Fig.45	**SITE**	**CITATION**
1	Stravropouli	Urem-Kotsou and Ghioura 2004, fig. 9, no. 1
2	Stravropouli	Urem-Kotsou and Ghioura 2004, fig. 9, no. 2
3	Dikili Tash	Tsirtsoni 2000, fig. 10
4	Stravropouli	Urem-Kotsou and Ghioura 2004, fig. 7, no. 2
5	Stravropouli	Urem-Kotsou and Ghioura 2004, fig. 7, no. 1
6	Stravropouli	Urem-Kotsou and Ghioura 2004, fig. 17, no. 1
7	Stravropouli	Urem-Kotsou and Ghioura 2004, fig. 7, no.3
8	Stravropouli	Urem-Kotsou and Ghioura 2004, fig. 15, no. 15

Fig.	**SITE**	**CITATION**
1	Franchthi Cave	Vitelli 1999, fig. 1, g
2	Sarakenos Cave	Sampson 2008a, fig. 56, no. 1114
3	Sarakenos Cave	Sampson 2008a, fig. 55, no. 1031

4	Franchthi Cave	Vitelli 1999, fig. 5, g
5	Franchthi Cave	Vitelli 1999, fig. 27, b
6	Franchthi Cave	Vitelli 1999, fig. 16, h
7	Franchthi Cave	Vitelli 1999, fig. 35, h
8	Sarakenos Cave	Sampson 2008a, fig. 55, no. 1052
9	Sarakenos Cave	Sampson 2008a, fig. 56, no. 982
10	Sarakenos Cave	Sampson 2008a, fig.56, no. 1050
11	Sarakenos Cave	Sampson 2008a, fig. 55, no. 107
12	Sarakenos Cave	Sampson 2008a, fig. 55, no. 1021
13	Franchthi Cave	Vitelli 1999, fig. 1, m
14	Franchthi Cave	Vitelli 1999, fig. 33, a
15	Franchthi Cave	Vitelli 1999, fig. 26, n
16	Franchthi Cave	Vitelli 1999, fig. 6, k
17	Skoteini Cave	Sampson 1993, fig. 52, no. 995
18	Franchthi Cave	Vitelli 1999, fig. 33, f

Fig. 47	**SITE**	**CITATION**
1	Arapi	Hauptmann and Milojčić 1969, fig. 5, no. 2
2	Otzaki	Hauptmann 1981, fig. 17, no. 9
3	Arapi	Hauptmann and Milojčić 1969, fig. 17, no. 9
4	Otzaki	Hauptmann 1981, fig. 82, no. 10
5	Arapi	Hauptmann and Milojčić 1969, fig. 2, no. 2
6	Arapi	Hauptmann and Milojčić 1969, fig. 2, no. 6
7	Arapi	Hauptmann and Milojčić 1969, fig. 2, no. 7
8	Arapi	Hauptmann and Milojčić 1969, fig. 2, no. 8
9	Arapi	Hauptmann and Milojčić 1969, fig, 2, no. 1
10	Arapi	Hauptmann and Milojčić 1969, fig. 12, no. 6

11	Tsangli	Wace and Thompson 1912, fig. 55, o
12	Arapi	Hauptmann and Milojčić 1969, fig. 1, no. 3
13	Arapi	Hauptmann and Milojčić 1969, fig. 12, no. 4
14	Arapi	Hauptmann and Milojčić 1969, fig. 7, no. 23
15	Arapi	Hauptmann and Milojčić 1969, fig. 18, 2
16	Arapi	Hauptmann and Milojčić 1969, fig. 5, no. 2

Fig. 48	**SITE**	**CITATION**
1	Lerna	Vitelli 2007, fig. 72, l
2	Skoteini Cave	Sampson 1993, fig. 53, 1278
3	Skoteini Cave	Sampson 1993, fig. 53, no. 1257
4	Skoteini Cave	Sampson 1993, fig. 43, no. 1273a
5	Corinth	Phelps 2007, fig. 27, no. 7
6	Klenia Cave	Phelps 2007, fig. 26, no. 16
7	Corinth	Phelps 2007, fig. 28, no. 5
8	Corinth	Phelps 2007, fig. 28, no. 7
9	Corinth	Phelps 2007, fig. 25, no. 26
10	Lerna	Vitelli 2007, fig. 72, i
11	Lerna	Vitelli 2007, fig. 72, k
12	Lerna	Vitelli 2007, fig. 72, m
13	Lerna	Vitelli 2007, fig. 72, n
14	Franchthi Cave	Vitelli 1999, fig. 5, a
15	Lerna	Vitelli 2007, fig. 72, o
16	Skoteini Cave	Sampson 1993, fig. 54, no. 1103
17	Franchthi Cave	Vitelli 1999, fig. 5, b

Fig. 49	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 61, no. 10

2	Otzaki	Hauptmann 1981, fig. 17, no. 12
3	Otzaki	Hauptmann 1981, fig. 58, no. 12
4	Otzaki	Hauptmann 1981, fig. 62, no. 8a
5	Otzaki	Hauptmann 1981, fig. 81, no. 12
6	Arapi	Hauptmann and Milojčić 1969, fig. 7, no. 18
7	Arapi	Hauptmann and Milojčić 1969, fig. 15, no. 8
8	Otzaki	Hauptmann 1981, fig. 90, no. 2
9	Otzaki	Hauptmann 1981, fig. 82, no. 7
10	Otzaki	Hauptmann 1981, fig. 82, no. 9
11	Otzaki	Hauptmann 1981, fig. 82, no. 6
12	Otzaki	Hauptmann 1981, fig. 58, no. 13
13	Otzaki	Hauptmann 1981, fig. 66, no. 5
14	Otzaki	Hauptmann 1981, fig. 66, no. 8

Fig. 50	**SITE**	**CITATION**
1	Arapi	Hauptmann and Milojčić 1969, fig. 2, no. 2
2	Corinth	Phelps 2004, fig. 26, no. 2
3	Sarakenos Cave	Sampson 2008a, fig. 124, 538
4	Otzaki	Hauptmann and Milojčić 1969, fig. 65, no. 1
5	Arapi	Hauptmann and Milojčić 1969, fig. 15, no. 6
6	Arapi	Hauptmann and Milojčić 1969, fig. 3, no. 7
7	Tsangli	Wace and Thompson 1912, fig 55, j

Pl. 51	**SITE**	**CITATION**
1	Sitagroi	Keighley 1986, fig. 11.17, no. 6
2	Sitagroi	Keighley 1986, fig. 11.17, no. 2
3	Dikili Tash	Tsirtonsi 2001, fig. 4, b

4	Promachon-Topolnica	Vajsov 2007, fig. 22, no. 6
5	Sitagroi	Keighley 1986, fig. 11.17, no. 5
6	Sitagroi	Keighley 1986, fig. 11.17, no. 9
7	Sitagroi	Keighley 1986, fig. 11.17, no. 1
8	Megalo Nisi Galanis	Kalogirou 1994, fig. 302, a
9	Megalo Nisi Galanis	Kalogirou 1994, fig. 302, b
10	Promachon-Topolnica	Vajsov 2007, fig. 10, a
11	Stavropouli	Urem-Kotsou and Ghioura 2004, fig. 14, no. 4
12	Stavropouli	Urem-Kotsou and Ghioura 2004, fig. 14, no. 5
13	Promachon-Topolnica	Vajsov 2007, fig. 22, no. 11

Fig. 52	**SITE**	**CITATION**
1	Corinth	Phelps 2004, fig. 27, no. 8
2	Corinth	Phelps 2004, fig. 27, no. 1
3	Corinth	Phelps 2004, fig. 27, no. 12
4	Corinth	Phelps 2004, fig. 27, no. 13
5	Lerna	Vitelli 2004, fig. 72, f
6	Lerna	Vitelli 2004, fig. 72, h
7	Lerna	Vitelli 2004, fig. 72, i
8	Lerna	Vitelli 2004, fig. 72, g
9	Corinth	Phelps 2004, fig. 27, no. 10
10	Lerna	Vitelli 2004, fig. 72, e
11	Corinth	Phelps 2004, fig. 47, no. 24
12	Corinth	Phelps 2004, fig. 47, no. 28

Fig. 53	**SITE**	**CITATION**
1	Franchthi Cave	Vitelli 1999, fig. 16, n

2	Franchthi Cave	Vitelli 1999, fig. 7, d
3	Franchthi Cave	Vitelli 1999, fig. 7, b
4	Skoteini Cave	Sampson 1993, fig. 54, 17
5	Skoteini Cave	Sampson 1993, fig. 53, 7
6	Skoteini Cave	Sampson 1993, fig. 55, no. 26
7	Franchthi Cave	Vitelli 1999, fig.7, 55, 26c
8	Franchthi Cave	Vitelli 1999, fig. 27, i
9	Franchthi Cave	Vitelli 1999, fig. 35, g
10	Franchthi Cave	Vitelli 1999, fig. 7, f
11	Franchthi Cave	Vitelli 1999, fig. 11, f
12	Skoteini Cave	Sampson 1993, fig. 52, 102

Fig. 54	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 31, no. 6
2	Skoteini Cave	Sampson 1193, fig. 56, no. 3
3	Corinth	Phelps 2004, fig. 32, no. 26
4	Corinth	Phelps 2004, fig. 32, no. 30
5	Corinth	Phelps 2004, fig. 32, no. 24
6	Corinth	Phelps 2004, fig. 32, no. 6
7	Corinth	Phelps 2004, fig. 32, no. 15
8	Franchthi Cave	Vitelli 1999, fig. 16, j
9	Franchthi Cave	Vitelli 1999, fig. 16, i
10	Skoteini Cave	Sampson 1193, fig. 51, no. 1014
11	Franchthi Cave	Vitelli 1999, fig. 19, a
12	Gonia	Phelps 2004, fig. 33, no. 20
13	Klenia Cave	Phelps 2004, fig. 33, no. 22
14	Franchthi Cave	Vitelli 1999, fig. 19, c
15	Franchthi Cave	Vitelli 1999, fig. 38, d

Fig. 55	SITE	CITATION
1	Franchthi Cave	Vitelli 1999, fig. 28, c
2	Corinth	Phelps 2004, fig. 33, no. 8
3	Franchthi Cave	Vitelli, 1999, fig. 38, a
4	Franchthi Cave	Vitelli 1999, fig. 33, e
5	Corinth	Phelps 2004, fig. 31, no. 6
6	Corinth	Phelps 2004, fig. 30, no. 20
7	Corinth	Phelps 2004, fig. 31, no. 2
8	Corinth	Phelps 2004, fig. 31, no. 1
9	Klenia Cave	Phelps 2004, fig. 31, no. 18
10	Klenia Cave	Phelps 2004, fig. 31, no. 20
11	Corinth	Phelps 2004, fig. 31, no. 29
12	Corinth	Phelps 2004, fig. 31, no. 23

Fig. 56	SITE	CITATION
1	Corinth	Phelps 2004, fig. 30, no.1
2	Corinth	Phelps 2004, fig. 30, no. 15
3	Klenia Cave	Phelps 2004, fig. 30, no. 17
4	Skoteini Cave	Sampson 1993, fig. 56, no. 2
5	Corinth	Phelps 2004, fig. 30, no. 22
6	Skoteini Cave	Sampson 1993, fig. 56, no. 2
7	Klenia Cave	Phelps 2004, fig. 30, no. 26
8	Corinth	Phelps 2004, fig. 30, no. 25
9	Corinth	Phelps 2004, fig. 30, no. 29

Fig. 57	SITE	CITATION
1	Otzaki	Hauptmann and Milojčić 1969, pl. 13, no. 15

2	Servia	Heurtley 1939, pl. VI, no. 15
3	Servia	Heurtley 1939, pl. VI, no. 16
4	Tsangli	Wace and Thompson 1912, fig. 57, d
5	Tsangli	Wace and Thompson 1912, fig. 57, e
6	Mesianis/Karambairmiou	Tsoundas 1908, fig. 143
7	Tsangli	Wace and Thompson 1912, fig. 57, c
8	Tsangli	Wace and Thompson 1912, fig. 57, a
9	Tsangli	Wace and Thompson 1912, pl. IV, no. 5
10	Tsangli	Wace and Thompson 1912, pl. IV, no. 6
11	Mesianis/Karambairmiou	Tsoundas 1908, fig. 144
12	Tsangli	Hauptmann 1981, pl. 3, no. 13
13	Otzaki	Hauptmann 1981, pl. 62, no. 1
14	Servia	Heurtley 1939, pl. VI, no. 14
15	Tsangli	Wace and Thompson 1912, fig. 57, b

Fig. 58	**SITE**	**CITATION**
1	Sitagroi	Keighley 1986, fig. 11.1, no. 1
2	Sitagroi	Keighley 1986, fig. 11.2, no. 2
3	Sitagroi	Keighley 1986, fig. 11.5, no. 7
4	Sitagroi	Keighley 1986, fig. 11.5, no. 2
5	Sitagroi	Keighley 1986, fig. 11.2, no. 16
6	Sitagroi	Keighley 1986, fig. 11.2, no. 5
7	Sitagroi	Keighley 1986, fig. 11.17, no. 4
8	Sitagroi	Keighley 1986, fig. 11.4, no. 1
9	Sitagroi	Keighley 1986, fig. 11.5, no. 4

Fig. 59	**SITE**	**CITATION**
1	Sitagroi	Keighley 1986, fig. 11.1, no.5

2	Sitagroi	Keighley 1986, fig. 11.3, no. 8
3	Sitagroi	Keighley 1986, fig. 11.4, no. 6
4	Sitagroi	Keighley 1986, fig. 11.13, no. 7
5	Sitagroi	Keighley 1986, fig. 11.12, no. 2
6	Sitagroi	Keighley 1986, fig. 11.2, no. 7
7	Sitagroi	Keighley 1986, fig. 11.3, no 14
8	Dikili Tash	Yiouni 2000, fig. 8, no. 6
9	Promachon-Topolnica	Vajsov 2007, fig. 28, no. 13
10	Promachon-Topolnica	Vajsov 2007, fig. 28, no. 12
11	Sitagroi	Evans 1986, fig. 12.11, no. 2
12	Sitagroi	Evans 1986, fig. 12.1, no. 5

Fig. 60	**SITE**	**CITATION**
1	Promachon-Topolnica	Vajsov 2007, fig. 23, no. 4
2	Promachon-Topolnica	Vajsov 2007, fig. 23, no. 14
3	Promachon-Topolnica	Vajsov 2007, fig. 23, no. 10
4	Promachon-Topolnica	Vajsov 2007, fig. 23, no. 11
5	Promachon-Topolnica	Vajsov 2007, fig. 23, no. 24
6	Promachon-Topolnica	Vajsov 2007, fig. 23, no. 21
7	Promachon-Topolnica	Vajsov 2007, fig. 23, no. 13
8	Promachon-Topolnica	Vajsov 2007, fig. 23, no. 12
9	Promachon-Topolnica	Vajsov 2007, fig. 23, no. 2
10	Promachon-Topolnica	Vajsov 2007, fig. 23, no. 16
11	Promachon-Topolnica	Vajsov 2007, fig. 13, no. 3
12	Promachon-Topolnica	Vajsov 2007, fig. 13, no. 1
13	Promachon-Topolnica	Vajsov 2007, fig. 13, no. 11
14	Promachon-Topolnica	Vajsov 2007, fig. 13, no. 10
15	Promachon-Topolnica	Vajsov 2007, fig. 13, no. 2

16	Promachon-Topolnica	Vajsov 2007, fig. 13, no. 8
17	Promachon-Topolnica	Vajsov 2007, fig. 13, no. 5a,b
18	Promachon-Topolnica	Vajsov 2007, fig. 13, no. 13a,b

Fig. 61	SITE	CITATION
1	Promachon-Topolnica	Vajsov 2007, fig.27, no. 4
2	Promachon-Topolnica	Vajsov 2007, fig.27, no. 1
3	Promachon-Topolnica	Vajsov 2007, fig.27, no. 7
4	Promachon-Topolnica	Vajsov 2007, fig.27, no. 6
5	Promachon-Topolnica	Vajsov 2007, fig.26, no. 16
6	Promachon-Topolnica	Vajsov 2007, fig.26, no. 14
7	Promachon-Topolnica	Vajsov 2007, fig.27, no. 9
8	Promachon-Topolnica	Vajsov 2007, fig.27, no. 13
9	Promachon-Topolnica	Vajsov 2007, fig.27, no. 15
10	Promachon-Topolnica	Vajsov 2007, fig.27, no. 17

Fig. 62	SITE	CITATION
1	Sitagroi	Evans 1986, fig. 12.3, no. 1
2	Sitagroi	Evans 1986, fig. 12.2, no. 3
3	Dikili Tash	Tsirtsoni 2000, fig. 11
4	Sitagroi	Evans 1986, fig. 12.2, no, 6

Fig. 63	SITE	CITATION
1	Sitagroi	Evans 1986, fig. 12.7, no. 2
2	Sitagroi	Evans 1986, fig. 12.5, no. 1
3	Sitagroi	Evans 1986, fig. 12. 6, no. 3
4	Sitagroi	Evans 1986, fig. 12.6, no. 2

Fig. 64	SITE	CITATION

1	Dikili Tash	Welsch 1918–1919, fig. 2, a
2	Dikili Tash	Welsch 1918–1919, fig. 2, b
3	Dikili Tash	Welsch 1918–1919, fig. 2, f
4	Dikili Tash	Welsch 1918–1919, fig. 2, j
5	Dikili Tash	Welsch 1918–1919, fig. 2, d
6	Dikili Tash	Welsch 1918–1919, fig. 2, e
7	Dikili Tash	Welsch 1918–1919, fig. 2, g
8	Dikili Tash	Welsch 1918–1919, fig. 2, k
9	Dikili Tash	Welsch 1918–1919, fig. 2, i
10	Dikili Tash	Welsch 1918–1919, fig. 2, l
11	Dikili Tash	Welsch 1918–1919, fig. 2, k
12	Dikili Tash	Welsch 1918–1919, fig. 2, n

Fig. 65	**SITE**	**CITATION**
1	Promachon-Topolnica	Vajsov 2007, fig.21A, no. 2
2	Promachon-Topolnica	Vajsov 2007, fig.21A, no. 1
3	Stravroupli	Urem-Kotsou and Ghioura 2004, fig. 14, no. 3

Fig. 66	**SITE**	**CITATION**
1	Promachon-Topolnica	Vajsov 2007, fig. 21B, no 4.
2	Promachon-Topolnica	Vajsov 2007, fig. 21B, no. 2
3	Promachon-Topolnica	Vajsov 2007, fig. 21B, no. 11
4	Promachon-Topolnica	Vajsov 2007, fig. 21B, no. 5
5	Promachon-Topolnica	Vajsov 2007, fig. 21B, no. 7
6	Promachon-Topolnica	Vajsov 2007, fig. 21B, no. 12
7	Promachon-Topolnica	Vajsov 2007, fig. 21B, no. 6
8	Promachon-Topolnica	Vajsov 2007, fig. 21B, no. 1
9	Promachon-Topolnica	Vajsov 2007, fig. 21B, no. 3

10	Promachon-Topolnica	Vajsov 2007, fig. 5, no 2
11	Promachon-Topolnica	Vajsov 2007, fig. 5, no. 4
12	Promachon-Topolnica	Vajsov 2007, fig. 5, no. 3

Fig. 67	**SITE**	**CITATION**
1	Franchthi Cave	Vitelli 1999, fig. 29, a
2	Franchthi Cave	Vitelli 1999, fig. 28, h
3	Corinth	Phelps 2004, fig. 16, no. 13
4	Alepotrypa Cave	Phelps 2004, fig.16, no. 18
5	Corinth	Phelps 2004, fig.61, no. 5
6	Corinth	Phelps 2004, fig. 61, no. 17
7	Alepotrypa Cave	Phelps 2004, fig. 61, no. 19
8	Corinth	Phelps 2004, fig. 61, 16
9	Elateia	Sotiriades 1908, fig. 7, left
10	Corinth	Lavezzi 1978, fig. 6, no. 38
11	Skoteini Cave	Sampson 2008, fig. 56, no. 4
12	Franchthi Cave	Vitelli 1999, fig.28, g
13	Otzaki	Hauptmann 1981, fig. 95, no. 2
14	Otzaki	Hauptmann 1981, fig. 60, no. 8
15	Otzaki	Hauptmann 1981, fig. 31, no. 19

Fig. 68	**SITE**	**CITATION**
1	Corinth	Walker-Kosmopoulos 1948, fig. 5
2	Corinth	Walker-Kosmopoulos 1948, fig. 5
3	Franchthi Cave	Vitelli 1999, fig. 20, f
4	Corinth	National Museum, Athens
5	Tsangli	Wace and Thompson 1912, fig. 50, a

6	Elateia	Sotiriades 1908, fig. 7, middle

Fig. 69	**SITE**	**CITATION**
1	Skoteini Cave	Sampson 1993, fig.26, no. 13
2	Skoteini Cave	Sampson 1993, fig. 75, no. 2
3	Skoteini Cave	Sampson 1993, fig. 75, no. 7
4	Skoteini Cave	Sampson 1993, fig. 75, no. 5
5	Sarakenos Cave	Sampson 2008a, fig. 58 no. 930
6	Sarakenos Cave	Sampson 2008a, fig. 58, no, 932
7	Sarakenos Cave	Sampson 2008a, fig. 58, no. 933
8	Skoteini Cave	Sampson 1993, fig. 73, no. 15
9	Skoteini Cave	Sampson 1993, fig. 73, no. 3
10	Skoteini Cave	Sampson 1993, fig. 75, no. 6
11	Skoteini Cave	Sampson 1993, fig. 76, no. 19
12	Skoteini Cave	Sampson 1993, fig.77, no. 25
13	Skoteini Cave	Sampson 1993, fig. 75, no. 4
14	Skoteini Cave	Sampson 1993, fig. 76, no. 22
15	Skoteini Cave	Sampson 1993, fig. 75, no. 1

Fig. 70	**SITE**	**CITATION**
1	Skoteini Cave	Sampson 1993, fig. 76, no. 24
2	Sarakenos Cave	Sampson 2008a, fig. 58, no. 931
3	Skoteini Cave	Sampson 1993, fig. 77, no. 8
4	Skoteini Cave	Sampson 1993, fig. 76, no. 16
5	Skoteini Cave	Sampson 1993, fig. 76, no. 17
6	Skoteini Cave	Sampson 1993, fig. 76, no. 20
7	Skoteini Cave	Sampson 1993, fig. 76, no. 18
8	Skoteini Cave	Sampson 1993, fig. 76, no. 23

9	Skoteini Cave	Sampson 1993, fig. 76, no. 21
10	Skoteini Cave	Sampson 1993, fig. 76, no. 10
11	Otzaki	Hauptman 1981, fig. 97, no. 7
12	Otzaki	Hauptman 1981, fig. 31, no. 3

Fig. 71	**SITE**	**CITATION**
1	Skoteini Cave	Sampson 1993, fig. 78, 7
2	Skoteini Cave	Sampson 1993, fig. 78, 1
3	Skoteini Cave	Sampson 1993, fig. 78, 3
4	Skoteini Cave	Sampson 1993, fig. 78, 2
5	Skoteini Cave	Sampson 1993, fig. 78, 5
6	Skoteini Cave	Sampson 1993, fig. 78, 4
7	Skoteini Cave	Sampson 1993, fig. 78, 6
8	Corinth	Lavezzi 1978, fig. 6, no. 34

Fig. 72	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 47, no. 5
2	Otzaki	Hauptmann 1981, fig. 47, no. 4a
3	Otzaki	Hauptmann 1981, fig. 47, no. 3
4	Sesklo	Tsoundas 1908, fig. 152
5	Otzaki	Hauptmann 1981, fig. 80, no. 1
6	Otzaki	Hauptmann 1981, fig. 10, no. 12
7	Otzaki	Hauptmann 1981, fig. 31, no. 3

Fig. 73	**SITE**	**CITATION**
1	Promachon-Topolnica	Vajsov 2007, fig. 21B, no. 9a, 9c

Fig. 74	**SITE**	**CITATION**

1	Dimini	Tsoundas 1908, fig.113
2	Dimini	Tsoundas 1908, fig. 114
3	Tsangli	Wace and Thompson 1912, fig. 56, top, middle left
4	Dimini	Tsoundas 1908, fig. 115
5	Franchthi Cave	Vitelli 1999, fig. 8, e
6	Franchthi Cave	Vitelli 1999, fig. 8, f
7	Skoteini Cave	Sampson 1993, fig. 80, no. 39
8	Skoteini Cave	Sampson 1993, fig. 80, no. 37
9	Skoteini Cave	Sampson 1993, fig. 80, no. 26
10	Skoteini Cave	Sampson 1993, fig. 79, no. 13
11	Skoteini Cave	Sampson 1993, fig. 79, no. 10
12	Skoteini Cave	Sampson 1993, fig. 80, no. 31
13	Skoteini Cave	Sampson 1993, fig. 80, no. 46
14	Skoteini Cave	Sampson 1993, fig. 80, no. 25
15	Skoteini Cave	Sampson 1993, fig. 81, no. 39
16	Skoteini Cave	Sampson 1993, fig. 79, no. 12
17	Skoteini Cave	Sampson 1993, fig. 80, no. 27

Fig. 75	**SITE**	**CITATION**
1	Orchomenos	Kunze 1931, pl. 5, no. 1
2	Orchomenos	Kunze 1931, pl. 5, c
3	Elateia	Weinberg 1937, pl. 62d, no. 7
4	Elateia	Weinberg 1937, pl. 62d, no, 8
5	Prosmyna (East Yerogalaro Ridge)	Blegen 1937, fig. 627, no. 4
6	Prosmyna (East Yerogalaro Ridge)	Blegen 1937, fig. 627, no.7
7	Prosmyna (East Yerogalaro Ridge)	Blegen 1937, fig. 627, no. 5
8	Prosmyna (East Yerogalaro Ridge)	Blegen 1937, fig. 627, no. 11

9	Otzaki	Hauptmann 1981, fig. 58, no. 11
10	Rini	Wace and Thompson, fig. 79, p
11	Tsangli	Wace and Thompson, fig. 56, second row, left
12	Tsangli	Wace and Thompson, fig. 56, second row, middle
13	Tsangli	Wace and Thompson, fig. 56, top middle, right
14	Corinth	Weinberg, 1937, fig. 29, i
15	Corinth	Weinberg, 1937, fig. 29, k
16	Promachon-Topolnica	Vajsov 2007, fig. 3, no. 1, A1
17	Promachon-Topolnica	Vajsov 2007, fig. 3, no. 1, A1

Fig. 76	**SITE**	**CITATION**
1	Promachon-Topolnica	Vajsov 2007, fig. 21B, no. 8
2	Promachon-Topolnica	Vajsov 2007, fig. 22, no. 14
3	Promachon-Topolnica	Vajsov 2007, fig, 22, no. 3
4	Promachon-Topolnica	Vajsov 2007, fig. 22, no. 3
5	Promachon-Topolnica	Vajsov 2007, fig. 11, a,b

Fig. 77	**SITE**	**CITATION**
1	Stravropouli	Urem-Kotsou and Ghioura 2004, image 9, no. 1
2	Stravropouli	Urem-Kotsou and Ghioura 2004, image 9, no. 2
3	Stravropouli	Urem-Kotsou and Ghioura 2004, image 9, no. 4
4	Servia	Heurtley 1939, fig. 8, b
5	Servia	Heurtley 1939, fig. 9, d
6	Servia	Heurtley 1939, fig. 9, a
7	Servia	Aslanis 1992, pl. 55, no. 7
8	Servia	Aslanis 1992, pl. 55, no. 8

Fig. 78	SITE	CITATION
1	Sarakenos Cave	Samoson 2008a, fig. 118, no. 958
2	Sarakenos Cave	Samoson 2008a, fig. 118, no. 947
3	Sarakenos Cave	Samoson 2008a, fig. 118, no. 939
4	Sarakenos Cave	Samoson 2008a, fig. 118, no. 944
5	Sarakenos Cave	Samoson 2008a, fig. 118, no. 344
6	Sarakenos Cave	Samoson 2008a, fig. 120, no. 212
7	Sarakenos Cave	Samoson 2008a, fig. 118, no. 950
8	Sarakenos Cave	Samoson 2008a, fig. 120, no. 452
9	Sarakenos Cave	Samoson 2008a, fig. 120, no. 17
10	Sarakenos Cave	Samoson 2008a, fig. 120, no. 267
11	Sarakenos Cave	Samoson 2008a, fig. 120, no. 949
12	Sarakenos Cave	Samoson 2008a, fig. 123, no. 940
13	Skoteini Cave	Sampson 1993, fig. 82, no. 1
14	Skoteini Cave	Sampson 1993, fig. 82, no. 5
15	Sarakenos Cave	Samoson 2008a, fig. 120, no. 330
16	Skoteini Cave	Sampson 1993, fig. 82, no. 4
17	Skoteini Cave	Sampson 1993, fig. 82, no. 2
18	Skoteini Cave	Sampson 1993, fig. 82, no. 3
19	Skoteini Cave	Sampson 1993, fig. 82, no. 7

Fig. 79	SITE	CITATION
1	Skoteini Cave	Sampson 1993, fig. 85, no. 25
2	Skoteini Cave	Sampson 1993, fig. 83, no. 8

3	Skoteini Cave	Sampson 1993, fig. 85, no. 30
4	Skoteini Cave	Sampson 1993, fig. 83, no. 4
5	Skoteini Cave	Sampson 1993, fig. 86, no. 45
6	Skoteini Cave	Samoson 2008a, fig. 121, no.1538
7	Skoteini Cave	Samoson 2008a, fig. 121, no. 1568
8	Skoteini Cave	Samoson 2008a, fig. 121, C,153
9	Skoteini Cave	Samoson 2008a, fig. 124, no. 637
10	Skoteini Cave	Sampson 1993, fig. 86, no. 34
11	Skoteini Cave	Sampson 1993, fig. 86, 33

Fig. 80	**SITE**	**CITATION**
1	Tsangli	Wace and Thompson 1912, fig. 56, second row from bottom, on right
2	Tsangli	Wace and Thompson 1912, fig. 56, middle
3	Tsangli	Wace and Thompson 1912, fig. 56, top right
4	Tsangli	Wace and Thompson 1912, fig. 56, top left
5	Tsangli	Wace and Thompson 1912, fig. 56, second row from top on right
6	Tsangli	Wace and Thompson 1912, fig. 56, 3rd row down on left
7	Tsangli	Wace and Thompson 1912, fig. 56, bottom right
8	Tsangli	Wace and Thompson 1912, fig. 56, bottom left

Fig. 81	**SITE**	**CITATION**
1	Rachmani	Wace and Thompson 1912, fig. 9, left
2	Otzaki	Hauptmann 1981, fig. 37, no. 18
3	Markou	Tsoundas 1908, fig. 111

4	Dimini	Tsoundas 1908, pl. 16, no. 1
5	Dimini	Tsoundas 1908, pl. 16, no. 2
6	Sesklo	Tsoundas 1908, fig. 112
7	Dimini	Tsoundas 1908, pl. 17, no. 1
8	Dimini	Tsoundas 1908, pl. 17, no. 2

Fig. 82	**SITE**	**CITATION**
1	Dimini	Tsoundas 1908, pl. 18, no. 11
2	Dimini	Tsoundas 1908, pl. 17, no. 5
3	Dimini	Tsoundas 1908, pl. 19, no. 4
4	Dimini	Tsoundas 1908, pl. 17, no. 4
5	Dimini	Tsoundas 1908, pl. 19, no. 1
6	Dimini	Tsoundas 1908, pl. 18, no. 4
7	Dimini	Tsoundas 1908, pl. 18, no. 8
8	Dimini	Tsoundas 1908, pl. 18, no. 5
9	Dimini	Tsoundas 1908, pl. 17, no. 7
10	Dimini	Tsoundas 1908, pl. 19, no. 3
11	Dimini	Tsoundas 1908, pl. 18, no. 10
12	Dimini	Tsoundas 1908, pl. 18, no. 6
13	Dimini	Tsoundas 1908, pl. 18, no. 9
14	Dimini	Tsoundas 1908, pl. 19, no. 5
15	Dimini	Tsoundas 1908, pl. 17, no. 8
16	Dimini	Tsoundas 1908, pl. 19, no. 11
17	Dimini	Tsoundas 1908, pl. 19, no. 6

Fig. 83	**SITE**	**CITATION**
1	Phthiotic Thebes	Wace and Thompson 1912, fig. 113, second row, left
2	Phthiotic Thebes	Wace and Thompson 1912, fig.

		113, middle, second row
3	Phthiotic Thebes	Wace and Thompson 1912, fig. 113, second row down on right
4	Phthiotic Thebes	Arvanitopoulos 1908, fig. 7
5	Phthiotic Thebes	Wace and Thompson 1912, fig. 113, top left
6	Phthiotic Thebes	Wace and Thompson 1912, fig. 113, top middle
7	Phthiotic Thebes	Wace and Thompson 1912, fig. 113, top right
8	Phthiotic Thebes	Wace and Thompson 1912, fig. 113, third row down on left
9	Phthiotic Thebes	Wace and Thompson 1912, fig. 113, second row from bottom on right
10	Phthiotic Thebes	Hauptmann 1981, fig. 91, no. 1
11	Phthiotic Thebes	Hauptmann 1981, fig. 91, no. 3

Fig. 84	**SITE**	**CITATION**
1	Promachon-Topolnica	Vasjov 2007, fig. 28, no. 17
2	Promachon-Topolnica	Vasjov 2007, fig. 28, no. 18
3	Promachon-Topolnica	Vasjov 2007, fig. 28, no. 14
4	Promachon-Topolnica	Vasjov 2007, fig. 28, no. 8
5	Promachon-Topolnica	Vasjov 2007, fig. 28, no. 15
6	Promachon-Topolnica	Vasjov 2007, fig. 28, no. 9
7	Promachon-Topolnica	Vasjov 2007, fig. 28, no. 4
8	Promachon-Topolnica	Vasjov 2007, fig. 28, no. 6
9	Promachon-Topolnica	Vasjov 2007, fig. 28, no. 10
10	Promachon-Topolnica	Vasjov 2007, fig. 28, no. 11
11	Promachon-Topolnica	Vasjov 2007, fig. 17, no. 3
12	Promachon-Topolnica	Vasjov 2007, fig. 17, no. 5

13	Promachon-Topolnica	Vasjov 2007, fig. 17, no. 8
14	Dikili Tash	Welsch 1918–1919, fig. 3, a
15	Dikili Tash	Welsch 1918–1919, fig. 3, f
16	Dikili Tash	Welsch 1918–1919, fig. 3, d
17	Dikili Tash	Welsch 1918–1919, fig. 3, m

Fig. 85	**SITE**	**CITATION**
1	Promachon-Topolnica	Vajsov 2007, fig. 28, no. 1
2	Promachon-Topolnica	Vajsov 2007, fig. 28, no. 2
3	Promachon-Topolnica	Vajsov 2007, fig. 28, no. 5
4	Promachon-Topolnica	Vajsov 2007, fig. 28, no. 7
5	Promachon-Topolnica	Vajsov 2007, fig. 28, no. 16
6	Promachon-Topolnica	Vajsov 2007, fig. 17, no. 4
7	Promachon-Topolnica	Vajsov 2007, fig. 17, no. 6
8	Promachon-Topolnica	Vajsov 2007, fig. 17, no. 1
9	Promachon-Topolnica	Vajsov 2007, fig. 17, no. 9
10	Promachon-Topolnica	Vajsov 2007, fig. 17, no. 7
11	Dikili Tash	Welsch 1918–1919, fig .3, e
12	Dikili Tash	Welsch 1918–1919, fig. 3, c
13	Dikili Tash	Welsch 1918–1919, fig. 3, g
14	Dikili Tash	Welsch 1918–1919, fig. 3, t

Fig. 86	**SITE**	**CITATION**
1	Skoteini Cave	Sampson 1993, fig. 37, no. 195
2	Skoteini Cave	Sampson 1993, fig. 32, no. 26
3	Skoteini Cave	Sampson 1993, fig. 49, no. 82
4	Sarakenos Cave	Sampson 2008a, fig. 96, no. 587
5	Sarakenos Cave	Sampson 2008a, fig. 96, 964

6	Skoteini Cave	Sampson 1993, fig. 37, no. 185
7	Skoteini Cave	Sampson 1993, fig. 50, no. 95
8	Skoteini Cave	Sampson 1993, fig. 32, no. 23
9	Skoteini Cave	Sampson 1993, fig. 31, no. 6
10	Skoteini Cave	Sampson 1993, fig. 40, no. 261
11	Skoteini Cave	Sampson 1993, fig. 50, no. 96
12	Skoteini Cave	Sampson 1993, fig. 51, no. 99
13	Skoteini Cave	Sampson 1993, fig. 35, no. 122
14	Skoteini Cave	Sampson 1993, fig. 31, no. 7
15	Skoteini Cave	Sampson 1993, fig. 23, no. 38
16	Skoteini Cave	Sampson 1993, fig. 38, no. 196

Fig. 87	**SITE**	**CITATION**
1	Skoteini Cave	Sampson 1993, fig. 44, no. 371
2	Skoteini Cave	Sampson 1993, fig. 43, no. 328
3	Skoteini Cave	Sampson 1993, fig. 42, no. 322
4	Skoteini Cave	Sampson 1993, fig. 42, no. 300
5	Skoteini Cave	Sampson 1993, fig. 50, no. 88
6	Skoteini Cave	Sampson 1993, fig. 40, no. 234
7	Skoteini Cave	Sampson 1993, fig. 44, no. 373
8	Skoteini Cave	Sampson 1993, fig. 39, no. 223
9	Skoteini Cave	Sampson 1993, fig. 32, no. 37
10	Skoteini Cave	Sampson 1993, fig. 33, no. 47
11	Skoteini Cave	Sampson 1993, fig. 51, no. 101
12	Sarakenos Cave	Sampson 2008a, fig. 92, no. 729
13	Skoteini Cave	Sampson 1993, fig. 40, no. 245

Fig. 88	**SITE**	**CITATION**

1	Sarakenos Cave	Sampson 2008a, fig. 88, no. 768
2	Sarakenos Cave	Sampson 2008a, fig. 88, no. 557
3	Sarakenos Cave	Sampson 2008a, fig. 92, no. 707
4	Sarakenos Cave	Sampson 2008a, fig. 88, no. 761
5	Sarakenos Cave	Sampson 2008a, fig. 89, no. 766
6	Sarakenos Cave	Sampson 2008a, fig. 88, no. 767
7	Sarakenos Cave	Sampson 2008a, fig. 89, no. 746

Fig. 89	**SITE**	**CITATION**
1	Skoteini Cave	Sampson 1993, fig. 37, no.171
2	Skoteini Cave	Sampson 1993, fig. 50, no. 95a
3	Skoteini Cave	Sampson 1993, fig. 32, no. 51
4	Skoteini Cave	Sampson 1993, fig. 34, no. 94
5	Skoteini Cave	Sampson 1993, fig.49, no. 67
6	Skoteini Cave	Sampson 1993, fig. 43, no. 351
7	Skoteini Cave	Sampson 1993, fig. 35, no. 126
8	Skoteini Cave	Sampson 1993, fig. 31, no. 20
9	Skoteini Cave	Sampson 1993, fig. 37, no. 191
10	Sarakenos Cave	Sampson 2008a, fig. 92, no. 718
11	Skoteini Cave	Sampson 1993, fig. 34, no. 59
12	Sarakenos Cave	Sampson 2008a, fig. 42, no. 742
13	Skoteini Cave	Sampson 1993, fig. 44, no. 415
14	Skoteini Cave	Sampson 1993, fig. 39, no. 230
15	Skoteini Cave	Sampson 1993, fig. 34, no. 55
16	Skoteini Cave	Sampson 1993, fig. 42, no. 321
17	Skoteini Cave	Sampson 1993, fig. 50, no. 97

Fig. 90	**SITE**	**CITATION**

1	Skoteini Cave	Sampson 1993, fig. 91, no. 14
2	Skoteini Cave	Sampson 1993, fig. 91, no. 11
3	Skoteini Cave	Sampson 1993, fig. 91, no. 10
4	Skoteini Cave	Sampson 1993, fig. 91, no. 13
5	Skoteini Cave	Sampson 1993, fig. 38, no. 4
6	Skoteini Cave	Sampson 1993, fig. 37, no.193
7	Skoteini Cave	Sampson 1993, fig. 46, no. 416
8	Skoteini Cave	Sampson 1993, fig. 49, no. 71
9	Skoteini Cave	Sampson 1993, fig. 46, no. 443
10	Skoteini Cave	Sampson 1993, fig. 45, no. 402
11	Skoteini Cave	Sampson 1993, fig. 36, no. 36
12	Skoteini Cave	Sampson 1993, fig. 45, no. 403
13	Sarakenos Cave	Sampson 2008a, fig. 104, no. 1101
14	Sarakenos Cave	Sampson 2008a, fig. 103, no. 726
15	Sarakenos Cave	Sampson 2008a, fig. 103, no. 710
16	Sarakenos Cave	Sampson 2008a, fig. 103, no. 651
17	Sarakenos Cave	Sampson 2008a, fig. 104, no. 1438
18	Sarakenos Cave	Sampson 2008a, fig. 101, no. 62
19	Skoteini Cave	Sampson 1993, fig. 45, no. 405

Fig. 91	**SITE**	**CITATION**
1	Skoteini Cave	Sampson 1993, fig. 89, bottom right
2	Sarakenos Cave	Sampson 2008a, fig. 127, no. 1415
3	Sarakenos Cave	Sampson 2008a, fig. 126, no. 723
4	Skoteini Cave	Sampson 1993, fig. 92, no. 5

5	Skoteini Cave	Sampson 1993, fig. 92, no. 3
6	Sarakenos Cave	Sampson 2008a, fig.127, no. 1450
7	Skoteini Cave	Sampson 1993, fig. 89, Γ22
8	Sarakenos Cave	Sampson 2008a, fig. 126, no. 922
9	Skoteini Cave	Sampson 1993, fig. 92, no. 1
10	Skoteini Cave	Sampson 1993, fig. 34, no. 60
11	Sarakenos Cave	Sampson 2008a, fig. 89 (no #)
12	Sarakenos Cave	Sampson 2008a, fig. 127, 1451
13	Sarakenos Cave	Sampson 2008a, fig. 126, 107
14	Skoteini Cave	Sampson 1993, fig. 92, no. 6 (A12)
15	Skoteini Cave	Sampson 1993, fig. 44, no. 367

Fig. 92	**SITE**	**CITATION**
1	Franchthi Cave	Vitelli 1999, fig. 15, a
2	Franchthi Cave	Vitelli 1999, fig. 15, b
3	Franchthi Cave	Vitelli 1999, fig. 15, f
4	Franchthi Cave	Vitelli 1999, fig. 15, d
5	Franchthi Cave	Vitelli 1999, fig. 15, e
6	Franchthi Cave	Vitelli 1999, fig. 11, g

Fig. 93	**SITE**	**CITATION**
1	Franchthi Cave	Vitelli 1999, fig. 33, i
2	Franchthi Cave	Vitelli 1999, fig. 33, j
3	Franchthi Cave	Vitelli 1999, fig. 33, k
4	Franchthi Cave	Vitelli 1999, fig. 32, a
5	Franchthi Cave	Vitelli 1999, fig. 32, b
6	Franchthi Cave	Vitelli 1999, fig. 32, c

7	Franchthi Cave	Vitelli 1999, fig. 32, d
8	Franchthi Cave	Vitelli 1999, fig. 32, e
9	Franchthi Cave	Vitelli 1999, fig. 32, g

Fig. 94	**SITE**	**CITATION**
1	Franchthi Cave	Vitelli 1999, fig. 32, h
2	Franchthi Cave	Vitelli 1999, fig. 32, i
3	Franchthi Cave	Vitelli 1999, fig. 32, j
4	Ayiorytikia	Petrakis 1999, fig. 33, no. 142
5	Ayiorytikia	Petrakis 1999, fig. 33, no. 141
6	Ayiorytikia	Petrakis 1999, fig. 32, no. 134
7	Ayiorytikia	Petrakis 1999, fig. 32, no. 136

Fig. 95	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 46, no. 7
2	Rachmani	Hauptmann 1981, fig. 95, no. 3
3	Arapi	Hauptmann and Milojčić 1969, fig. 11, no. 10
4	Otzaki	Hauptmann 1981, fig. 11, no. 12
5	Arapi	Hauptmann and Milojčić 1969, fig. 17, no. 4
6	Arapi	Hauptmann and Milojčić 1969, fig. 11, no. 6
7	Otzaki	Hauptmann 1981, fig. 72, no. 10
8	Arapi	Hauptmann and Milojčić 1969, fig. 11, no. 7
9	Otzaki	Hauptmann 1981, fig. 72, no. 9

Fig.96	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 51, no. 5
2	Otzaki	Hauptmann 1981, fig. 51, no. 3

3	Otzaki	Hauptmann 1981, fig. 22, no. 13
4	Otzaki	Hauptmann 1981, fig. 24, no. 6

Fig. 97	**SITE**	**CITATION**
1	Arapi	Hauptmann and Milojčić 1969, fig 15, no.4
2	Otzaki	Hauptmann 1981, fig. 68, no. 10
3	Otzaki	Hauptmann 1981, fig. 13, no. 17
4	Arapi	Hauptmann and Milojčić 1969, fig. 6, no. 16
5	Arapi	Hauptmann and Milojčić 1969, fig14, no. 10
6	Arapi	Hauptmann and Milojčić 1969, fig 3, no. 23

Fig.	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 13, no. 15
2	Otzaki	Hauptmann 1981, fig. 62, no. 9
3	Otzaki	Hauptmann 1981, fig. 6, no. 7

Fig. 99	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 30, no. 5
2	Otzaki	Hauptmann 1981, fig. 30, no. 6
3	Otzaki	Hauptmann 1981, fig. 95, no. 1
4	Otzaki	Hauptmann 1981, fig. 44, no. 10

Fig. 100	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 63, no. 4
2	Otzaki	Hauptmann 1981, fig. 22, no. 17
3	Otzaki	Hauptmann 1981, fig. 8, no. 25
4	Otzaki	Hauptmann 1981, fig. 23, no. 1
5	Otzaki	Hauptmann 1981, fig. 5, no. 13

Fig. 101	SITE	CITATION
1	Makryialos	Urem-Kotsou 2006, fig. 4, no. 41
2	Makryialos	Urem-Kotsou 2006, fig. 4, no. 43
3	Makryialos	Urem-Kotsou 2006, fig. 4, no. 56
4	Makryialos	Urem-Kotsou 2006, fig. 4, no. 57
5	Makryialos	Urem-Kotsou 2006, fig. 4, no. 34
6	Makryialos	Urem-Kotsou 2006, fig. 4, no. 45
7	Makryialos	Urem-Kotsou 2006, fig. 4, no. 1
8	Makryialos	Urem-Kotsou 2006, fig. 4, no. 17
9	Makryialos	Urem-Kotsou 2006, fig. 4, no. 19
10	Makryialos	Urem-Kotsou 2006, fig. 4, no. 18
11	Makryialos	Urem-Kotsou 2006, fig.4, no. 11

Fig. 102	SITE	CITATION
1	Makryialos	Urem-Kotsou 2006, fig. 4.21, Λ.1.1
2	Makryialos	Urem-Kotsou 2006, fig. 4.22, Λ3.3
3	Makryialos	Urem-Kotsou 2006, fig. 4.33, Λ4.1
4	Makryialos	Urem-Kotsou 2006, fig. 4.11, 3
5	Makryialos	Urem-Kotsou 2006, fig. 4.8, 8
6	Makryialos	Urem-Kotsou 2006, fig. 4.11,
7	Makryialos	Urem-Kotsou 2006, fig. 4.10, 1

8	Makryialos	Urem-Kotsou 2006, fig. 4.11, 5
9	Makryialos	Urem-Kotsou 2006, fig. 4.9, 9
10	Makryialos	Urem-Kotsou 2006, fig. 4.9, 4
11	Makryialos	Urem-Kotsou 2006, fig. 4.11, 7
12	Makryialos	Urem-Kotsou 2006, fig. 4.11, 4
13	Makryialos	Urem-Kotsou 2006, fig. 4.8, 5
14	Makryialos	Urem-Kotsou 2006, fig. 4.11, 6
15	Makryialos	Urem-Kotsou 2006, fig. 4.11, 8

Fig. 103	**SITE**	**CITATION**
1	Dikili Tash	Tsirtsoni 2000, fig. 2, C2
2	Dikili Tash	Tsirtsoni 2000, fig. 2, A1
3	Dikili Tash	Tsirtsoni 2001, fig. 13

Fig. 104	**SITE**	**CITATION**
1	Sitagroi	Keighley 1986, fig. 6.11, no. 6
2	Sitagroi	Keighley 1986, fig. 11.16, no. 11
3	Sitagroi	Keighley 1986, fig. 11.7, no. 8
4	Sitagroi	Keighley 1986, fig. 11.7, no. 5
5	Sitagroi	Keighley 1986, fig. 11.20, no. 7
6	Sitagroi	Keighley 1986, fig. 11.20, no. 6
7	Sitagroi	Keighley 1986, fig. 11.7, no. 1
8	Sitagroi	Keighley 1986, fig. 11.16, no. 2
9	Sitagroi	Keighley 1986, fig. 11.16, no. 1
10	Sitagroi	Keighley 1986, fig. 11.16, no.3
11	Sitagroi	Keighley 1986, fig. 11.20, no. 3

12	Sitagroi	Keighley 1986, fig. 11.5, no. 3

Fig. 105	**SITE**	**CITATION**
1	Sitagroi	Evans 1986, fig. 12.5, no. 6
2	Sitagroi	Evans 1986, fig. 12.14, no. 3
3	Sitagroi	Evans 1986, fig. 12.3, no. 2
4	Sitagroi	Evans 1986, fig. 12.14, no. 2
5	Sitagroi	Evans 1986, fig. 12.14, no. 4
6	Sitagroi	Evans 1986, fig. 12.14, no. 7
7	Sitagroi	Evans 1986, fig. 12.14, no. 4
8	Sitagroi	Evans 1986, fig. 12.11, no. 1
9	Sitagroi	Evans 1986, fig. 12.3, no. 1

Fig. 106	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 52, no. 4
2	Otzaki	Hauptmann 1981, fig. 88, no. 6
3	Otzaki	Hauptmann 1981, fig. 13, no. 8
4	Otzaki	Hauptmann 1981, fig. 95, no. 4
5	Otzaki	Hauptmann 1981, fig. 41, no. 11
6	Otzaki	Hauptmann 1981, fig. 43, no. 9
7	Otzaki	Hauptmann 1981, fig. 25, no. 20
8	Otzaki	Hauptmann 1981, fig. 35, no. 1
9	Otzaki	Hauptmann 1981, fig. 34, no. 1
10	Otzaki	Hauptmann 1981, fig. 5, no. 4
11	Otzaki	Hauptmann 1981, fig. 24, no. 7
12a	Otzaki	Hauptmann 1981, fig. 88, no. 1a

12b	Otzaki	Hauptmann 1981, fig. 88, no. 1b

Fig. 105	**SITE**	**CITATION**
1	Otzaki	Hauptmann 1981, fig. 86, no. 1
2	Otzaki	Hauptmann 1981, fig. 85, no. 5
3	Otzaki	Hauptmann 1981, fig. 35, no. 5
4	Otzaki	Hauptmann 1981, fig. 89, no. 5

Fig. 108	**SITE**	**CITATION**
1	Alepotrypa	Papathanassopoulos 2011, fig. 148
2	Sarakenos Cave	Sampson 2008a, p. 105, no. 1
3	Sarakenos Cave	Sampson 2008a, p. 105, no. 5
4	Sarakenos Cave	Sampson 2008a, p. 105, no. 4
5	Sarakenos Cave	Sampson 2008a, p. 105, no. 2
6	Sarakenos Cave	Sampson 2008a, p. 105, no. 9
7	Sarakenos Cave	Sampson 2008a, p. 105, no. 7
8	Sarakenos Cave	Sampson 2008a, p. 105, no. 8

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Figure 1: Late Neolithic Sites in Neighboring Lands

1. Kum Tepe
2. Illpinar
3. Pendik
4. Firkir Tepe
5. Yarimbugaz
6. Hoca Çeşme
7. Vessilnovo
8. Karanocvo
9. Varna
10. Gumelniţa
11. Boian
12. Cucteni
13. Turdaş
14. Tărtăria
15. Pretesi
16. Gradešcina
17. Bălgarčevo
18. Slatino
19. Vrisnik
20. Anzabegovo
21. Porodin
22. Rudna Glava
23. Vlassic
24. Lepenski Vir
25. Selevac
26. Vinča
27. Opovo
28. Banat
29. Tizapolgar-Bastanya
30. Butmir
31. Obre
32. Hvar
33. Danilo
34. Smilčić
35. Crno Vrilo
36. Podorgi
37. Dunavec
38. Kamnit
39. Maliq
40. Čakran

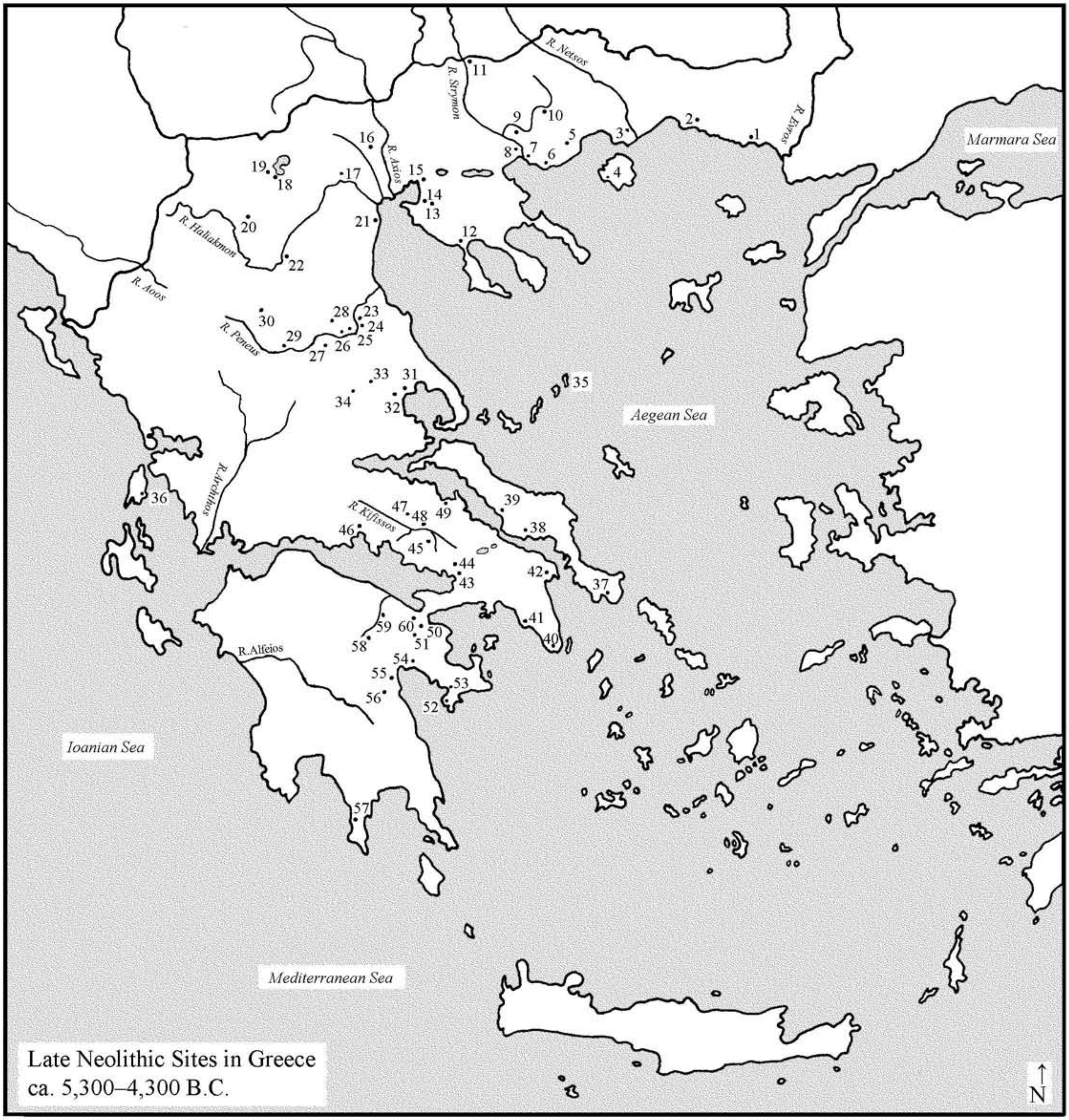


Figure 2: Late Neolithic Sites in Greece

1. Makri
2. Paradimi
3. Paradeisos
4. Limenaria
5. Dikili Tash
6. Akropotamos
7. Galepsos
8. Kyroneri
9. Dimitra
10. Sitagroi
11. Promachon-Toplonica
12. Olynthus
13. Vaskilka
14. Thermi B
15. Stavropouli
16. Yiannista
17. Polyplatanos
18. Dispilio
19. Avgi
20. Megalo Nisi Galanis
21. Makryialos
22. Servia
23. Makrychori
24. Rachmani
25. Arapi
26. Otzaki
27. Ayia Sofia
28. Larisa
29. Plateia Magoula Zarkou
30. Theopetra Cave
31. Pevkakia
32. Dimini
33. Tsani
34. Tsangli
35. Cave of the Cyclops
36. Chiriospilia Cave
37. Ayia Triada
38. Skoteini Cave
39. Varka Psachna
40. Kitsos Cave
41. Athenian Agora
42. Cave of Pan
43. Eutresis
44. Thespiae
45. Sarakenos Cave
46. Corycian Cave
47. Elateia
48. Orchomenos
49. Proskynas
50. Gonia
51. Klenia Cave
52. Franchthi Cave
53. Aria Argolidos
54. Prosymna
55. Ayiorytika
56. Lerna
57. Alepotrypa Cave
58. Asea
59. Nemea
60. Corinth

Figure 3

Late Neolithic Ia (ca. 5,300-4,800 BC)		Late Neolithic Ib (ca. 4,800-4,300 BC)
Akropotamos		Akropotamos
Alepotrypa Cave		Alepotrypa Cave
Aria Argolidos (I)		Aria Argolidos (2)
Asea		
	Arapi	Arapi
Athenian Agora and Acropolis		Athenian Agora
Avgi I		Avgi II
Ayiorytika		Ayiorytika
	Ayia Sophia I	
Ayia Triada Cave		Ayia Triada Cave
Cave of Cyclops, Youra		
Cave of Pan		Cave of Pan
Chaeronea		
Chirospilia Cave		Chirospilia Cave
Corinth (Forum West, Museum, site, Lechaion Road)		Corinth
Corycian Cave		Corycian Cave
Dikili Tash (I)		Dikili Tash (IIA-C)
Dimini		Dimini
Dimitra (I-II)		Dimitria (III)
Dispilio		
Elateia ("Bothros" and "Dhrakmani" Phases)		
Eutresis		Eutresis (II)
		Galepsos
		Gonia
Kitsos Cave		Kitsos Cave
		Klenai Cave
		Kryoneri
	Olynthus	Olynthus
Larissa		
Lerna		Lerna?
Limenaria, Thassos		Limenaria, Thassos
		Mandalo
Makri (I)		Makri II
Makrychori I		Makrychori 2
Makyrialos (I)		Makryialos (II)
Megalo Nisi Galanis (Kritrini Limni)	M. Nisi Galanis	
Nemea		

Figure 3

Orchomenos		
	Olynthos (II)	Olynthos (III)
	Otzaki (I)	Otzaki (II)
Paradimi (I-II)	Paradimi (III)	Paradimi (IV)
Plateia Magoula Zarkou		
Promachonas-Topolnica I-II	P-T (III)	Promachonas-TopolnicaIII-IV
Prosymna (East Yerogalaro Ridge)		Prosymna (West Yerogalaro Ridge)
Proskynas		
Rachmani	Rachmani	Rachmani
Sarakenos Cave		Sarakenos Cave
Servia (Phase 6)	Servia (Phase 7)	
Sitagroi (I-II)	Sitagroi (II)	Sitagroi (IIIA)
Skoteini Cave, Euboea (1-2)		Skoteini Cave, Euboea (3-4)
Stavropouli		Stavropouli
Thespai		
Theopetra Cave (2)		Theopetra (3)
Thermi B		Thermi B
Tsangli		Dimini
Yiannitsa		Yiannitsa B
Varka, Eurboea		
Vasilika II (Vasilika C)		Vasilika (III-IV) (Vasilika C)

Figure 4

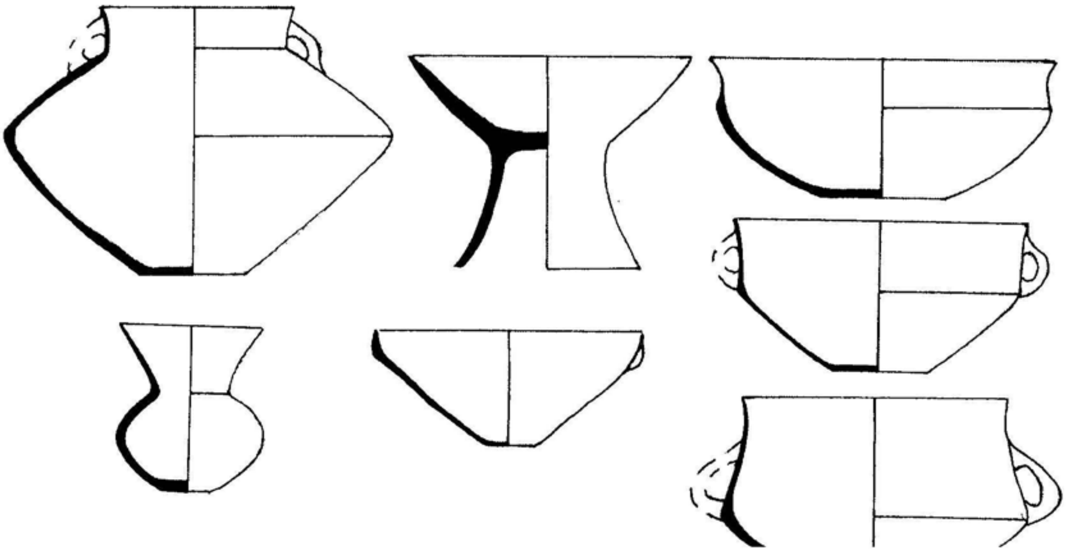
	Late Neolithic Ia (ca. 5,300-4,800 B.C.)		Late Neolithic Ib (ca. 4,800-4,300 B.C.)	
	Tsangli	Larisa	Arapi	Dimini
Matt-painted	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■
B3ε	■■■■■■■■■■	■■■■■■■■■■	■■■■■	
B3α3			■■■■■	■■■■■■■■■■
B3α2			■■■■■	■■■■■■■■■■
Akropotamos	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■
Akropotamos imports at Promachon-Topolnica			■■■■■■■■■■	■■■■■■■■■■
Akropotamos-Strumsko				■■■■■■■■■■
Black-on-red	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■
B3δ				
B3α2			■■■■■■	■■■■■■■■■■
Northern Greece Types (esp. Eastern Macedonia)			■■■■■■	■■■■■■■■■■
Strumsko-Akropotamos				■■■■■■■■■■
Strumsko			■■■■■■	
“Galepsos”				■■■■■
Polychrome	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■
Polychrome Matt-Painted	■■■■■■■■■■	■■■■■■■■■■	■■■■■	
Gonia			■■■■■■■■■■	■■■■■■
Klenia			■■■■■■■■■■	■■■■■■
B3ζ	■■■■■■■■■■	■■■■■		
B3γ		■■	■■■■■■■■■■	
B3β			■■■■■■	■
Dimitria			■	■■■■■■
Black-burnished	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■
Για1	■■■■■■■■■■	■■■■■■■■■■	■■■■	
Για2	■■■■■■■■■■	■■■■■■■■■■	■■■■	
Για3	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■	■■■■■■■■■■
Ribs-and-beading	■■■■■■■■■■	■■■■■■■■■■		
Pellets, discs, knobs,etc.	■■■■■■■■■■	■■■■■■■■■■	■■■■	
Incision, impression	■■■■■■■■■■	■■■■■■■■■■	■■■■	
Barbortine arcading	■■■■■■■■■■	■■■■■■■■■■		
Rippled		■■■■■■	■■■■■■■■■■	■■■■■
Channeled			■■■■■■	■■■■■■■■■■
Grooved			■■■■■■	■■■■■■■■■■

Figure 4

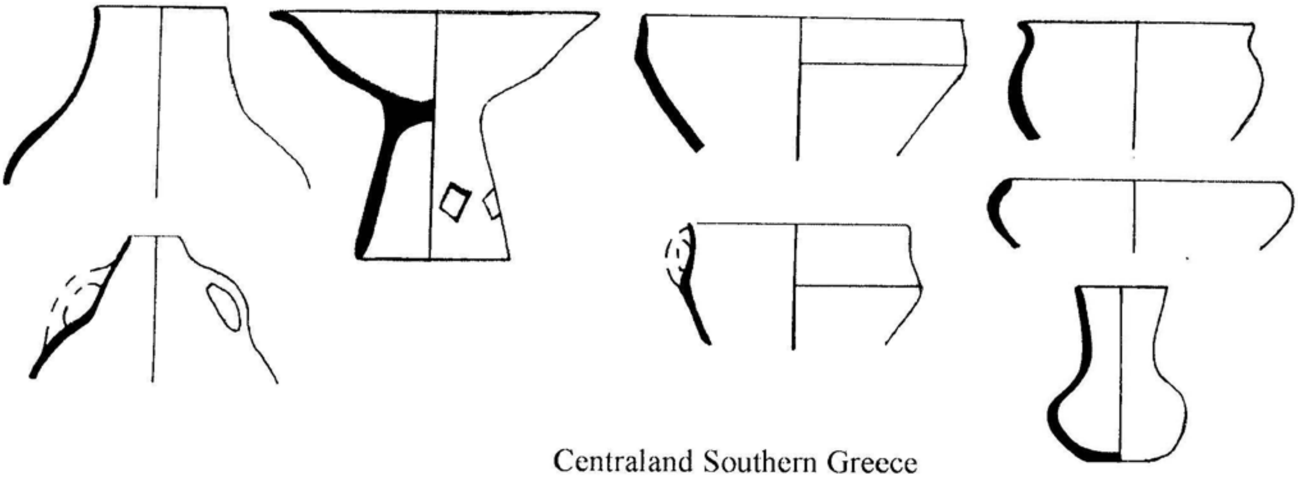
Γ2	?■■■		■■■■?	
Scratch-incised	■■■■■			
Black-topped			■■■■■■	■■■■■■■■■■■
Gray-burnished (Corinth)			■■■■■■■■■■■	
Gray-on-gray	■■■■			
Rhyta	■■■■■■■■■■■	■■■■■		
Scoops	■■■■■■■■■■■	■■■■■■■■■■■	■■■■■■■■■■■	■■■■■■■■■■■
LN Ia type	■■■■■■■■■■■	■■■■■■■■■■■		
LN Ib type			■■■■■■■■■■■	■■■■■■■■■■■
Askoi	■■■■■■■■■■■	■■■■■■■■■■■	■■■■■■■■■■■	■■■■■■■■■■■
Graphite-painted				
Promachon-Topolnica			■■■■■	
Graphite wash			■■■■■■	■■■■■■■■■■■
Dikili Tash-Slatino Strumska-style				■■■■■■■■
Bitumen-painted Topolnica type	■■■■■■■■■■■	■■■■■■■■■■■		
Incised	■■■■■■■■■■■	■■■■■■■■■■■	■■■■■■■■■■■	■■■■■■■■■■■
Skoteini 1 (Dot Incised)	■■■■■■■■■■■	■■■■■■■■■■■		
Skoteini 2		■■■■■■■■■■■		
Fine Incised	■■■■■■■■■■■	■■■■■		
Basketry Band	■■■■■■			
Promachon-Topolnica A1		■■■■■	■■■■■■■■■■■	■■■■■■■■■■■
Čakran	■■■■■■■■■■■			
Early Prosymna			■■■■■■■■■■■	■■■■■■
Sarakenos 1				
Skoteini 3/Sarakenos 2			■■■■■■■■■■■	■■■■■■■■■■■
Skoteini 4			■■■■■■■■■■■	■■■■■■■■■■■
B2 Classic Dimini				■■■■■■■■■■■
Γ2 Incised and Filled	?■■■		■■■■?	
Gradešnica				■■■■■■■■■■■
Marcia I				■■■■■■■■■■■
Promachon-Topolnica “Larisa”		■■■■	■■■■■■■■■■■	■■■■■■■■■■■
Heurtley’s Later Incised			■■■■■■■■■■■	■■■■■■■■■■■

Figure 4

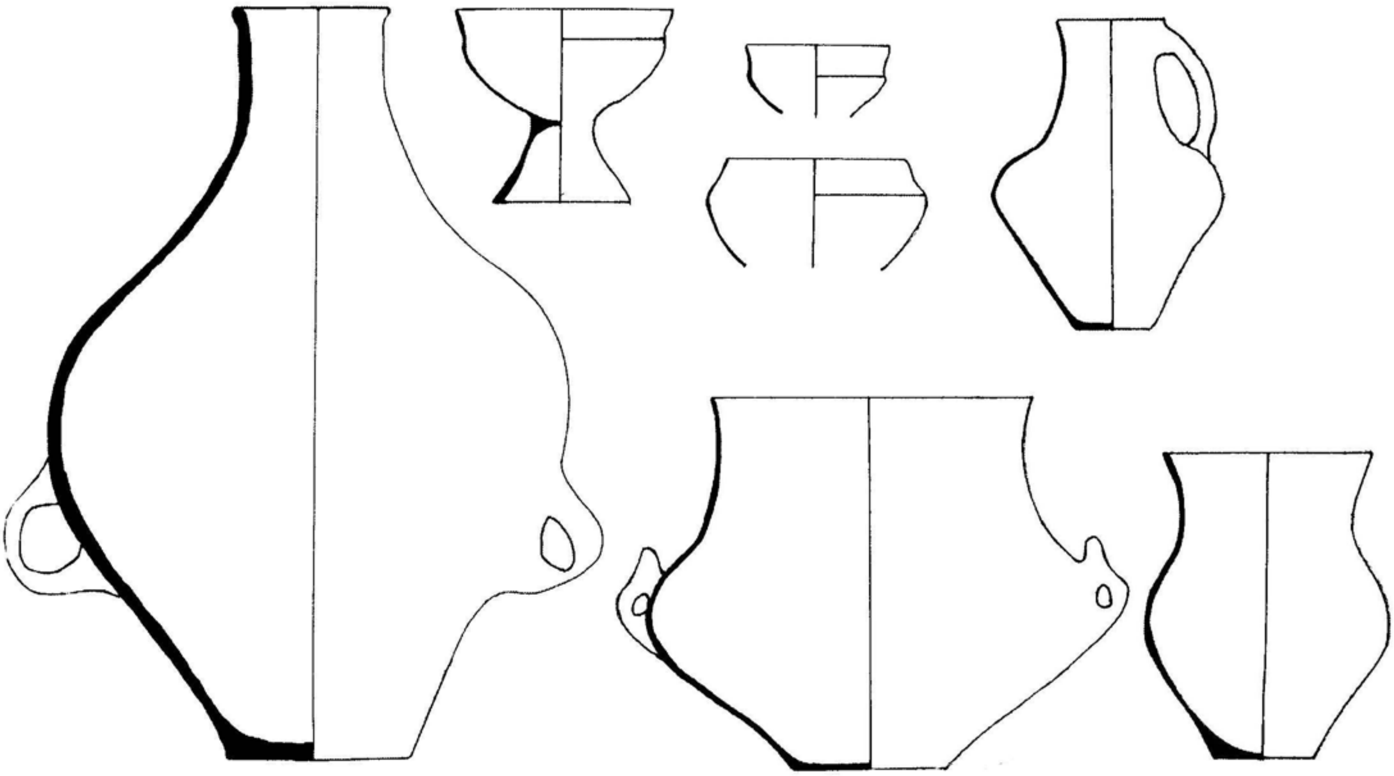
Monochrome	■■■■■■■■■■■	■■■■■■■■■■■	■■■■■■■■■■■	■■■■■■■■■■■
Coarse ware	■■■■■■■■■■■	■■■■■■■■■■■	■■■■■■■■■■■	■■■■■■■■■■■
Tripod cooking-pots	■■■■■■■■■■■	■■■■■■■■■■■		
Baking trays/pans	■■■■■■■■■■■	■■■■■■■■■■■		
Perforated sherds		■■■■■	■■■■■■■■■■■	■■■■■■■■■■■
“cheese-pots”				■■■■■



Thessaly

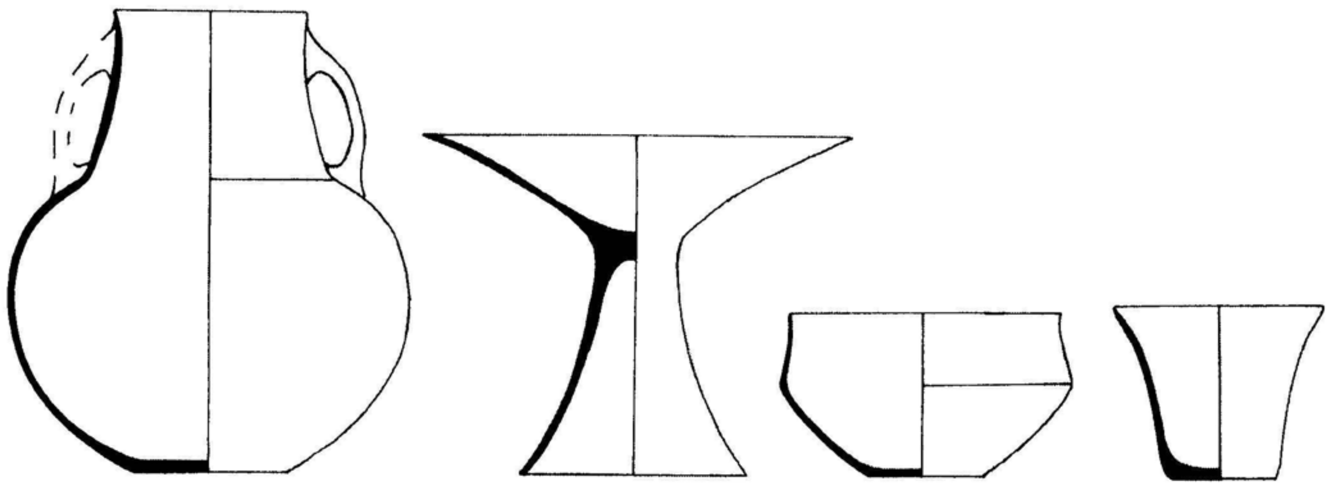


Centraland Southern Greece



Northern Greece

Main Matt-painted Pottery Shapes: Jars, Fruit-stands, and Carinated Bowls 1:6
Figure 5

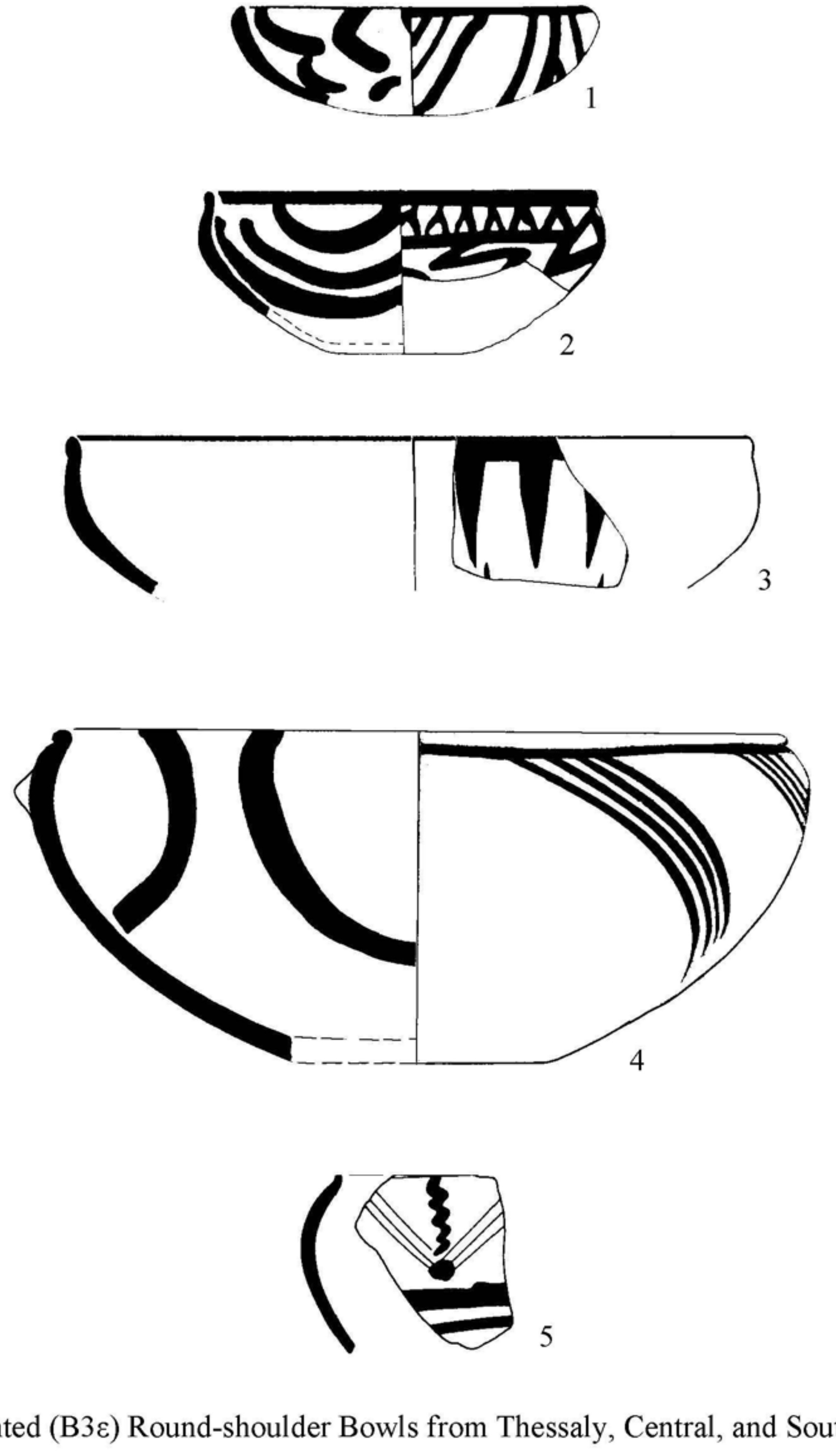


Main Matt-painted Pottery Shapes 1:6

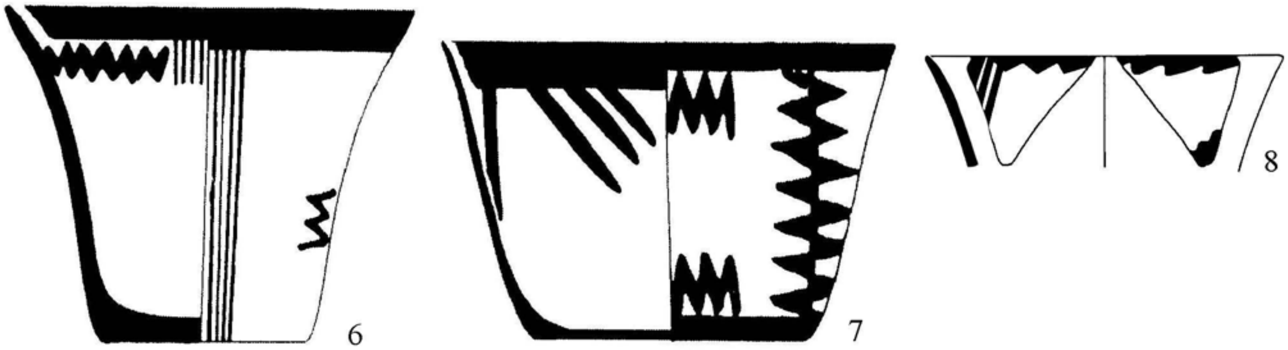
Figure 6

Matt-painted (B3ε) Anthrpomorphic Vessels from Thessaly, Central, and Southern Greece 1:3

Figure 7

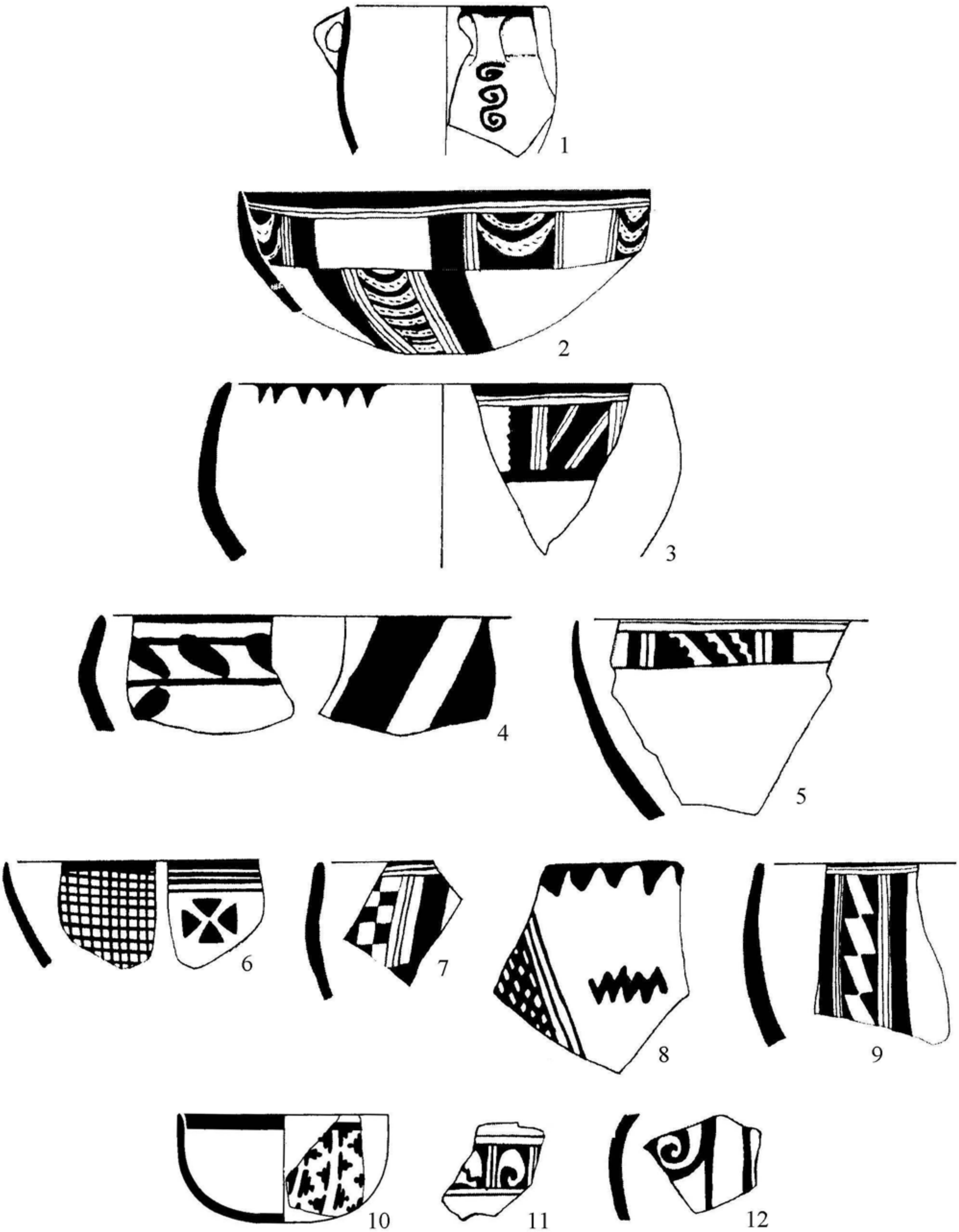


Matt-painted (B3ε) Round-shoulder Bowls from Thessaly, Central, and Southern Greece 1:3



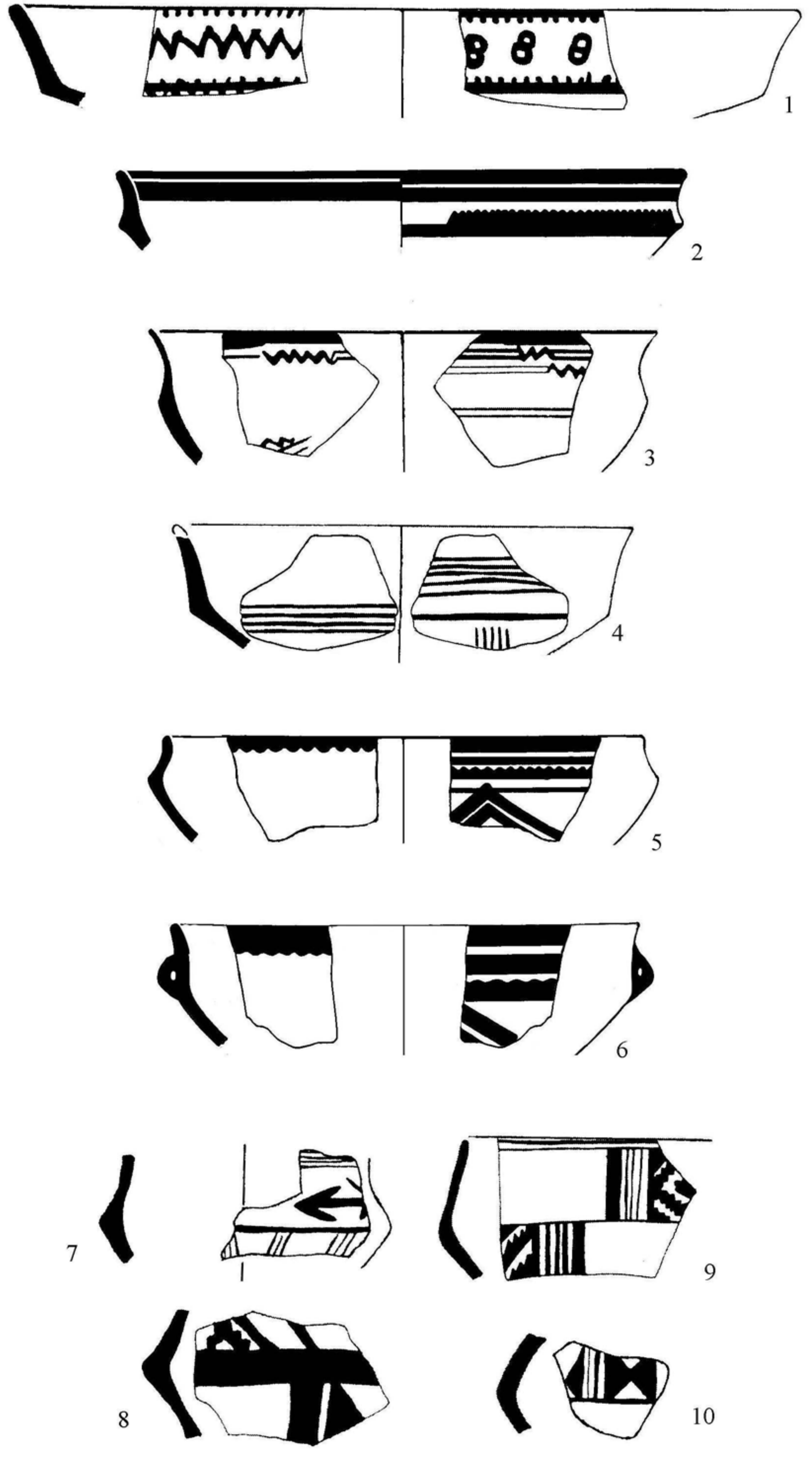
Matt-painted (B3ε) Tumbers from Thessaly, Central, and Southern Greece 1:3

Figure 8



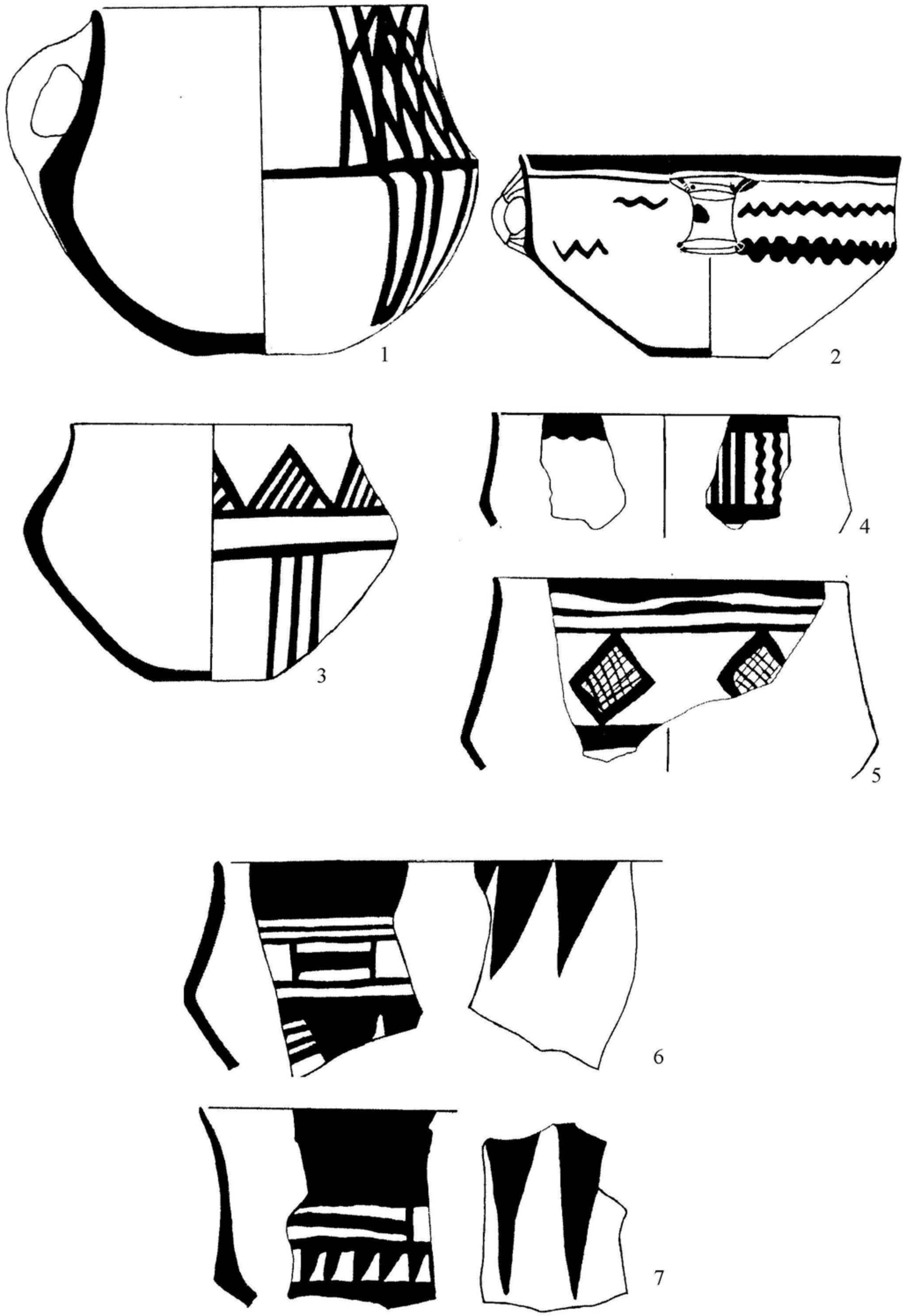
Matt-painted (B3ε) Bowls from Thessaly, Central, and Southern Greece 1:3

Figure 9



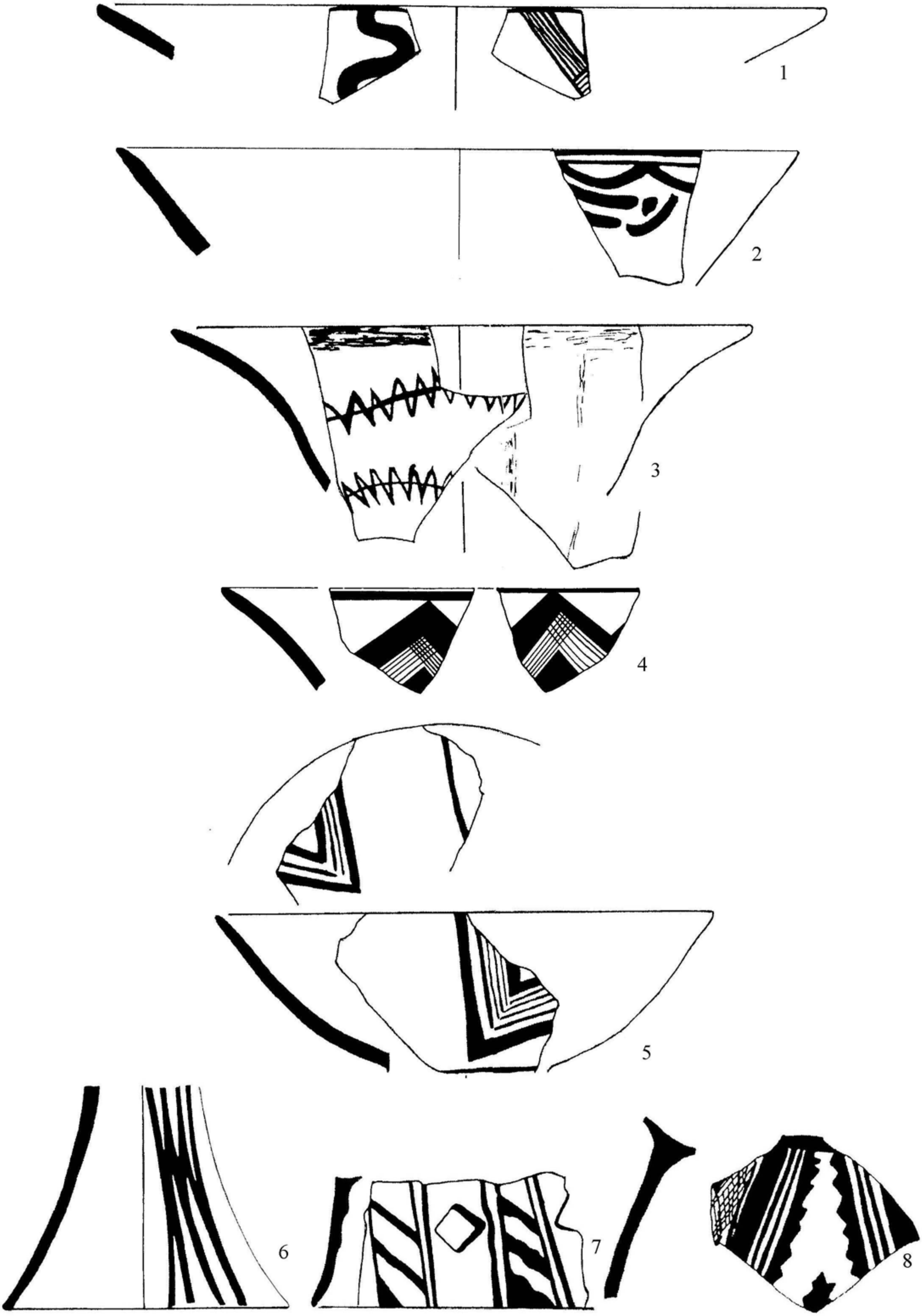
Matt-painted (B3ε) Carinated Bowls from Thessaly, Central, and Southern Greece 1:3

Figure 10

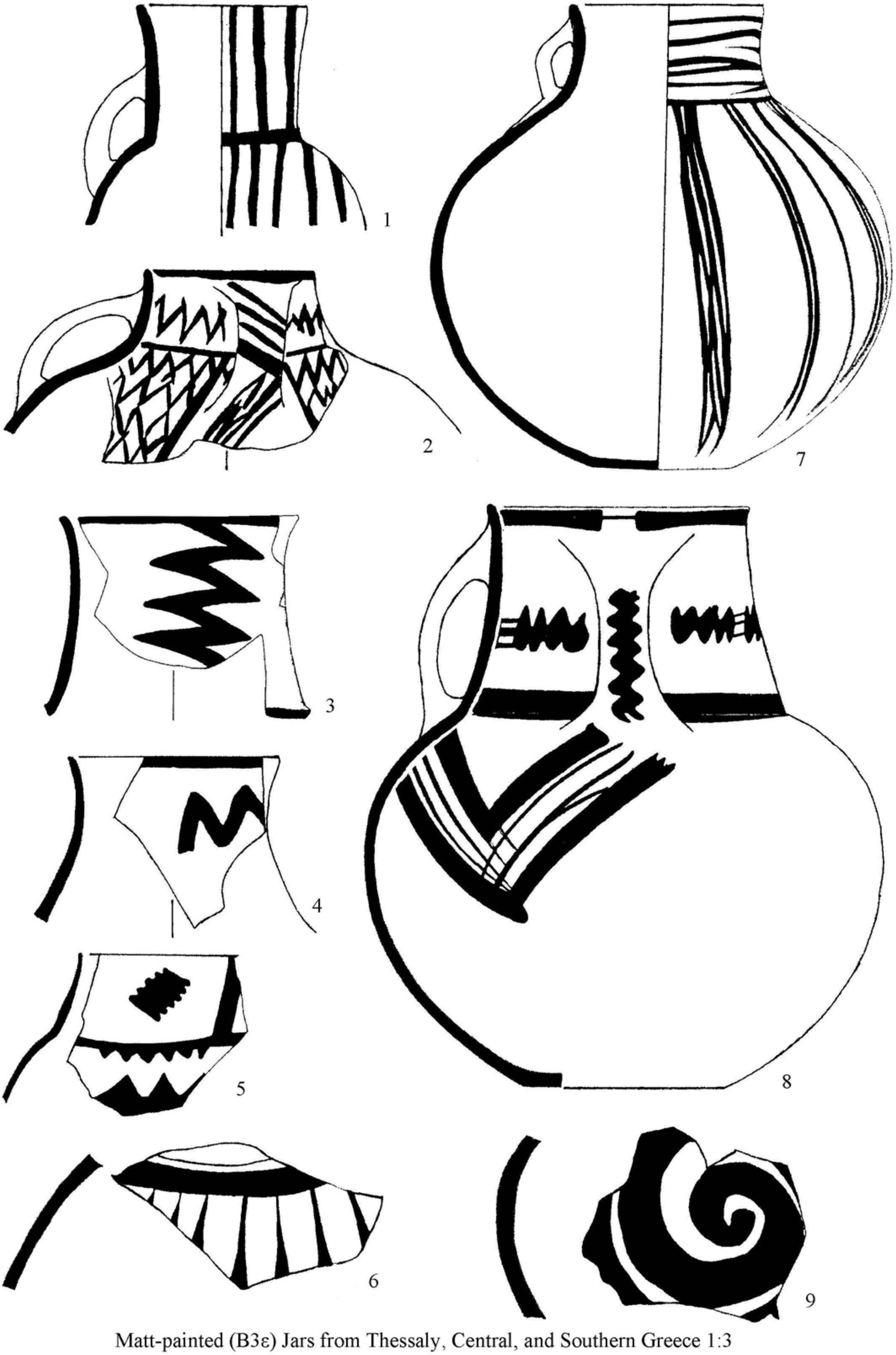


Matt-painted (B3ε) Carinated Bowls from Thessaly, Central, and Southern Greece 1:3

Figure 11



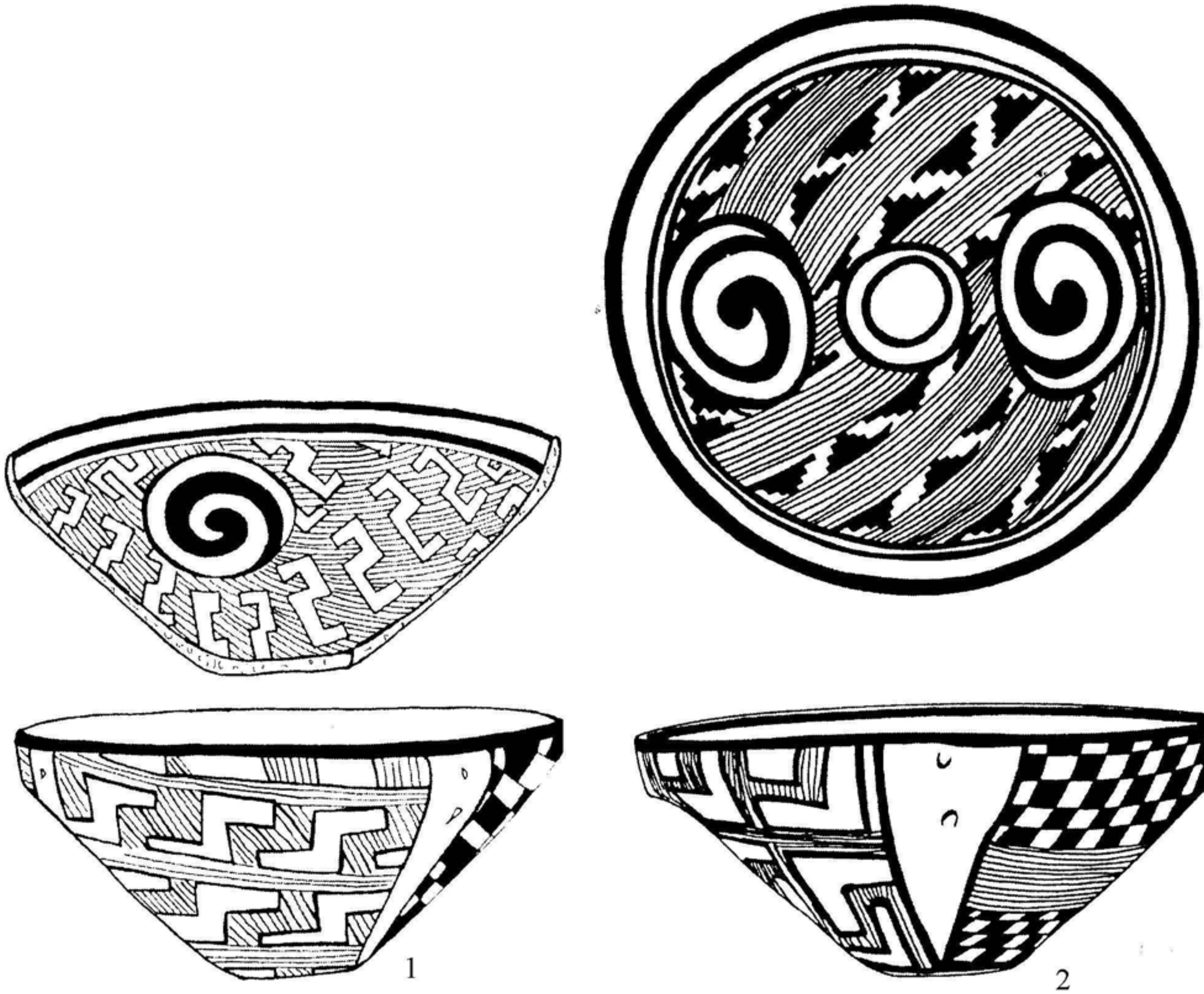
Matt-painted (B3ε) Fruit-stands from Thessaly, Central, and Southern Greece 1:3
Figure 12



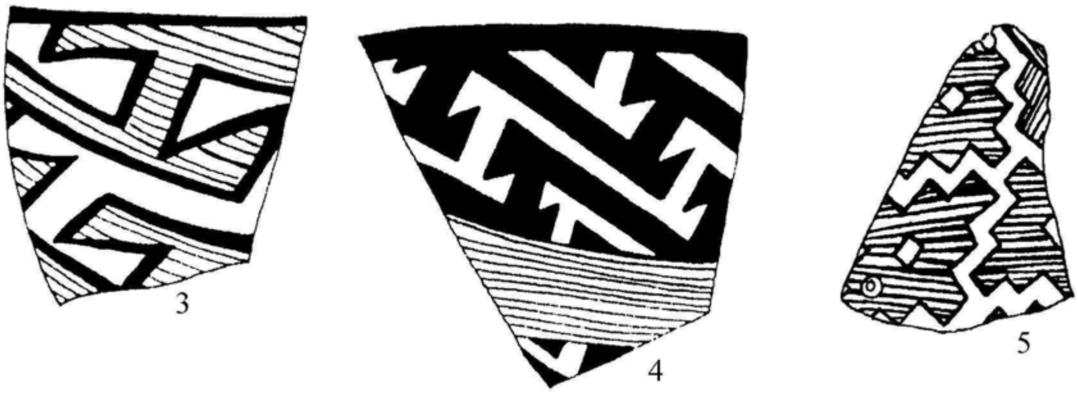
Matt-painted (B3ε) Jars from Thessaly, Central, and Southern Greece 1:3
Figure 13

Matt-painted (B3ε) Amphoras 1:3

Figure 14

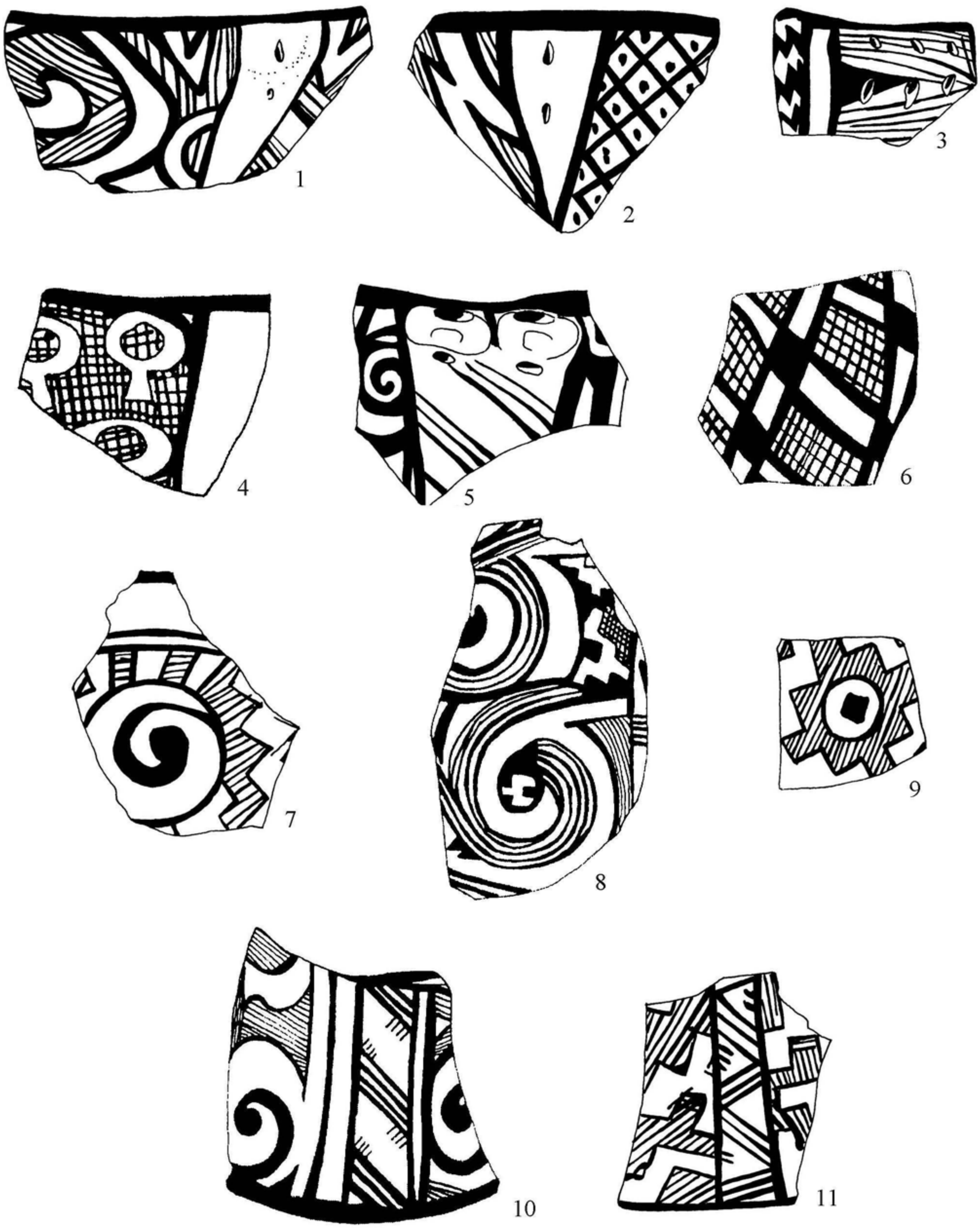


Classic Dimini Style Matt-painted Bowls 1:4



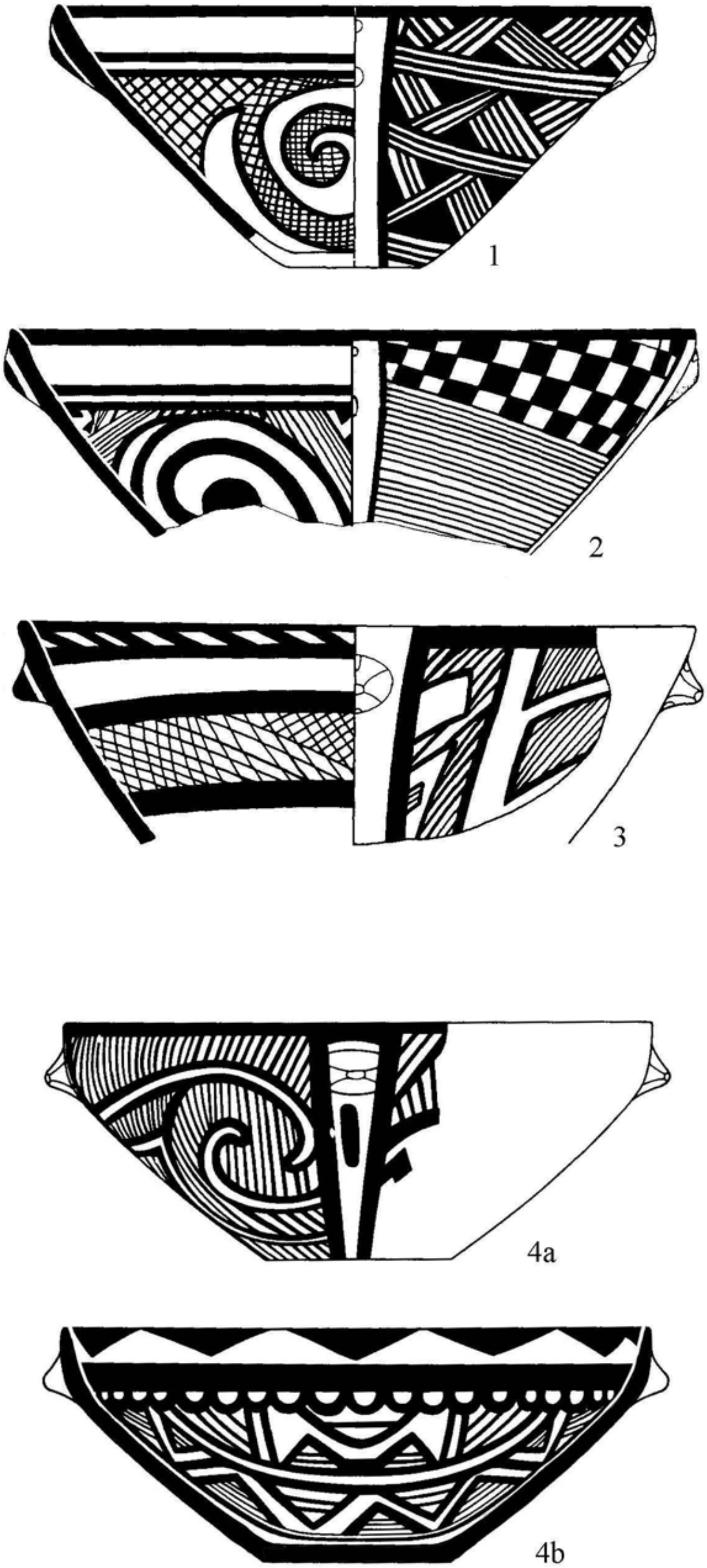
Classic Dimini Style Matt-painted Sherds 2:3

Figure 15



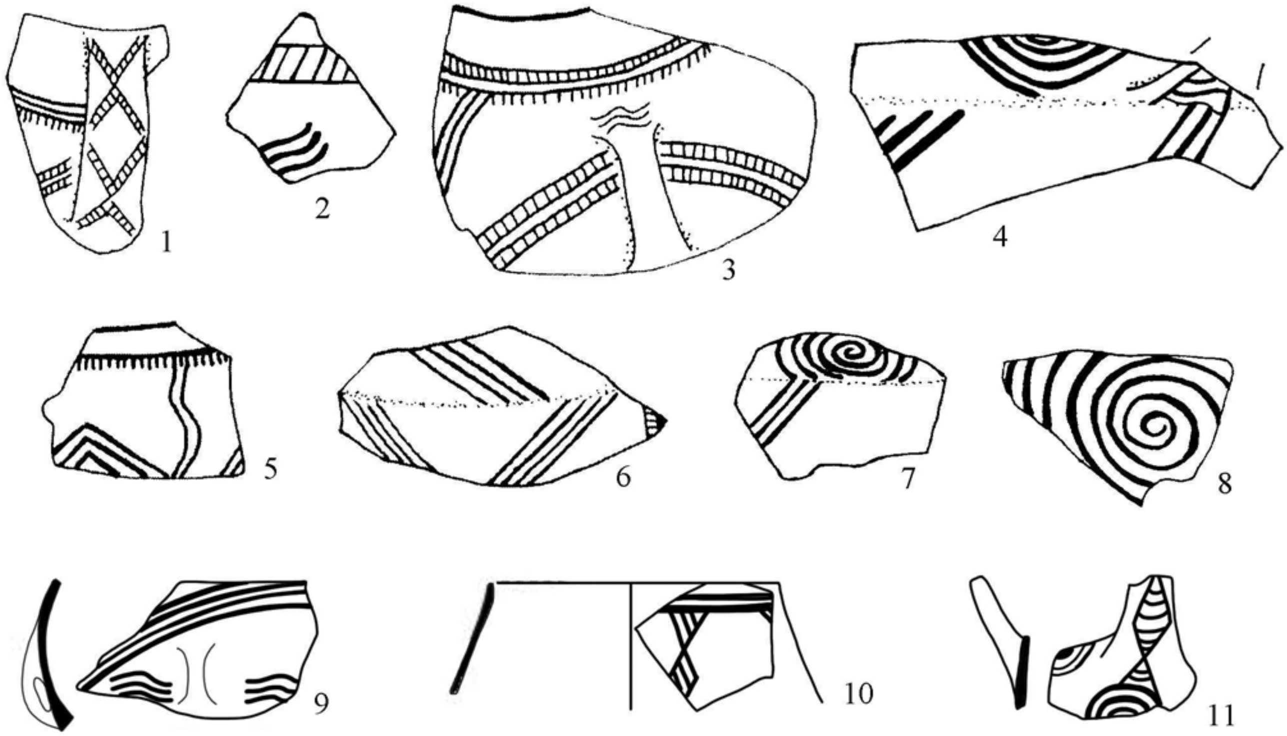
Classic Dimini Style Matt-painted Dimini Bowls and Fruit-stand Sherds 2:3

Figure 16



Classic Dimini Style Matt-painted Dimini Bowls 1:3

Figure 17



Akropotamos Style Matt-painted Pottery 1:2

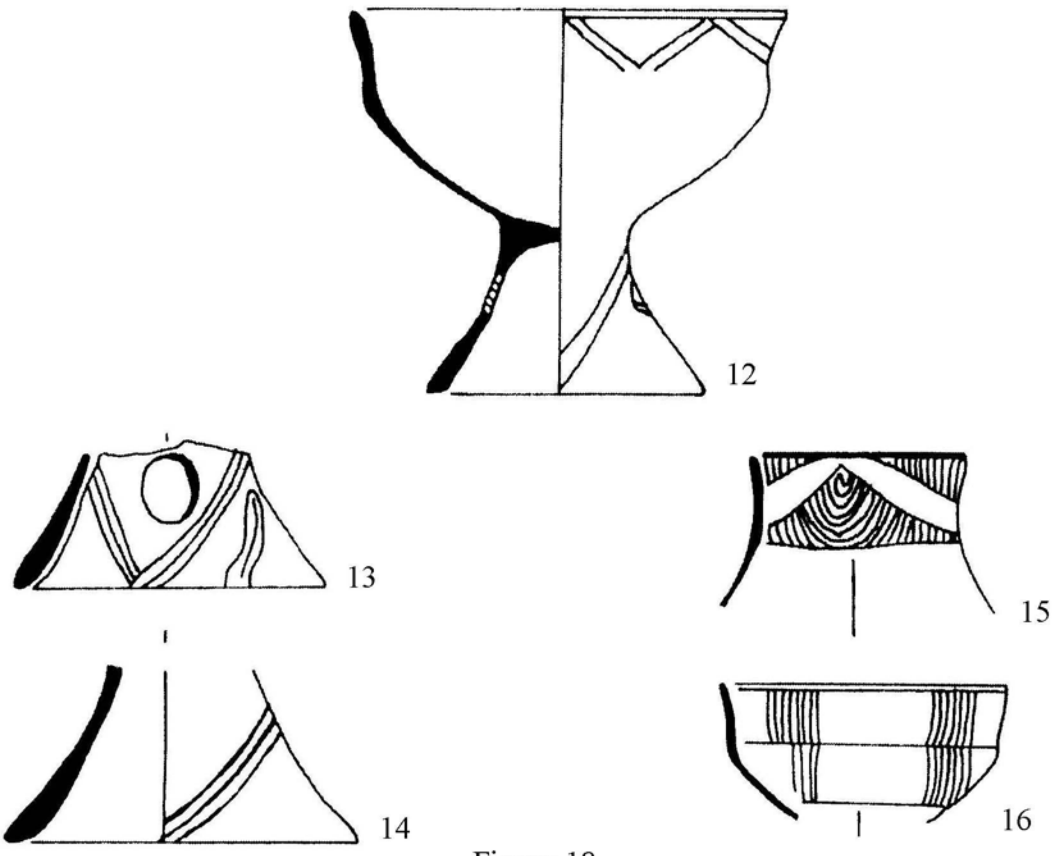
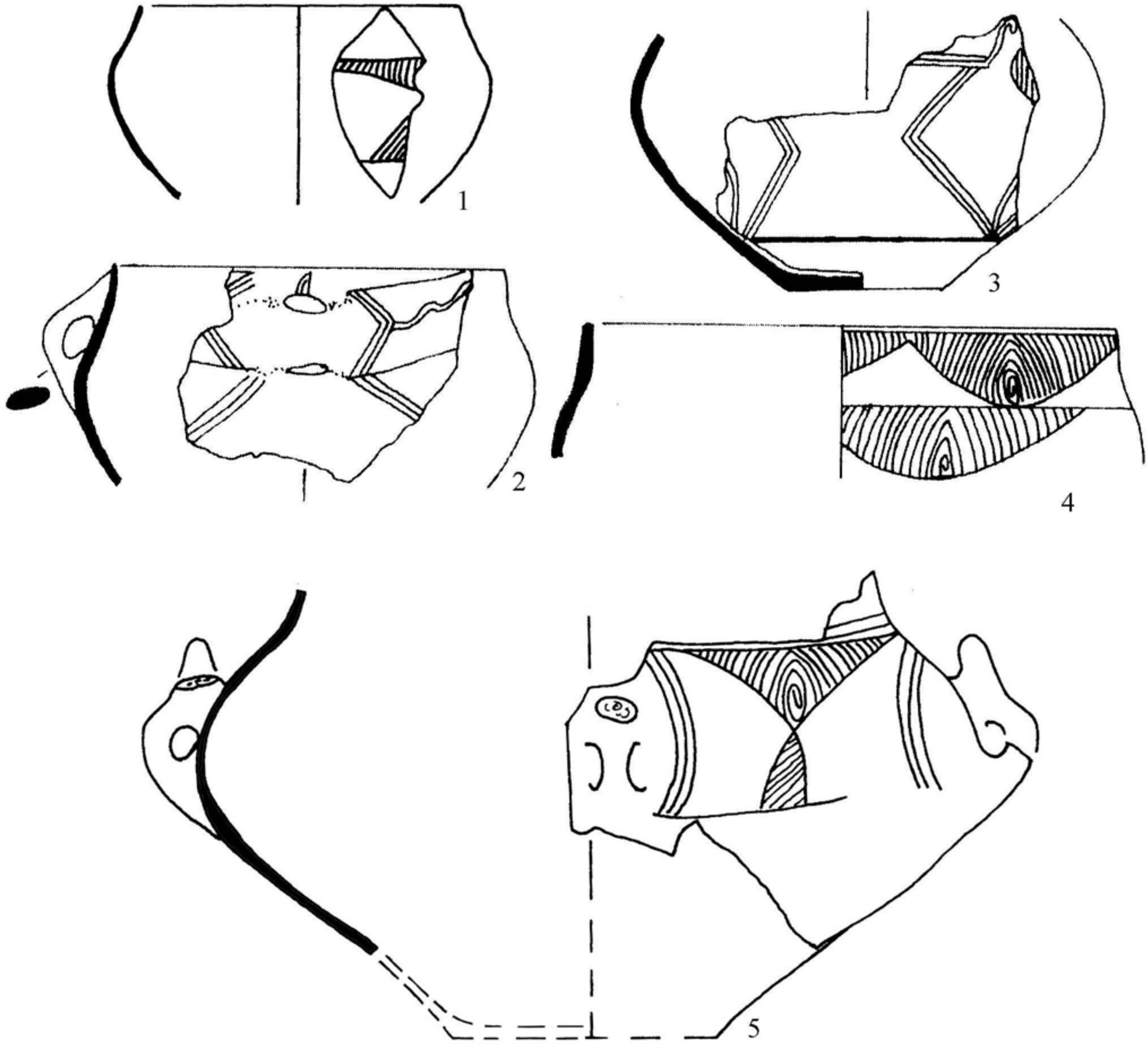
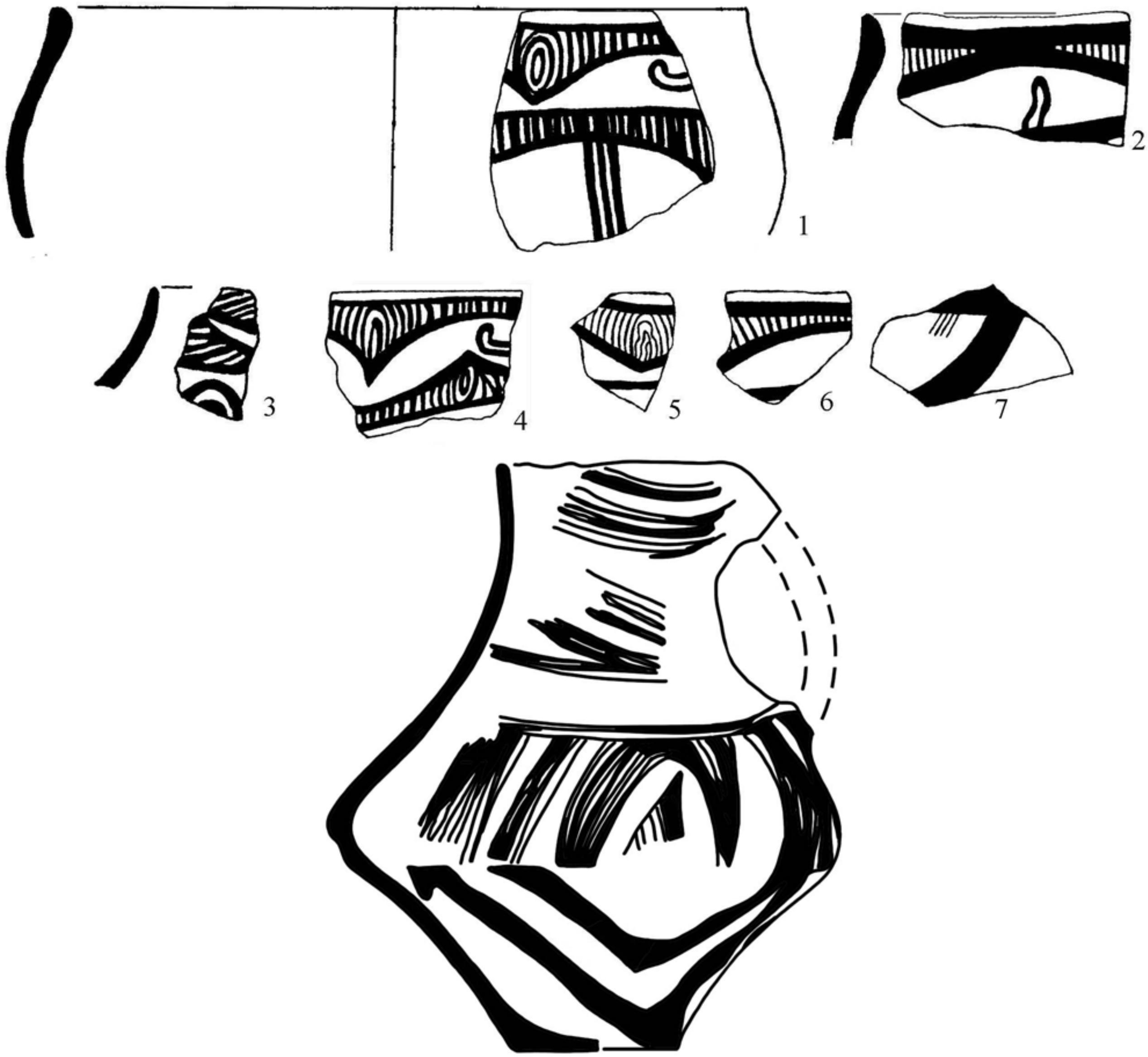


Figure 18
Promachon-Topolnica: Imitation Akropotamos Style Pottery 1:3

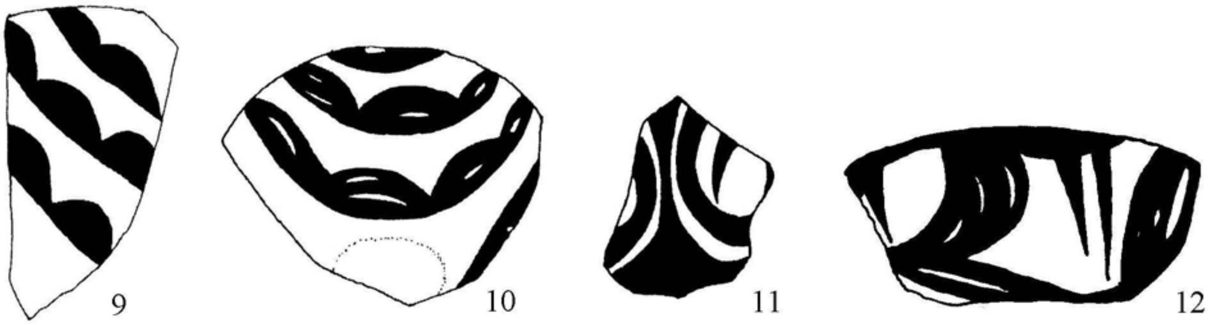


Imitation Akropotamos style from Promachon-Topolnica 1:3

Figure 19

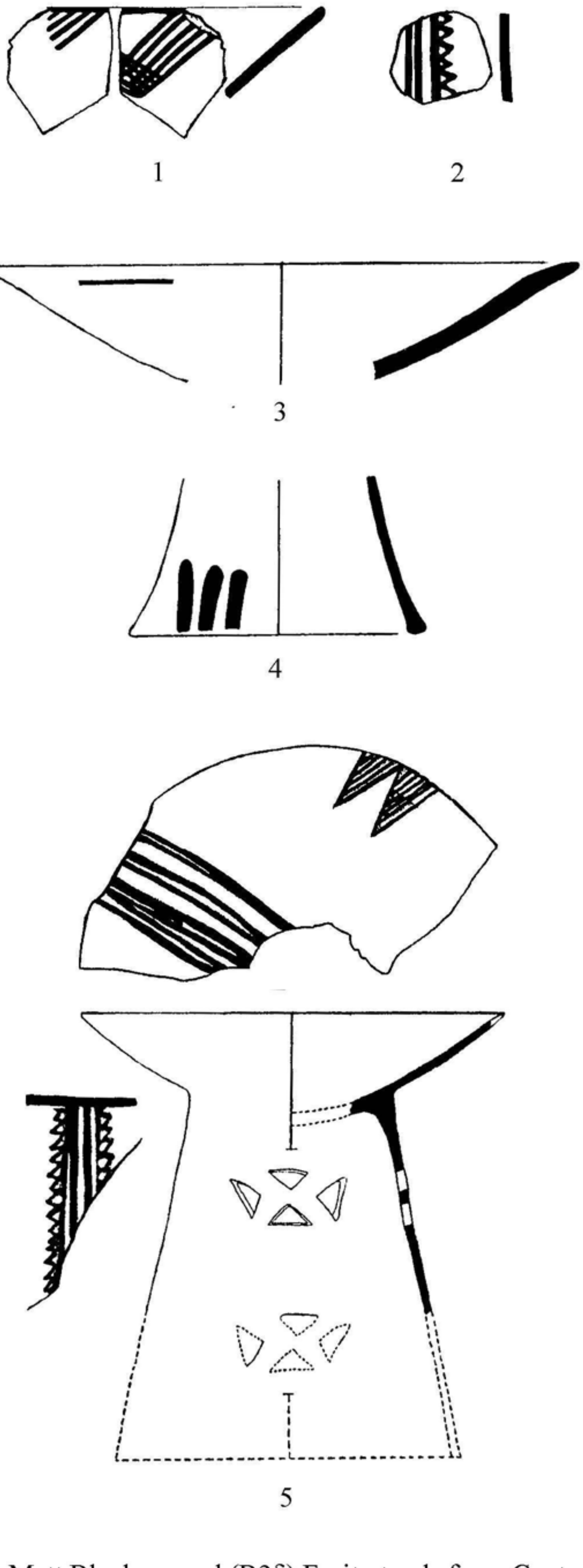


Matt-painted Combination of Akropotamos and Stumsko Styles 1:3



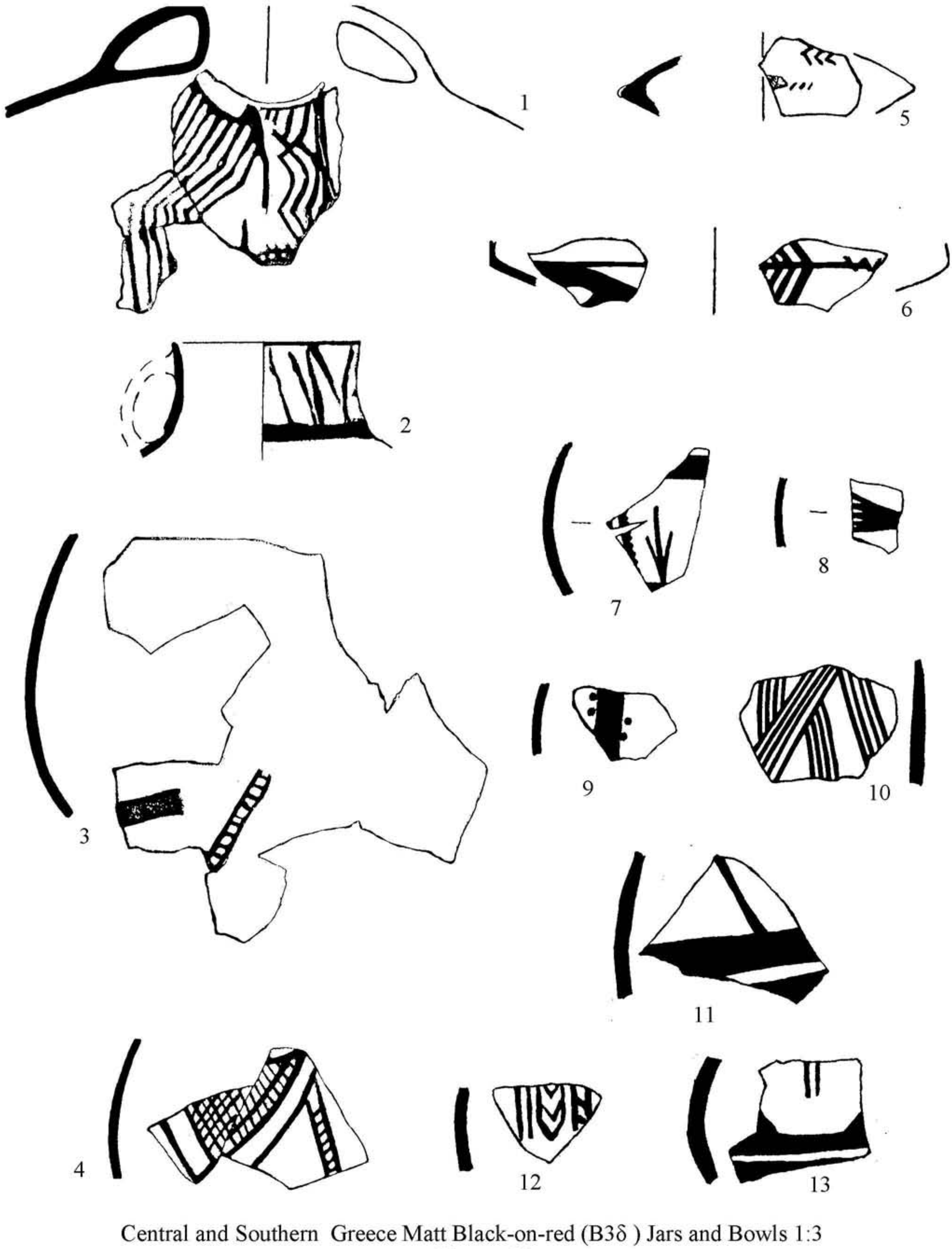
Akropotamos (Mylonas Type B) Matt-painted Pottery 1:2

Figure 20



Late Neolithic Ia Matt Black-on-red (B3δ) Fruit-stands from Central and Southern Greece 1:3

Figure 21



Central and Southern Greece Matt Black-on-red (B3δ) Jars and Bowls 1:3
Figure 22

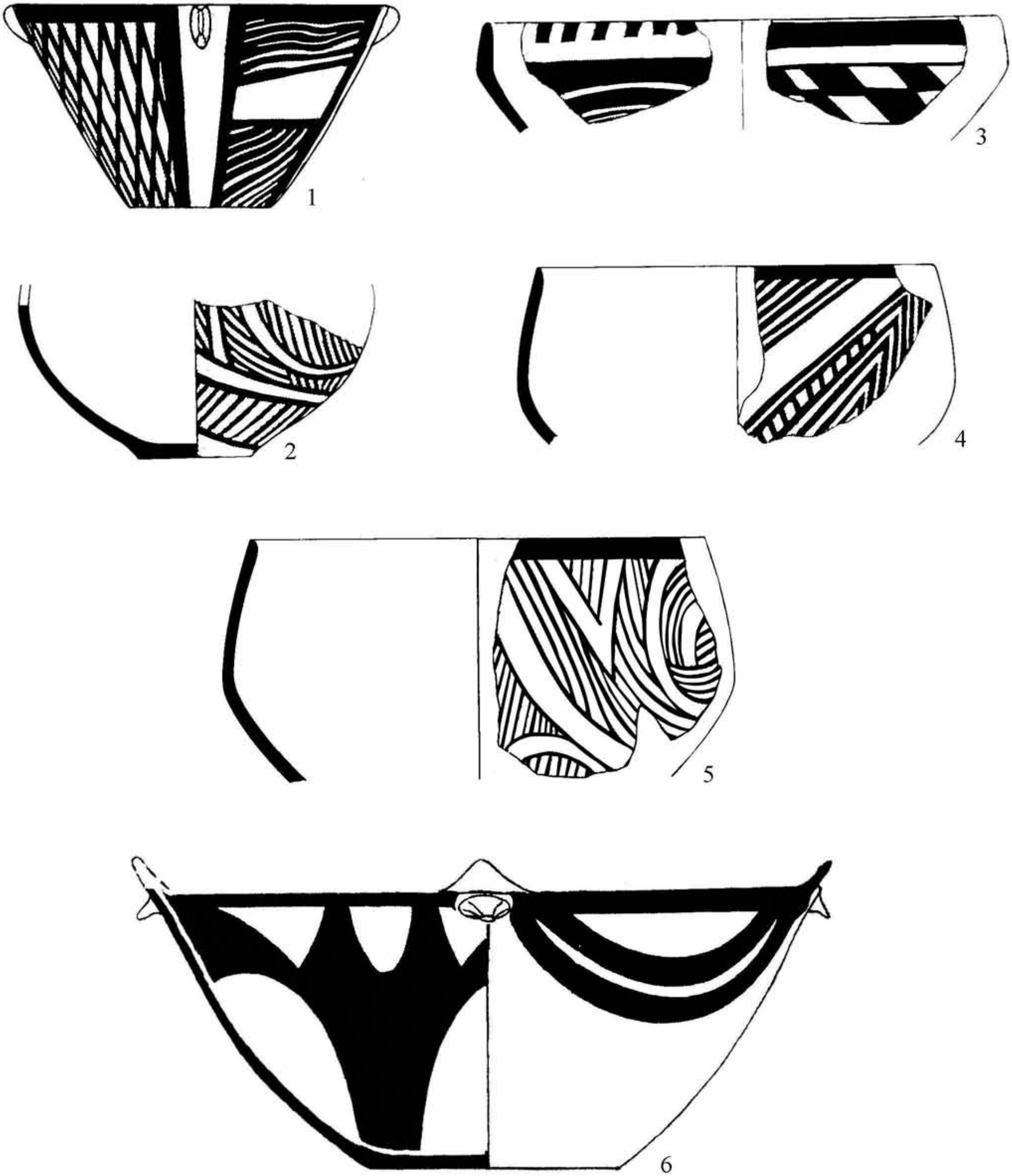
Late Neolithic Ib Black-on-red Otzaki and Classical Dimini Style (B3α2) Sherds from Thessaly

2:3

Late Neolithic Ib Black-on-red Otzaki and Classical Dimini Style (B3α2) Vessels from Thessaly

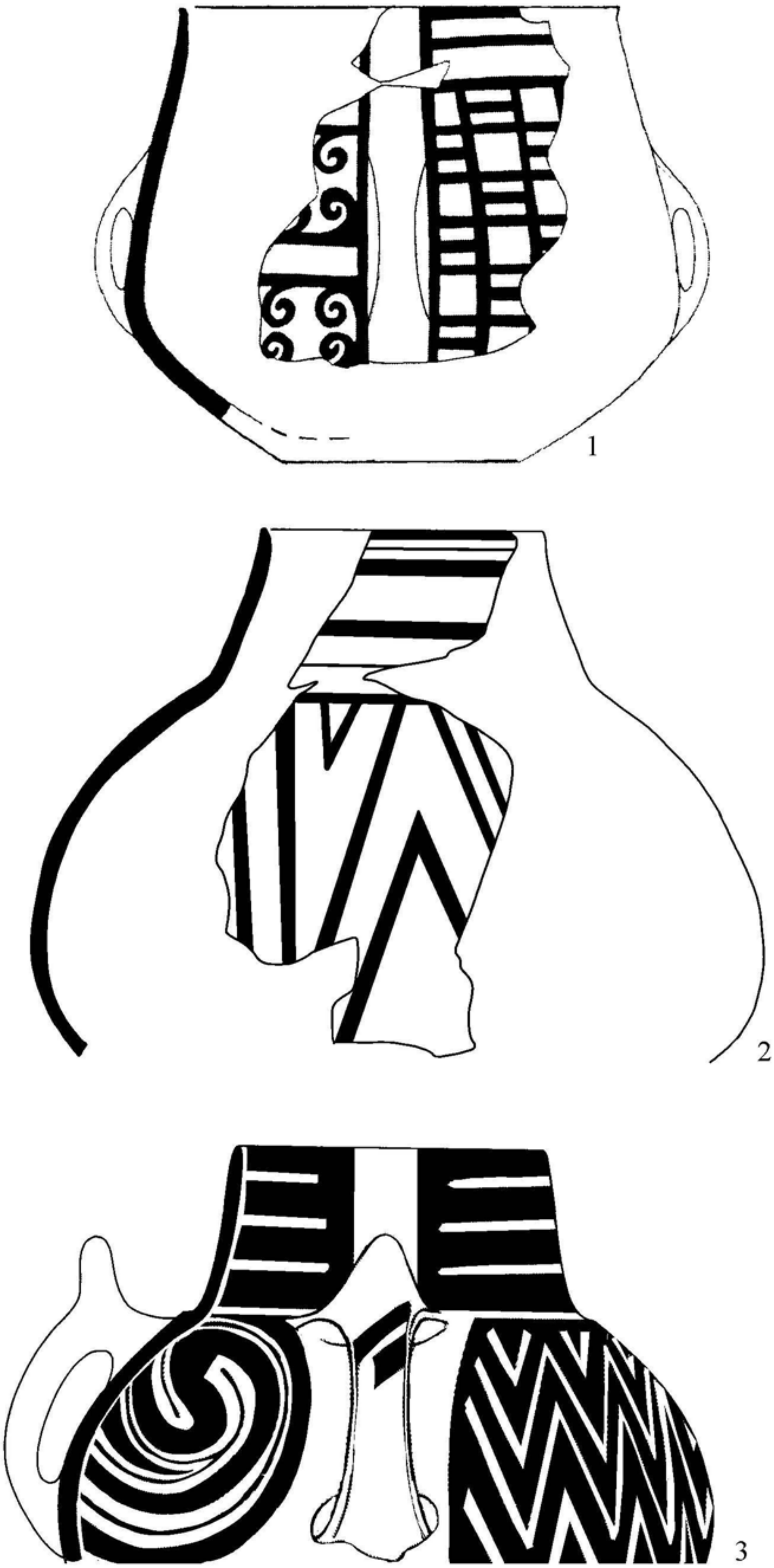
1:3

Figure 23



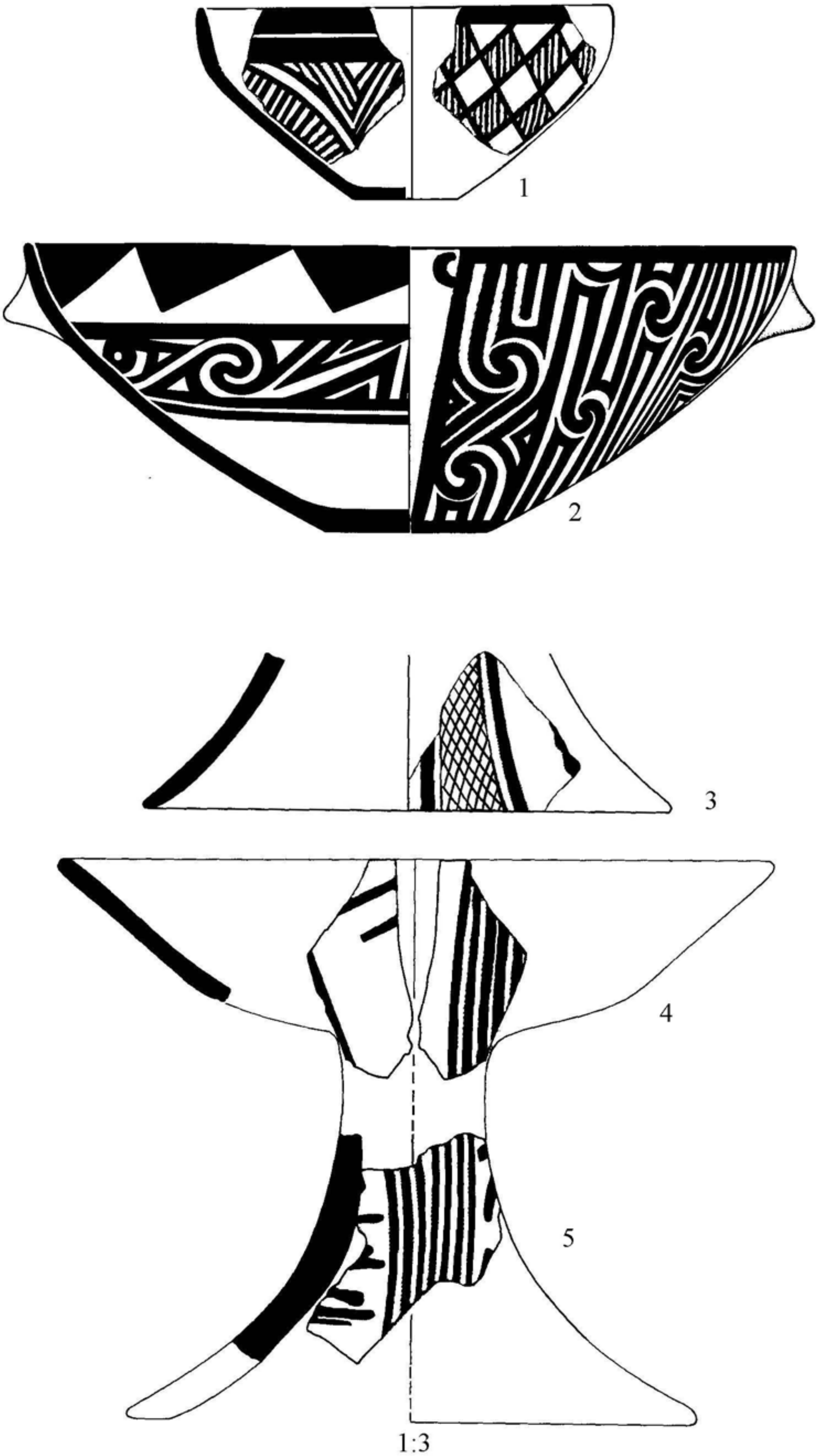
Thessaly: Late Neolithic Ib Black-on-red Oztaki and Classic Dimini Style (B3α2) Bowls 1:3

Figure 24



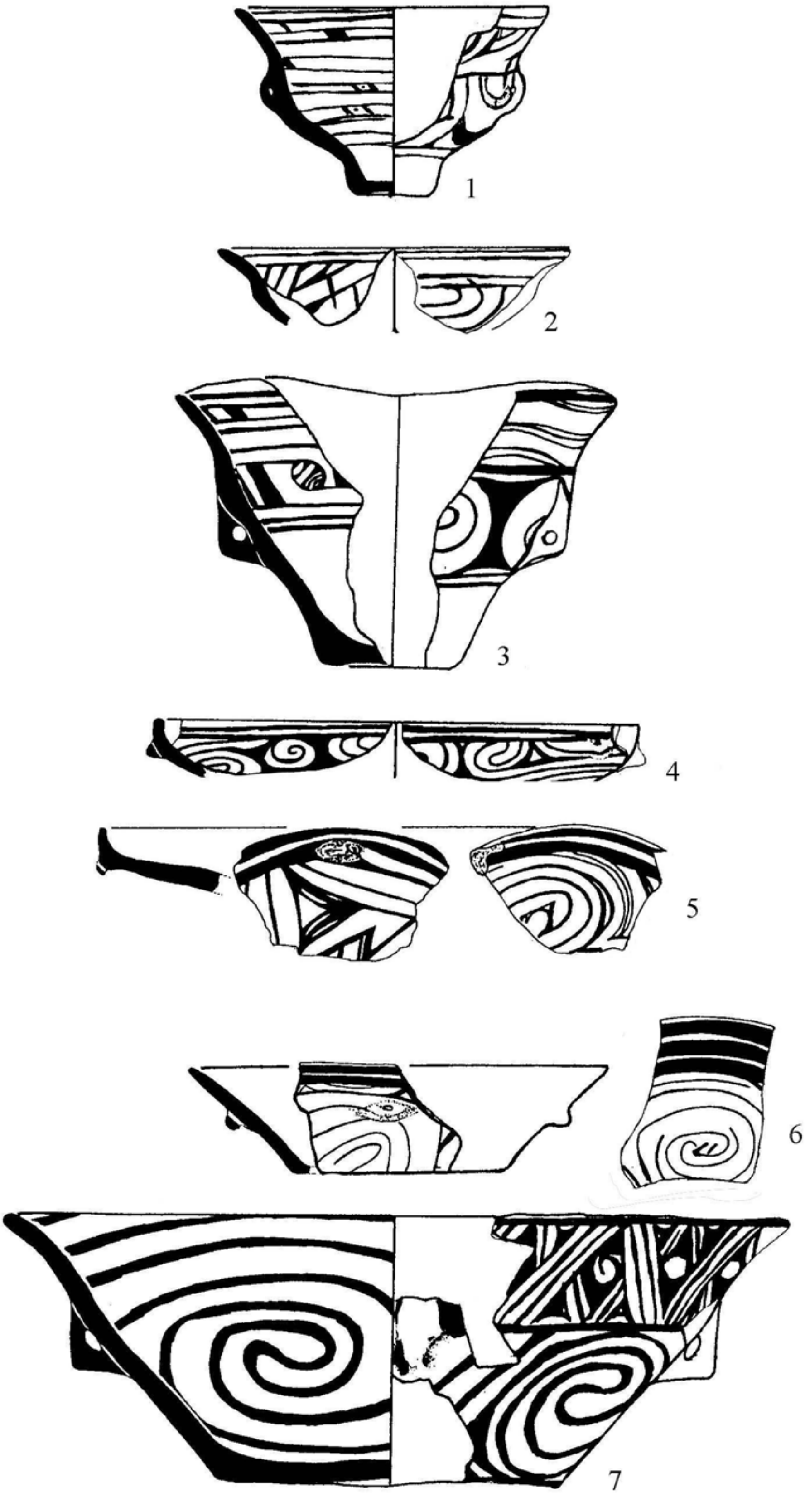
Late Neolithic Ib Black-on-red Otzaki and Classic Dimini Style (B3α2) Jars from Thessaly 1:3

Figure 25



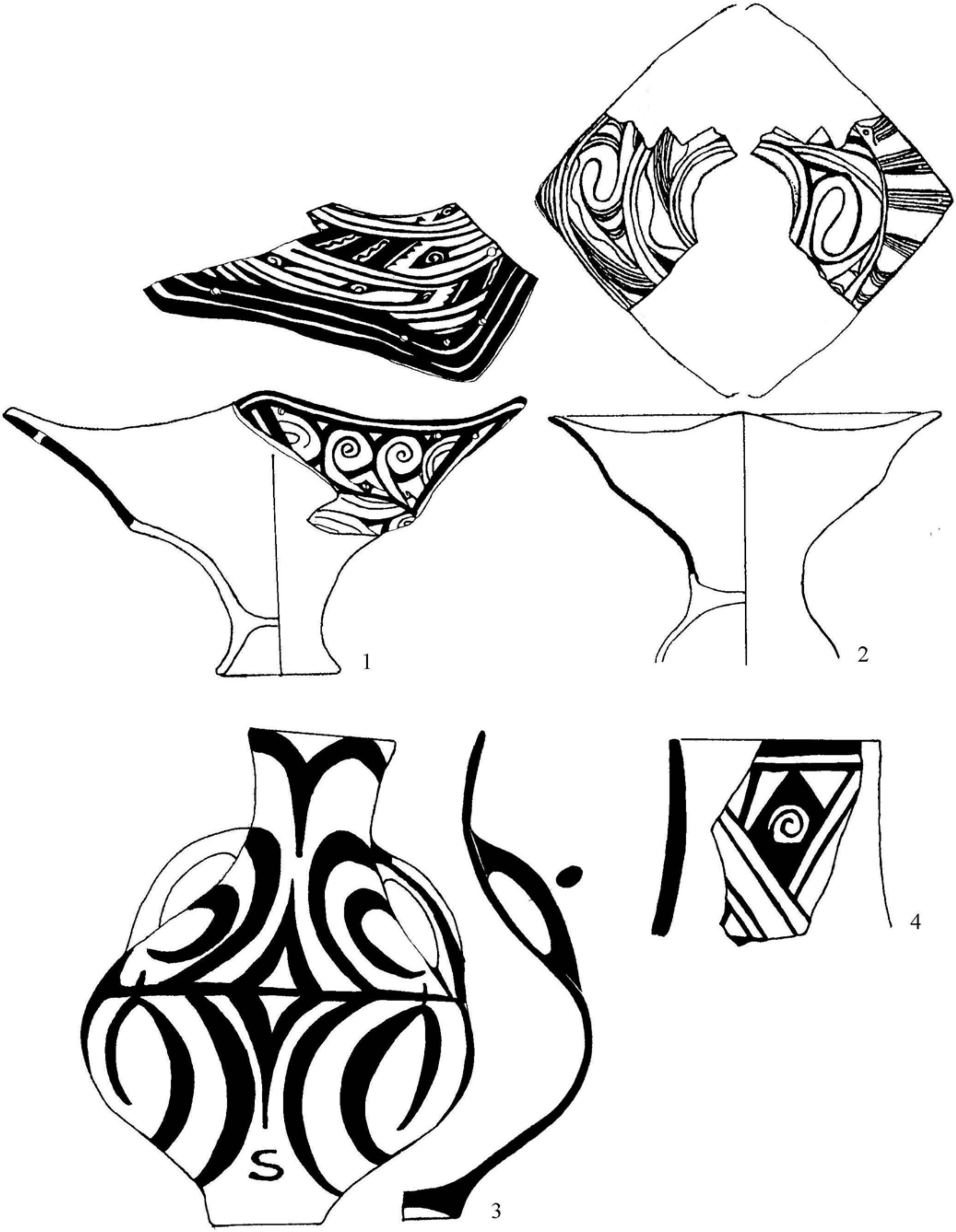
Thessaly: Late Neolithic Ib Black-on-red Otzaki and Classical Dimini Style (B3α2) Bowls and Fruitstands

Figure 26

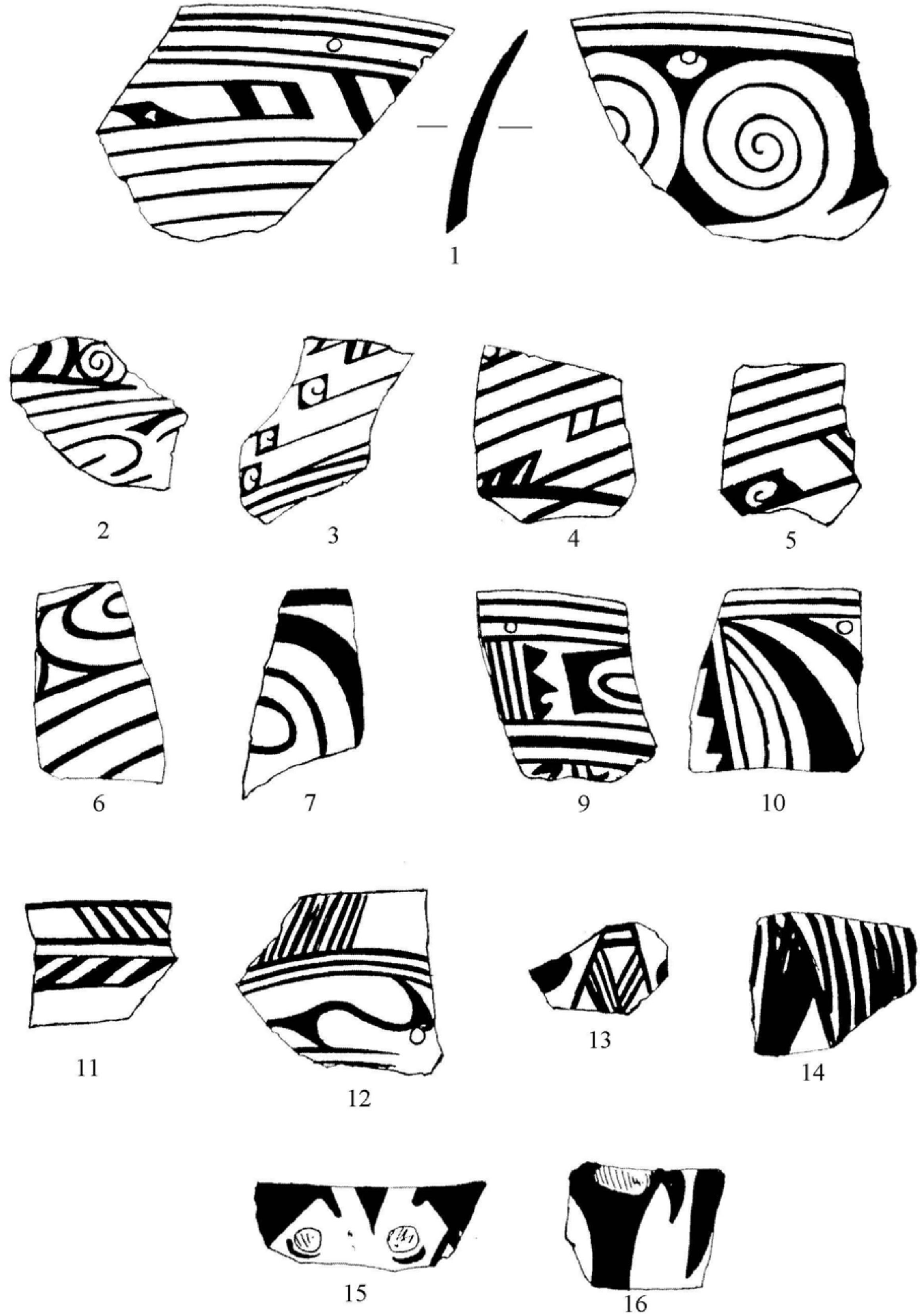


Macedonia: Black-on-red Bowls 1:3

Figure 27

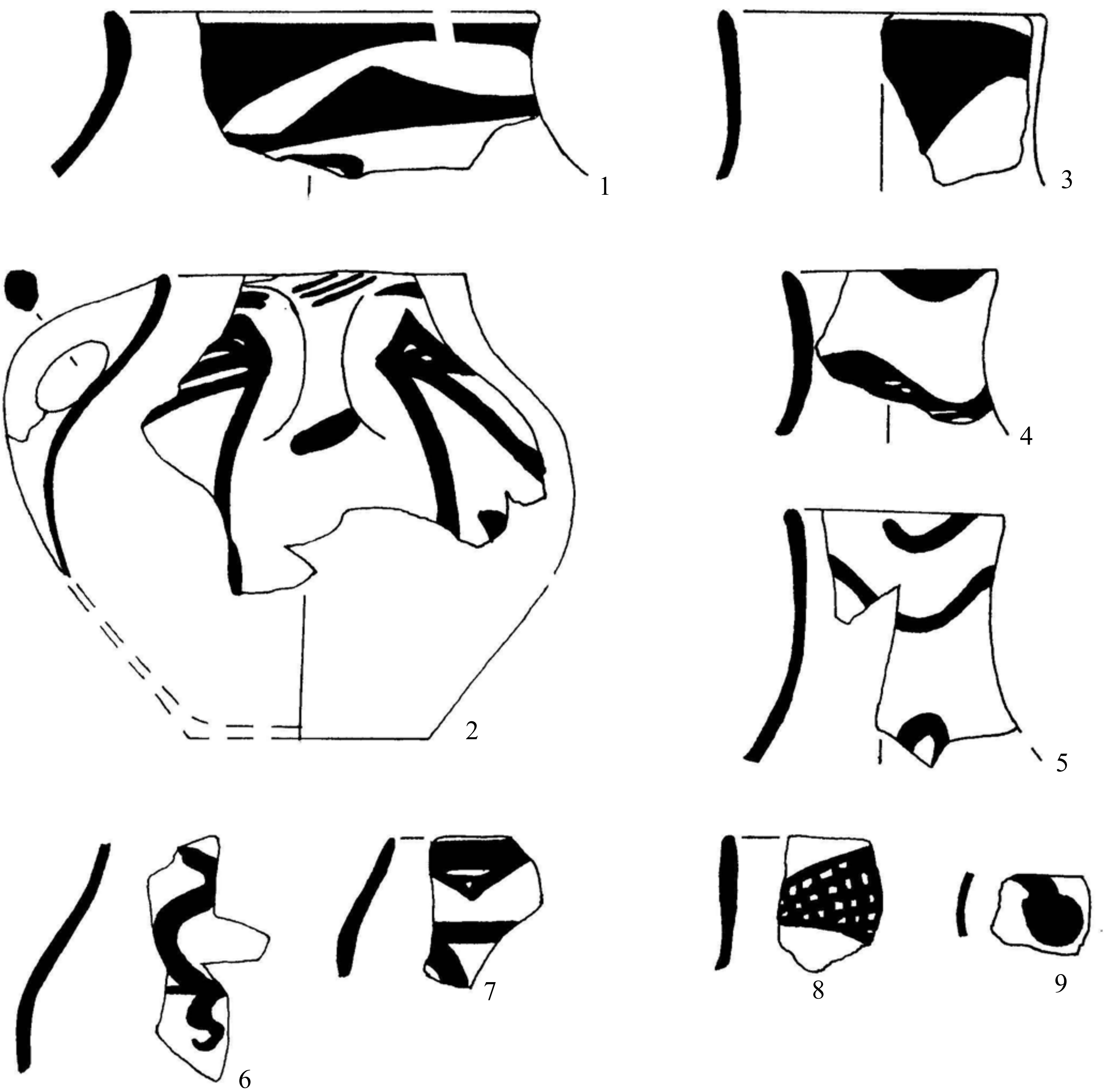


Macedonia: Black-on-red Pedastal Bowls and Oval-mouth Amphoras 1:3
Figure 28



Black-on-red Sherds from Dikili Tash 1:1

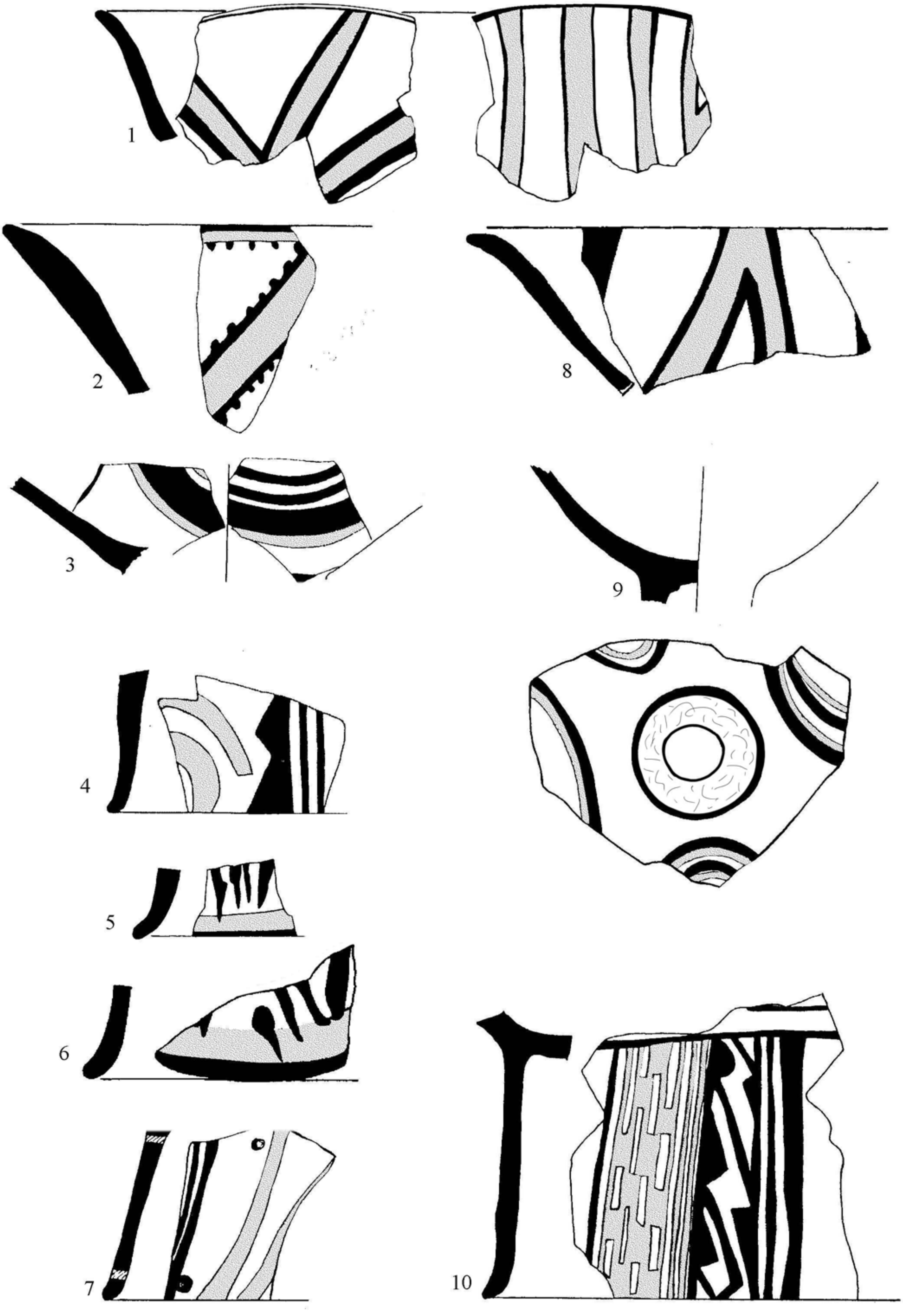
Figure 29



Promachon-Topolnica: Black-on-red Strumsko Style Jars 1:3

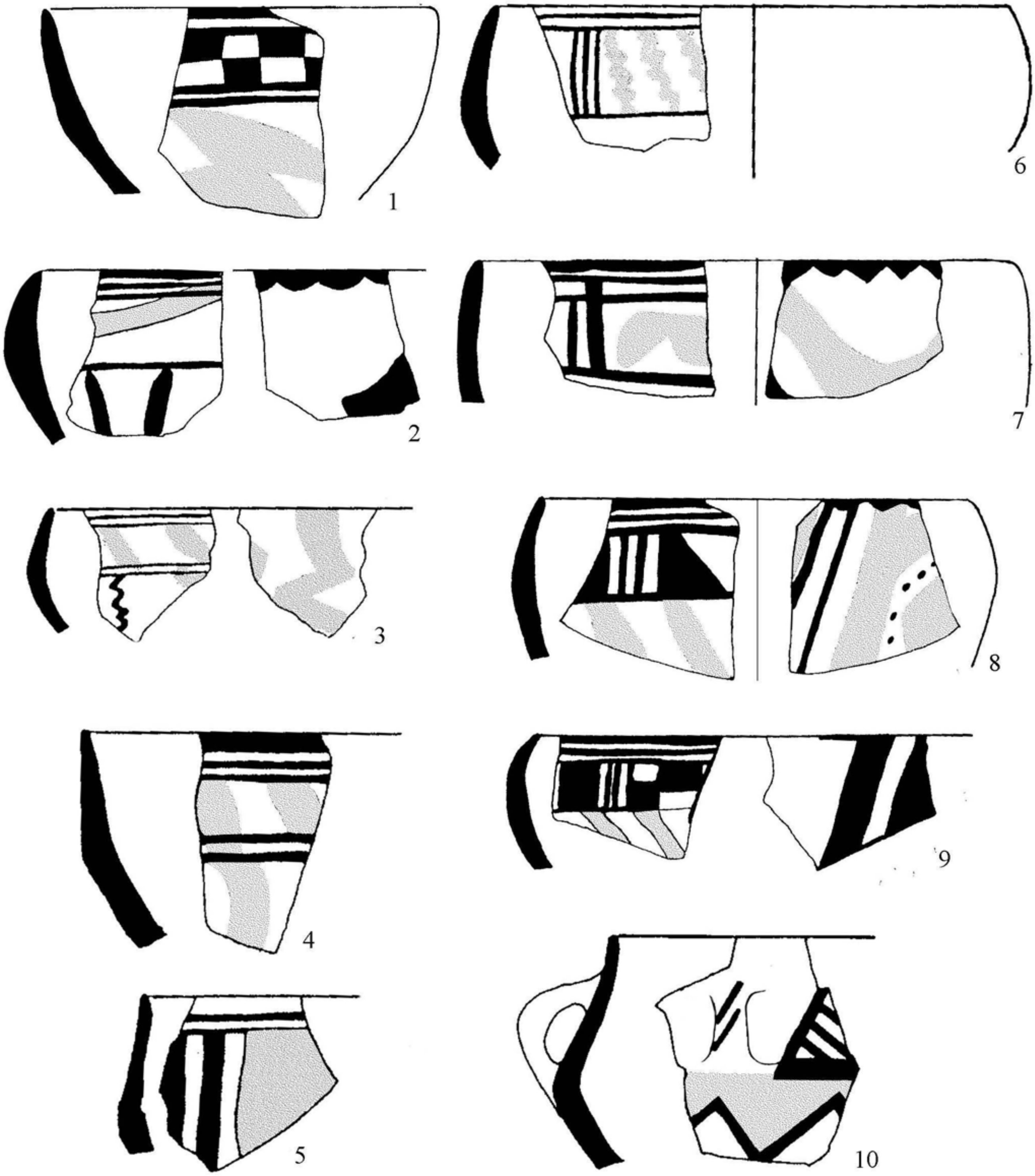
Promachon-Topolnica: Black-on-red Strumsko Stlye Jars 1:2

Figure 30

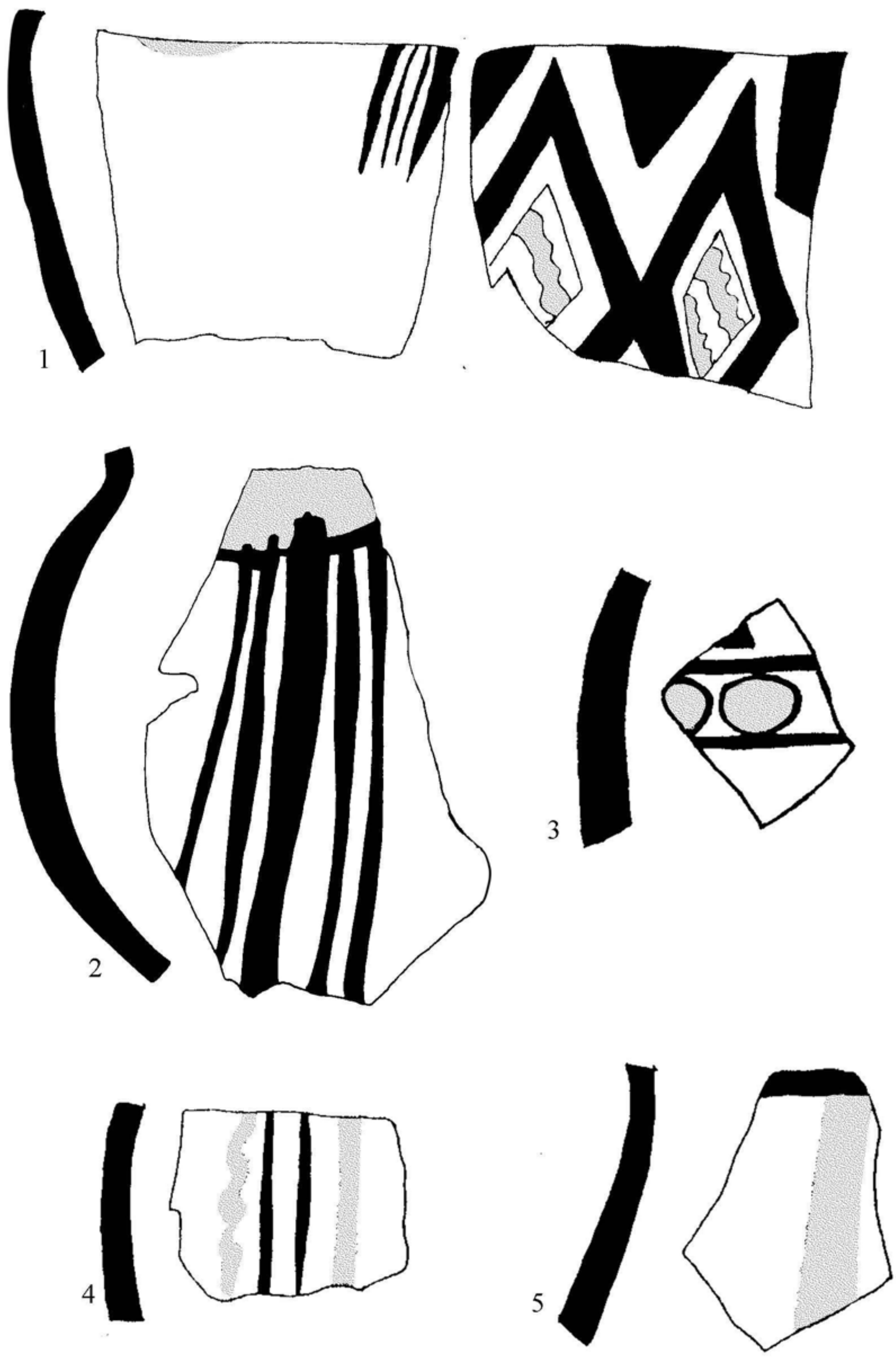


Central and Southern Greece: LN Ia Polychrome Matt-painted Fruit-stands 1:3

Figure 31

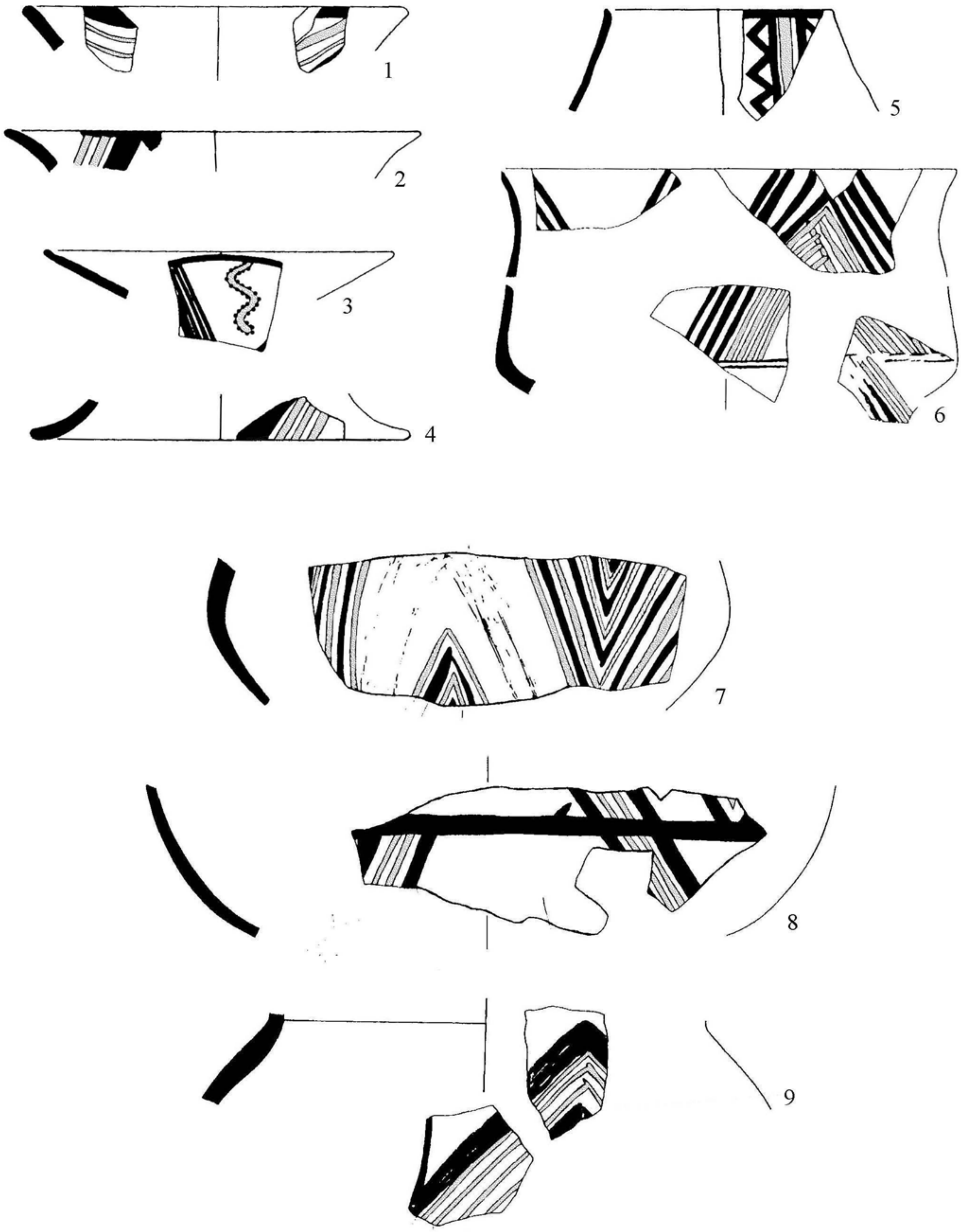


Central Greece: LN Ia Polychrome Matt-painted Pottery 1:3
Figure 32



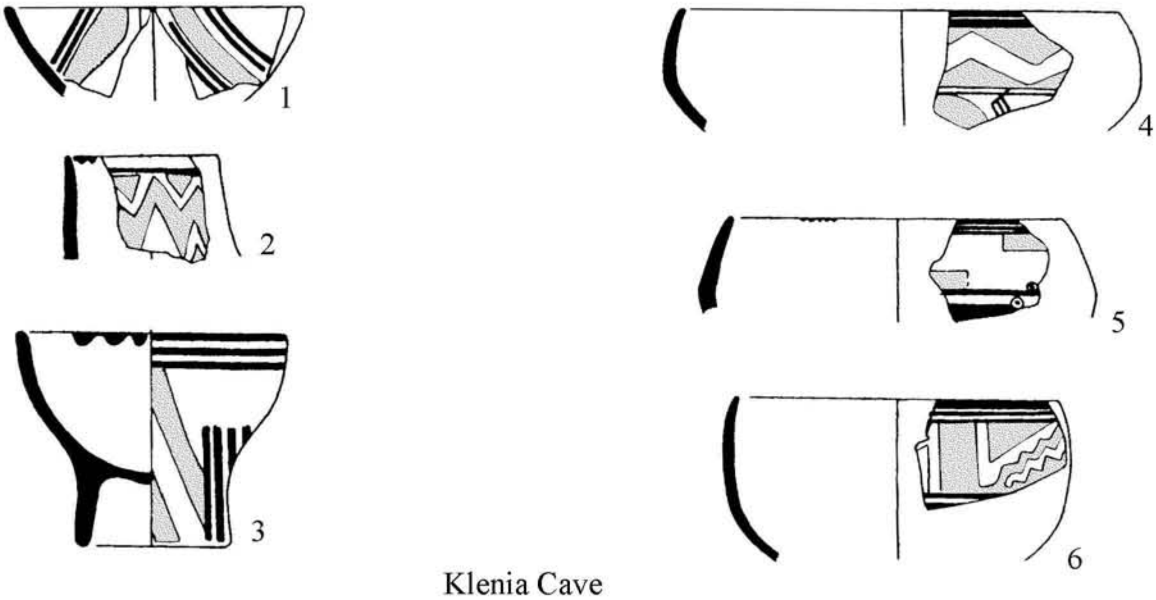
Central Greece: LN Ia Polychrome Matt-painted pottery 1:3

Figure 33

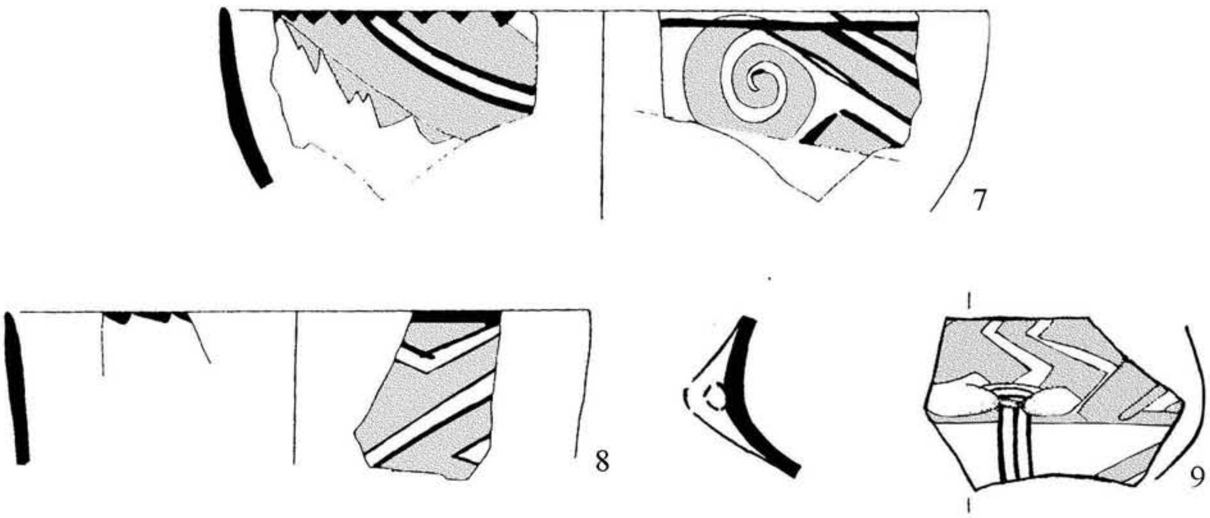


Peloponese: LN Ia Polychrome Matt-painted Pottery 1:3

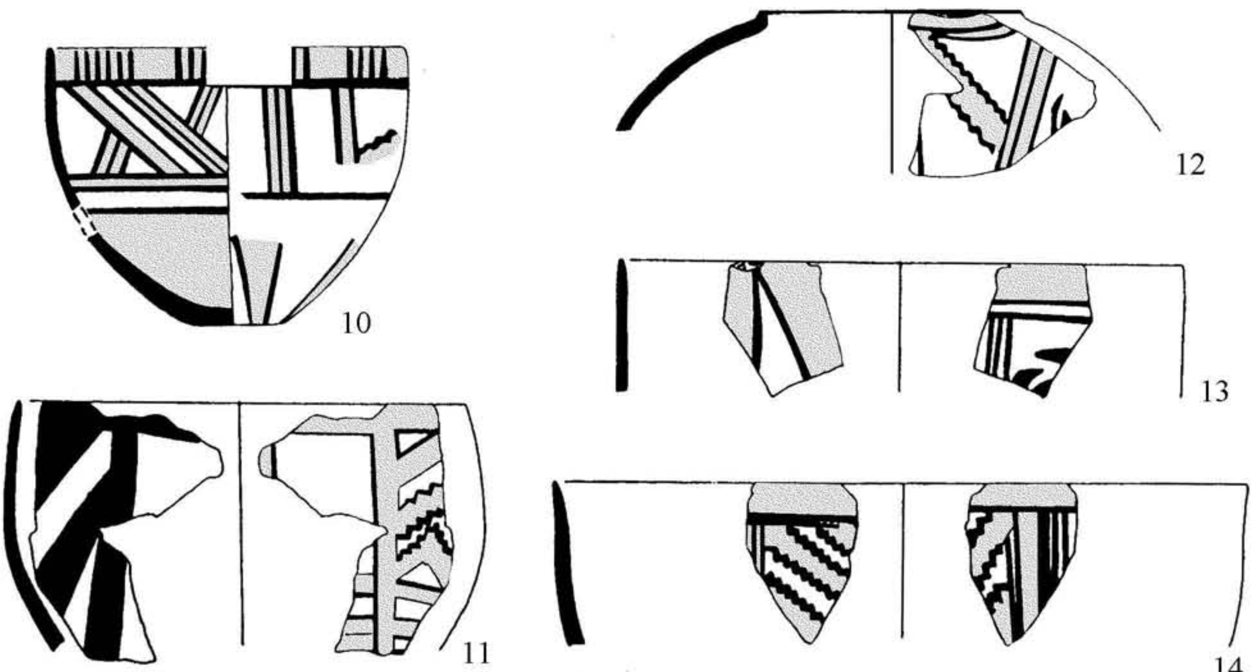
Figure 34



Klenia Cave



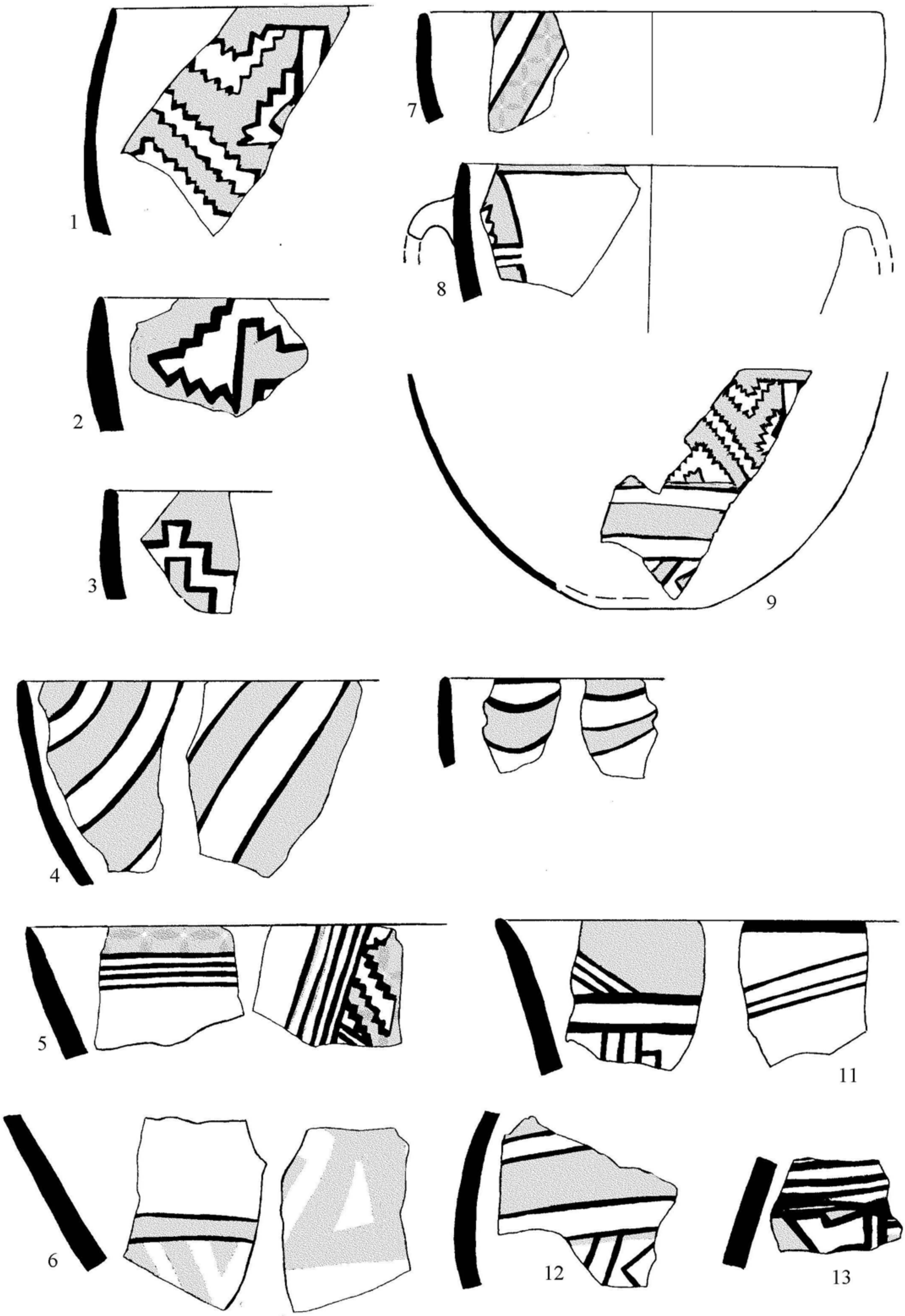
Lerna



Gonia

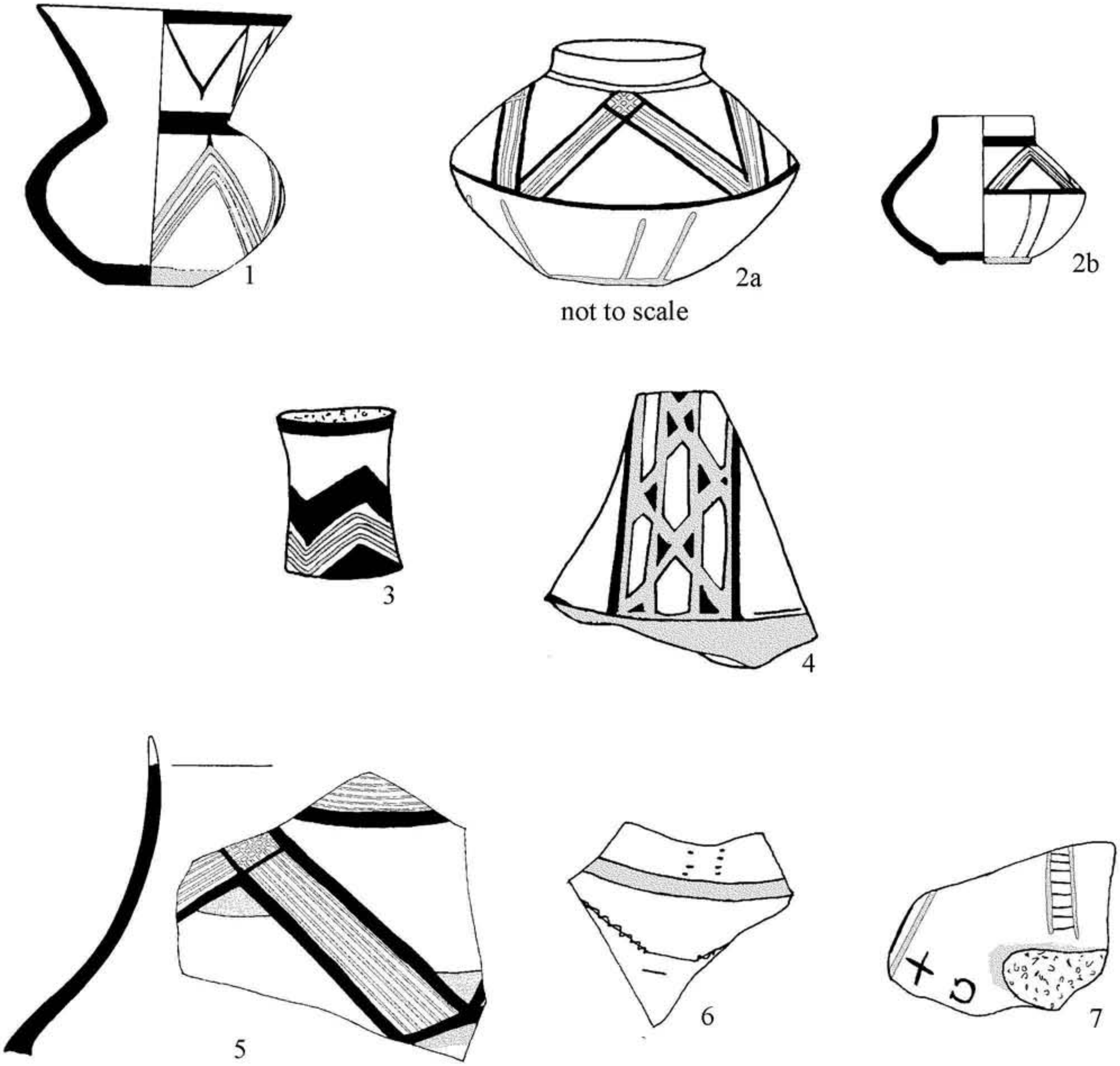
Peloponnese: Late Neolithic Ib Polychrome Painted Pottery 1:3

Figure 35



Sarakenos Cave: Late Neolithic Ib Polychrome Painted Pottery (Gonia Style) 1:3

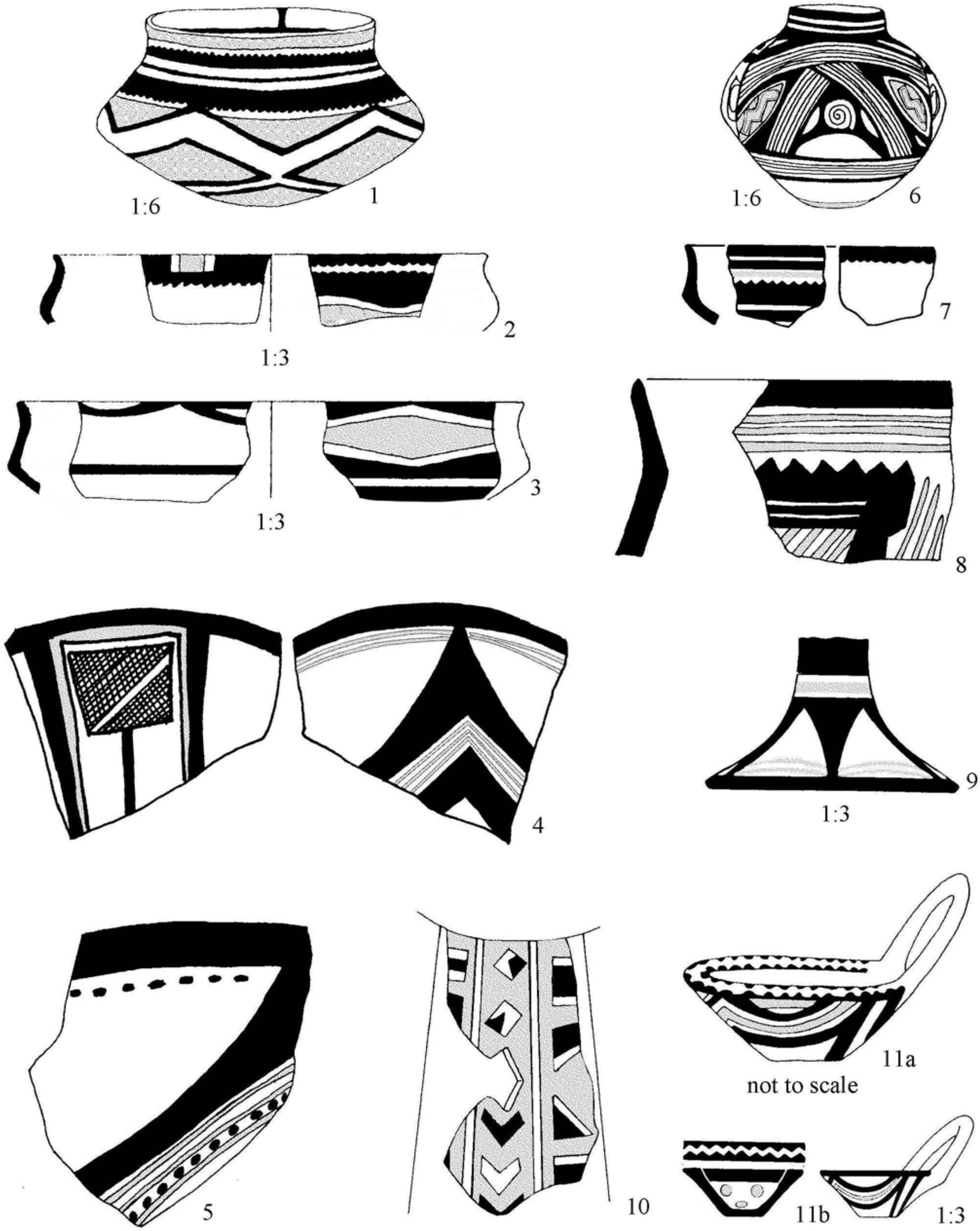
Figure 36



Thessaly

LN Ia B3ζ Black and Red on White Polychrome 1:3

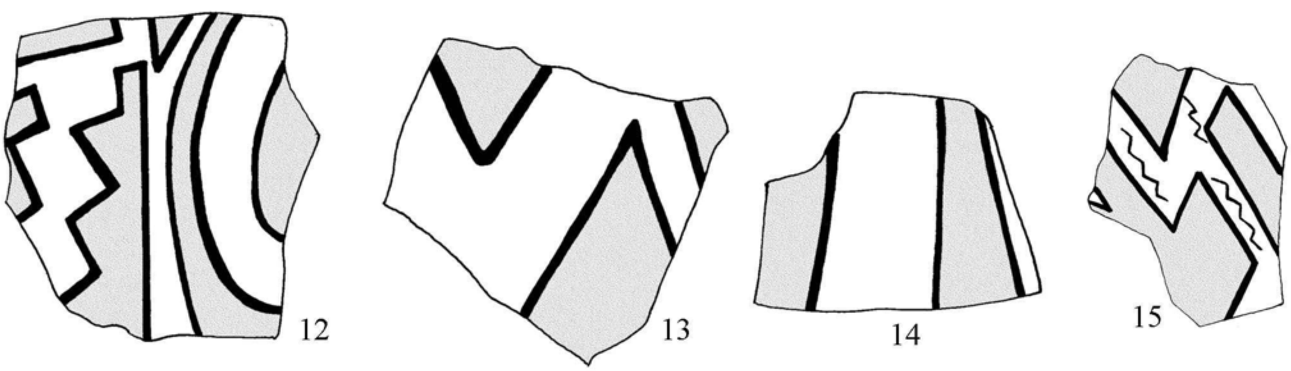
Figure 37



Thessaly: LN Ib B3γ Black and Red on White (Arapi Style) Polychrome 2:3

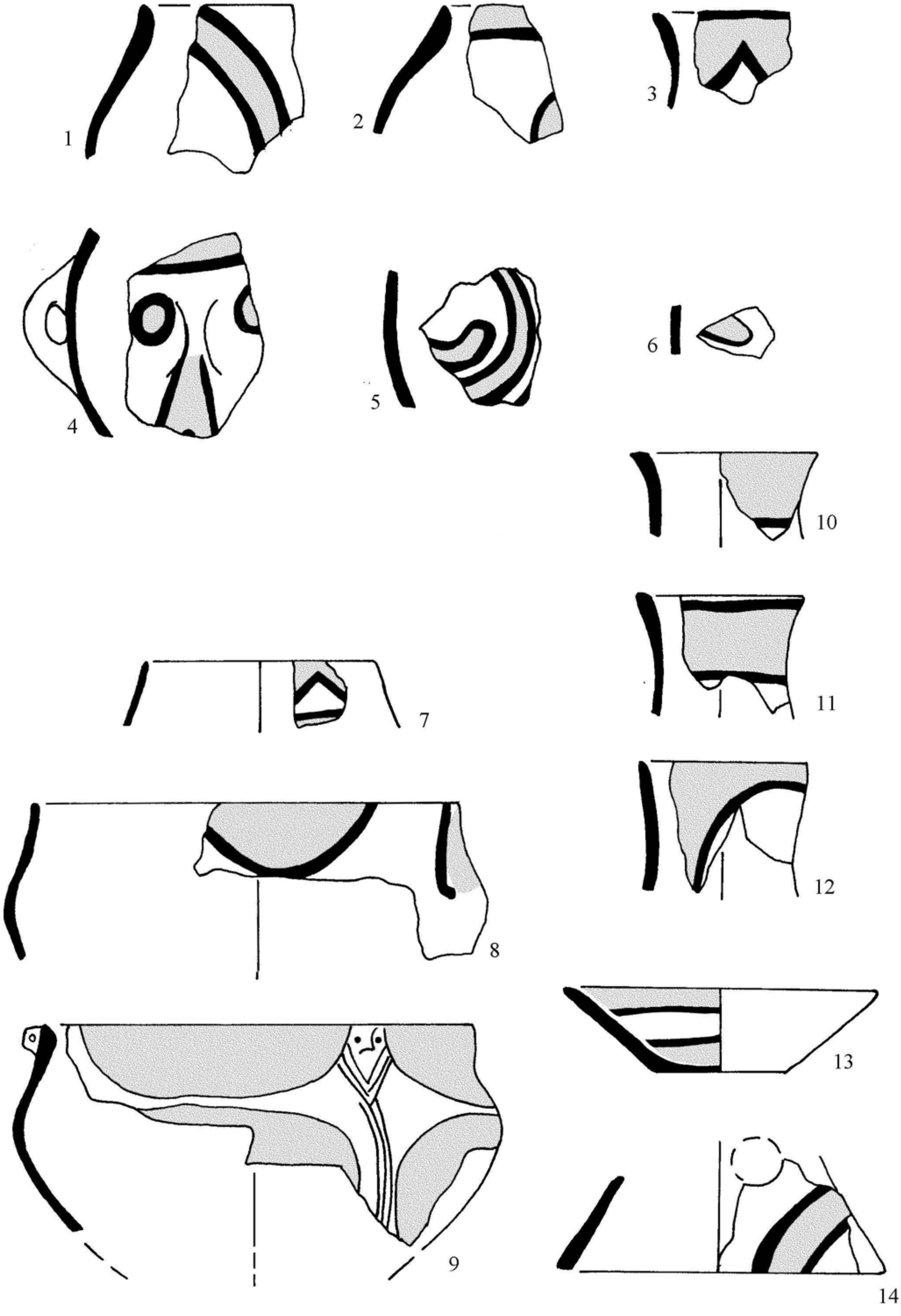
Figure 38

LN I b
Thessaly: B3β Black and White Paint on a Red Ground or Black and Red Paint on a Cream Ground
Sherds at 2:3, pots at 1:6

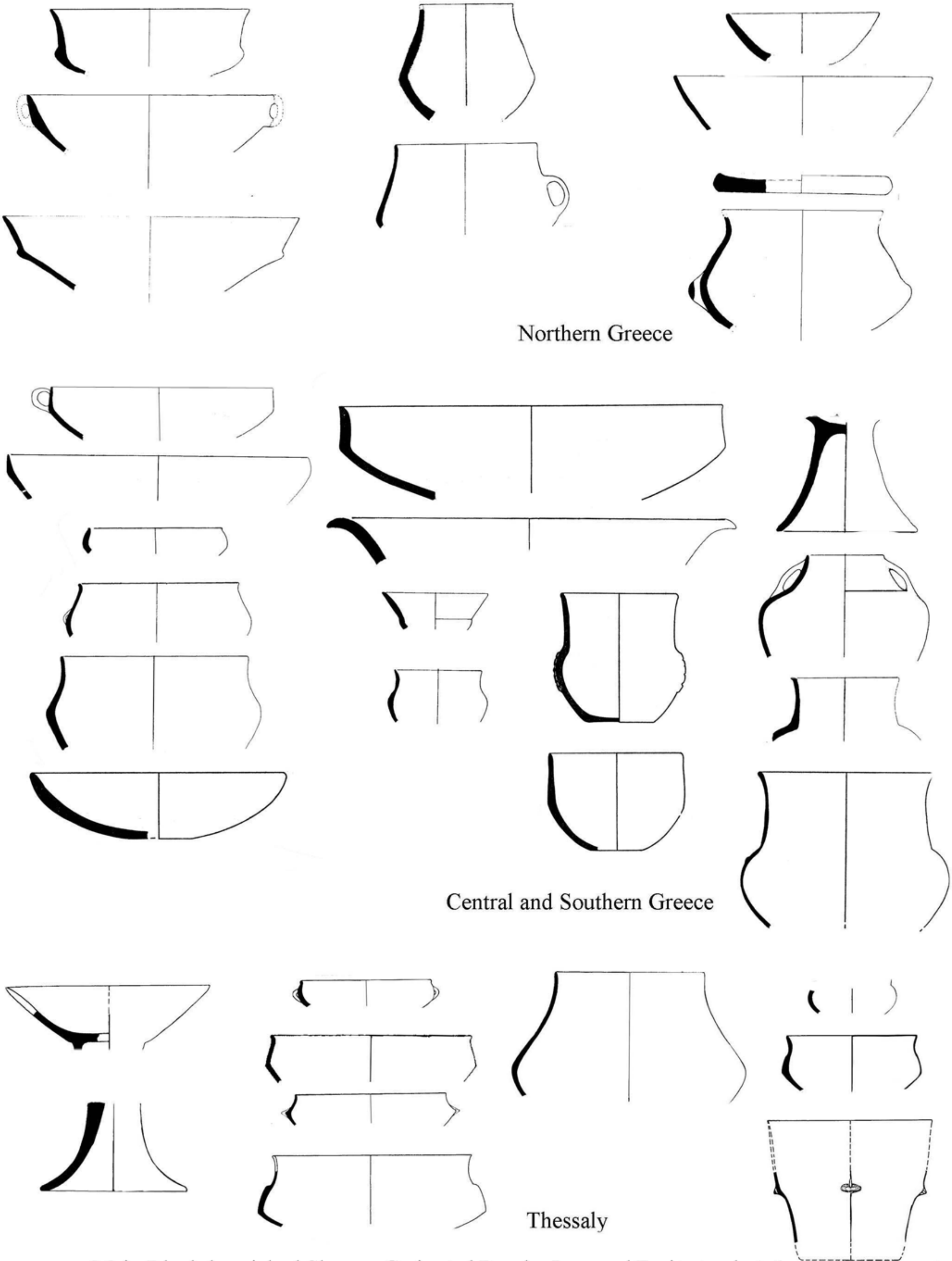


Thessaly:LN Ib "Ayia Sofia Style Sherds" 2:3

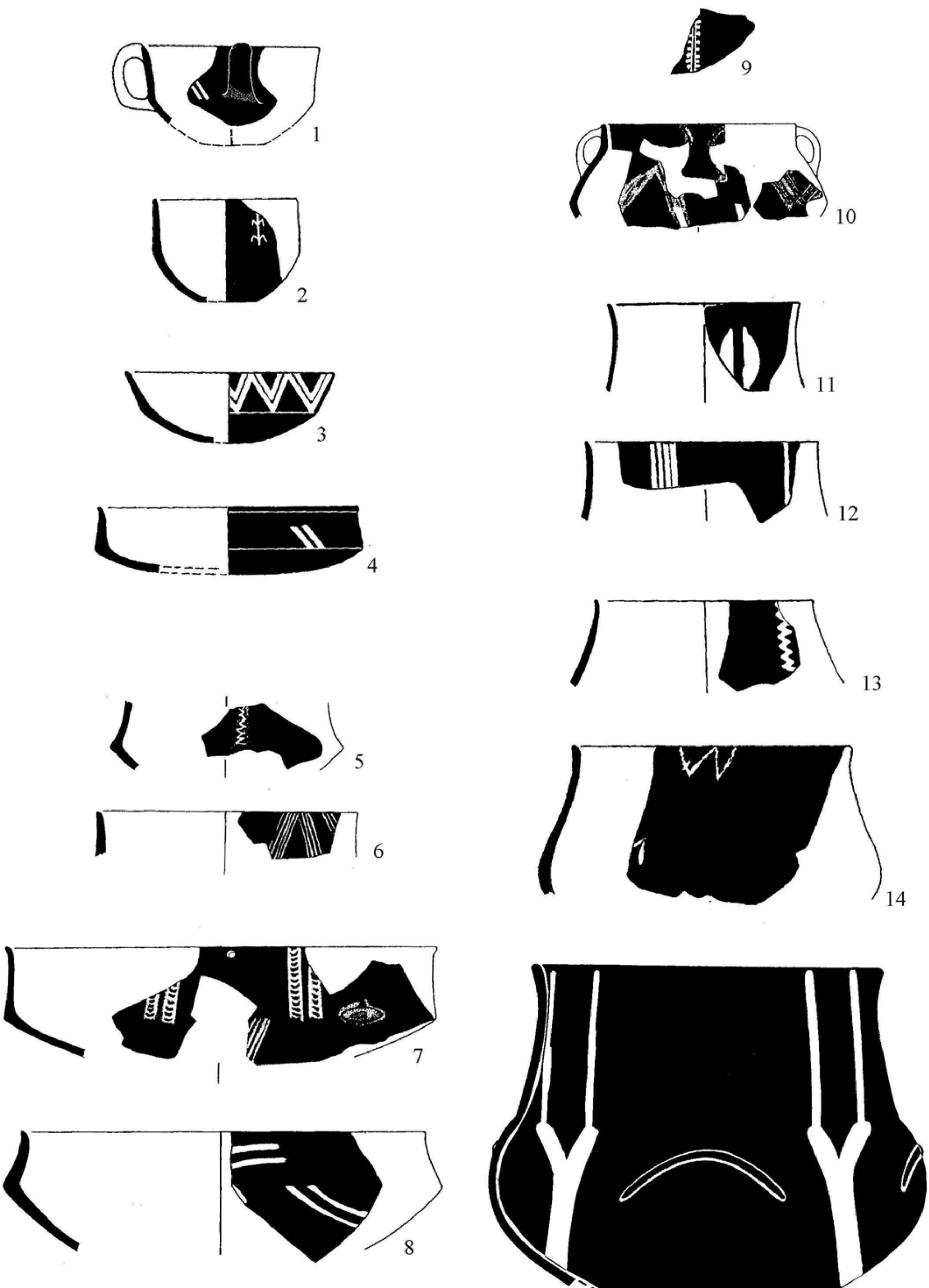
Figure 39



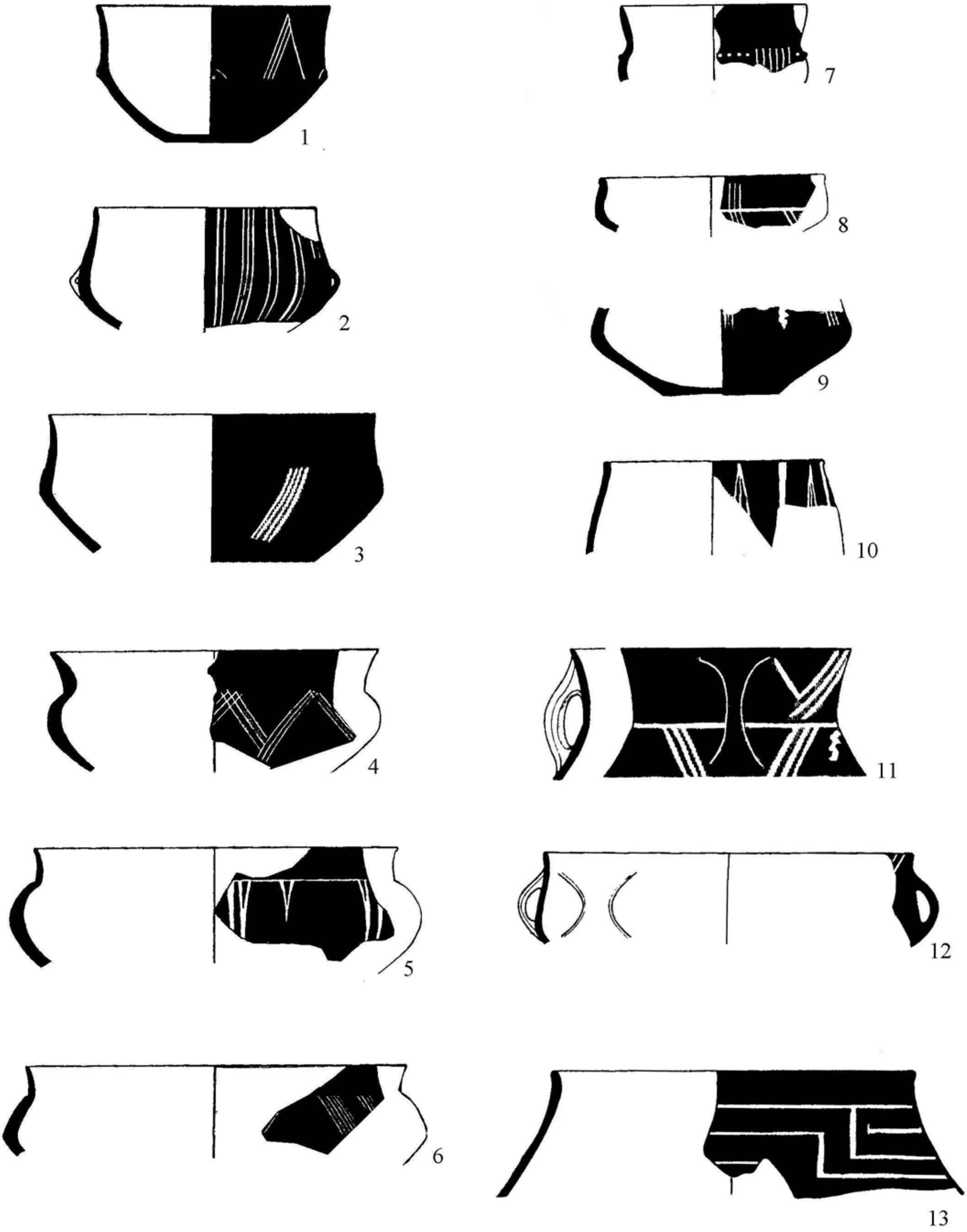
Promachon-Topolnica:LN Ib Dimitra Style Polychrome 1:3
Figure 40



Main Black-burnished Shapes: Carinated Bowls, Jars, and Fruit-stands 1:6
Figure 41

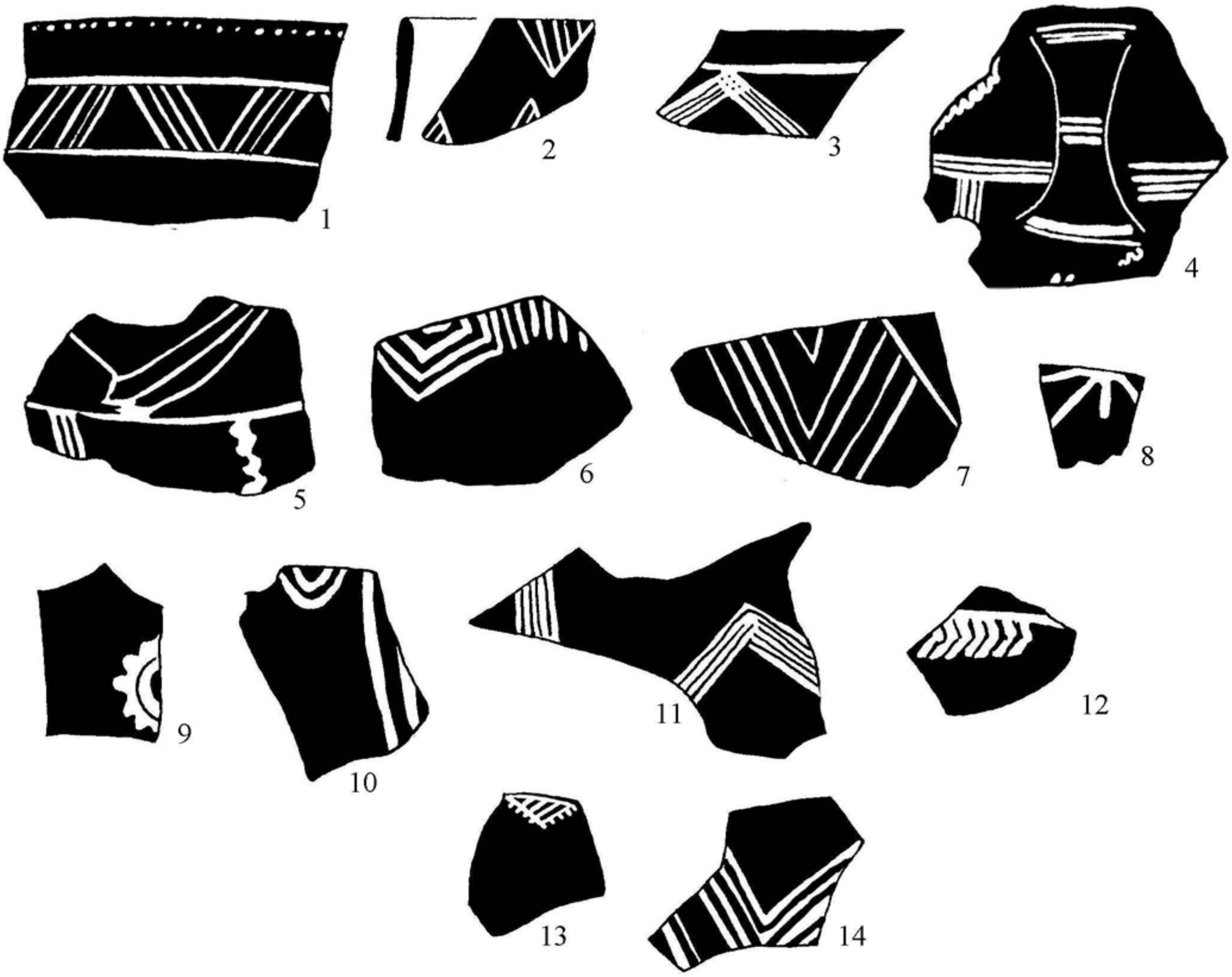


Peloponnese: Γ1α1 White Painted Decoration on Black-burnished Pottery 1:3
Figure 42



Thessaly: Γ1α1 White Painted Decoration on Black-burnished Pottery 1:3

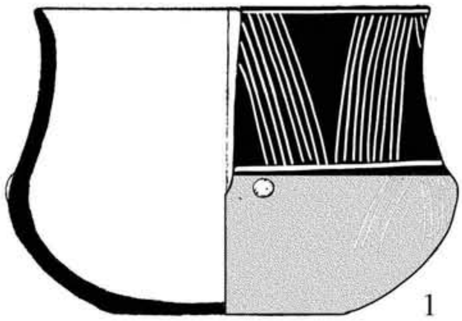
Figure 43

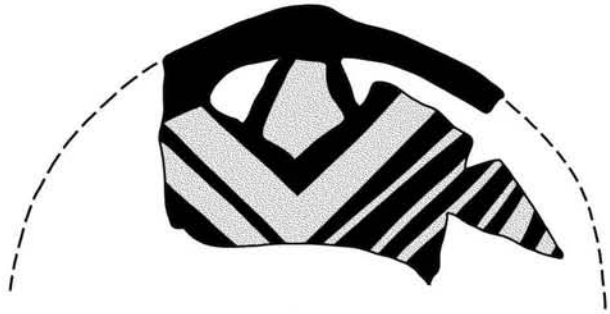


Thessaly: Γ1α1 White Painted Decoration on Black-burnished Pottery 1:1

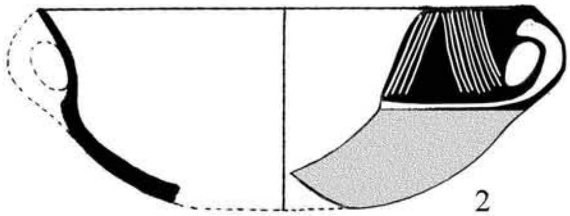
Thessaly: Γ1α1 White Painted Decoration on Black-burnished Fruit-stands 1:3

Figure 44

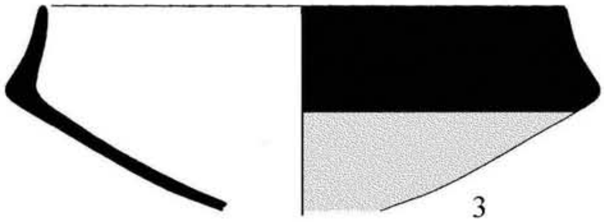




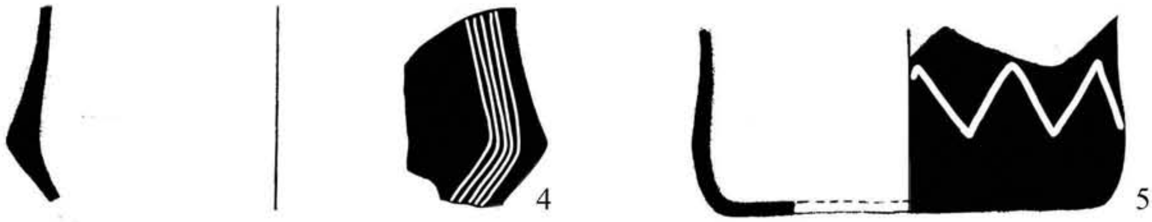
Black-topped with white paint and added plastics



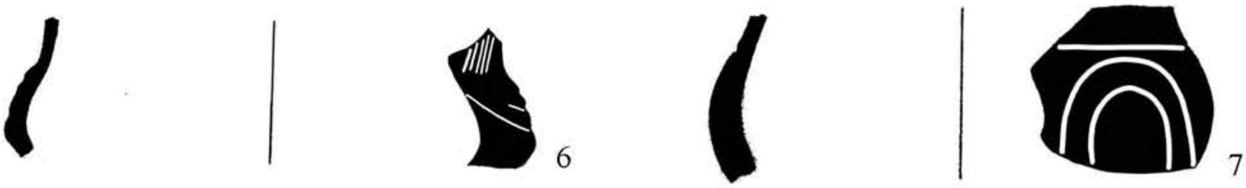
Black-topped with white paint

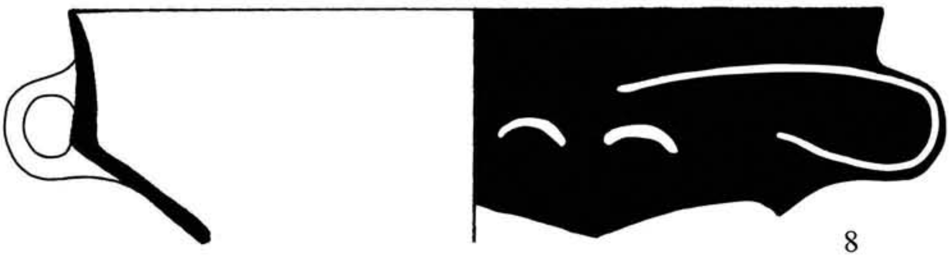


Black-topped with Red Ocher



Γ1α1: White Painted Decoration on Black-burnished Pottery

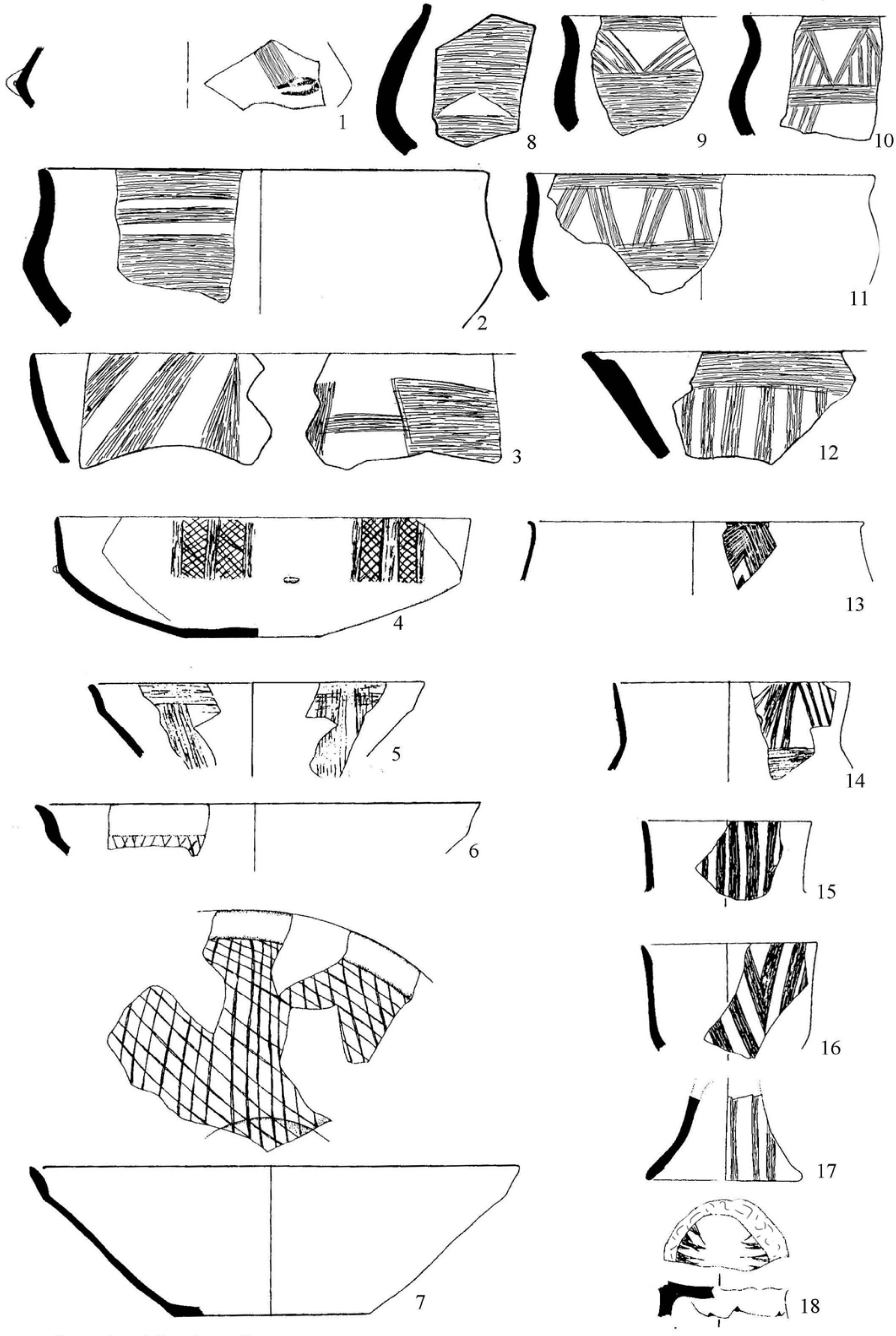




Impressed and Incised

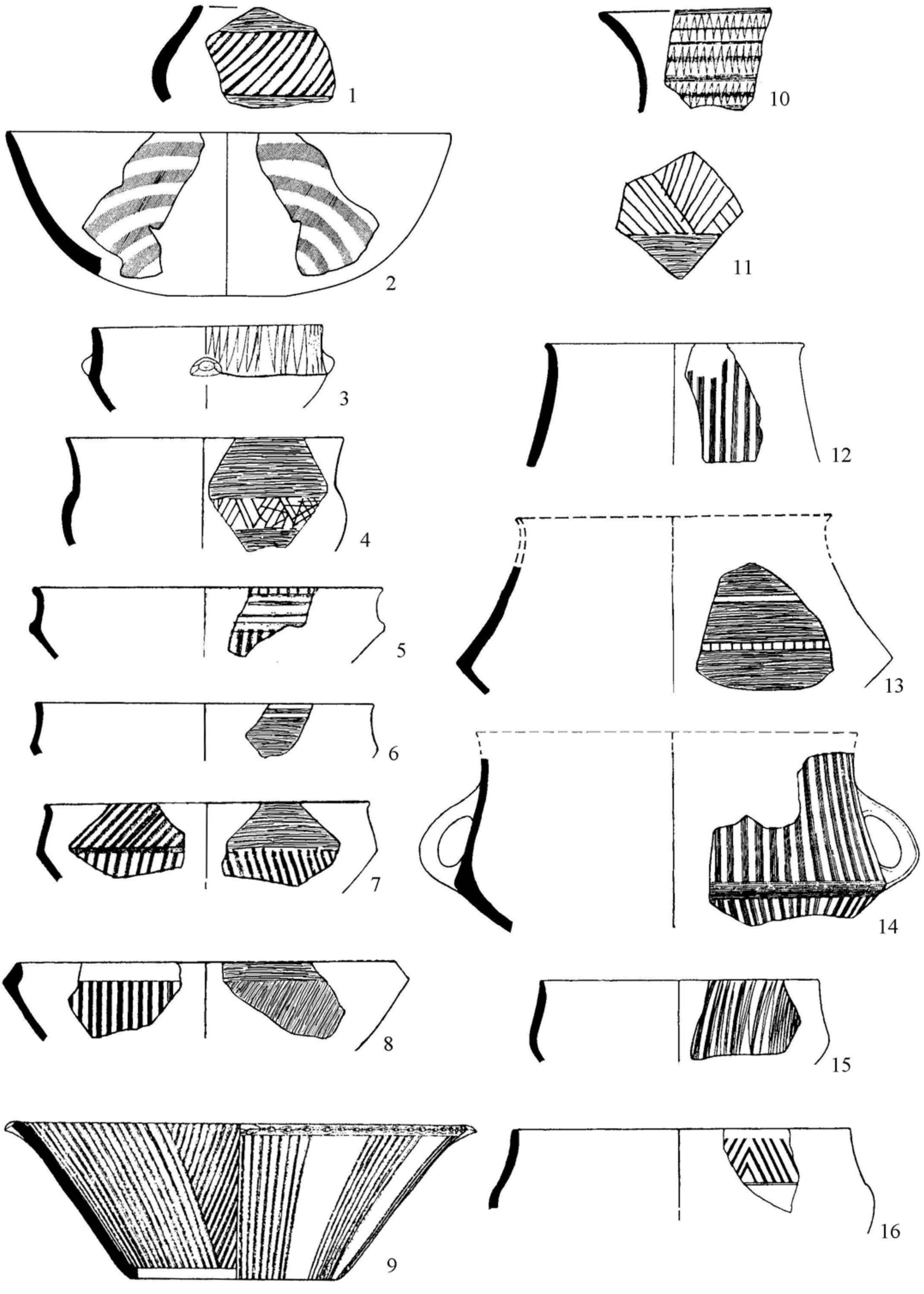
Macedonia : Various Black-burnished Decorative Techniques 1:3

Figure 45



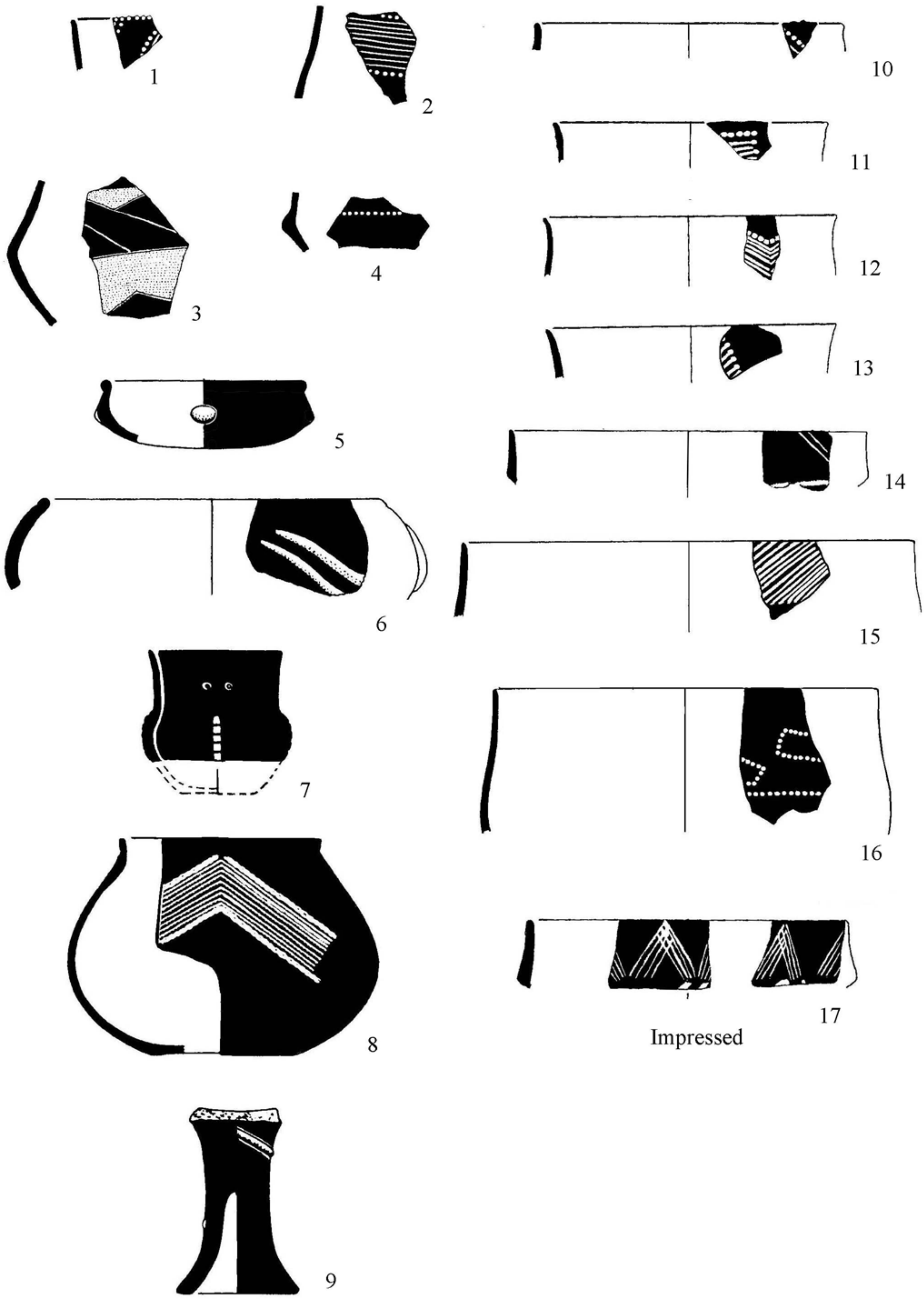
Central and Southern Greece: Γ1α2: Black Pattern Burnish on Black-burnished Pottery 1:3

Figure 46

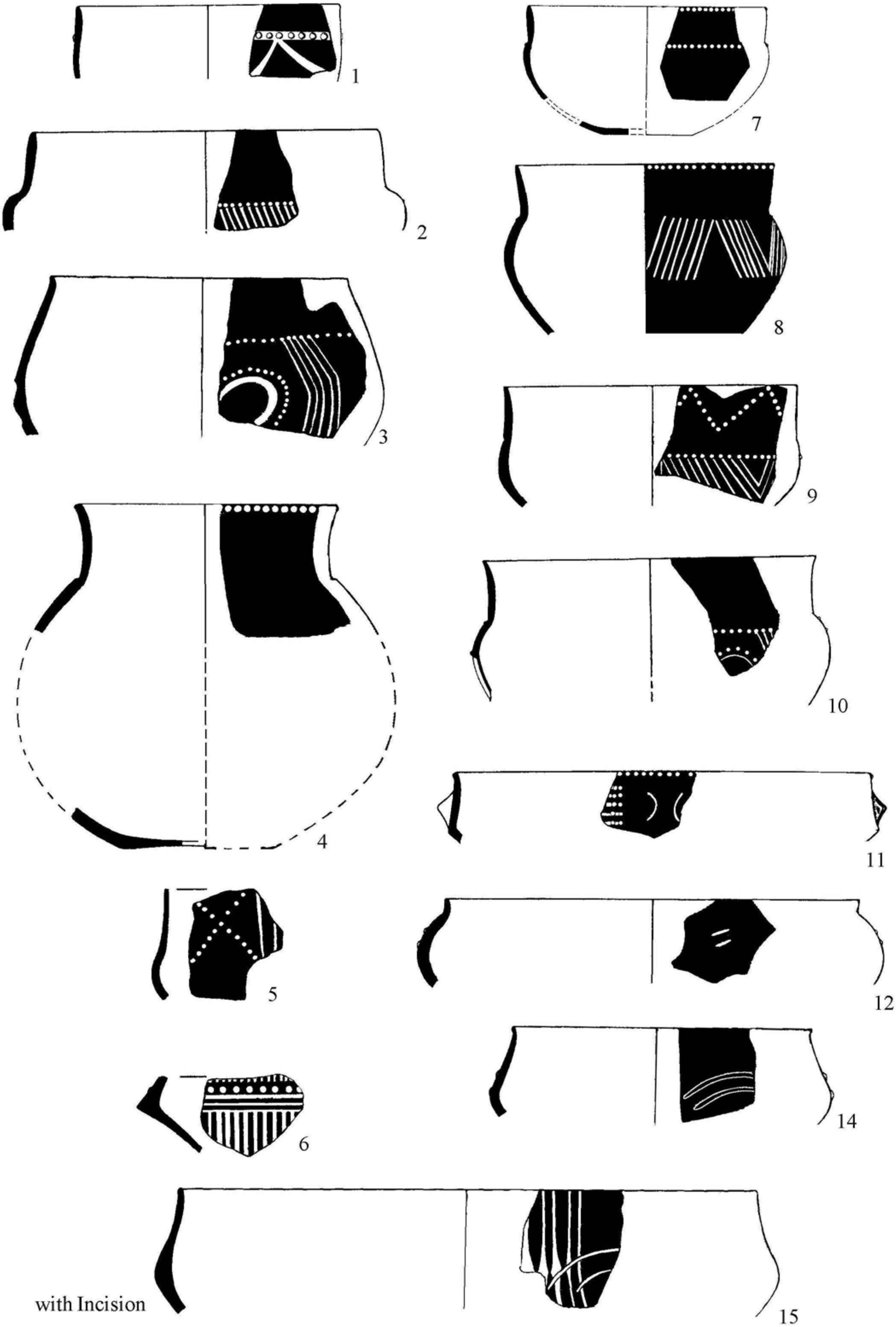


Thessaly: Γ1α2: Black Pattern Burnish on Black-burnished Pottery 1:3

Figure 47

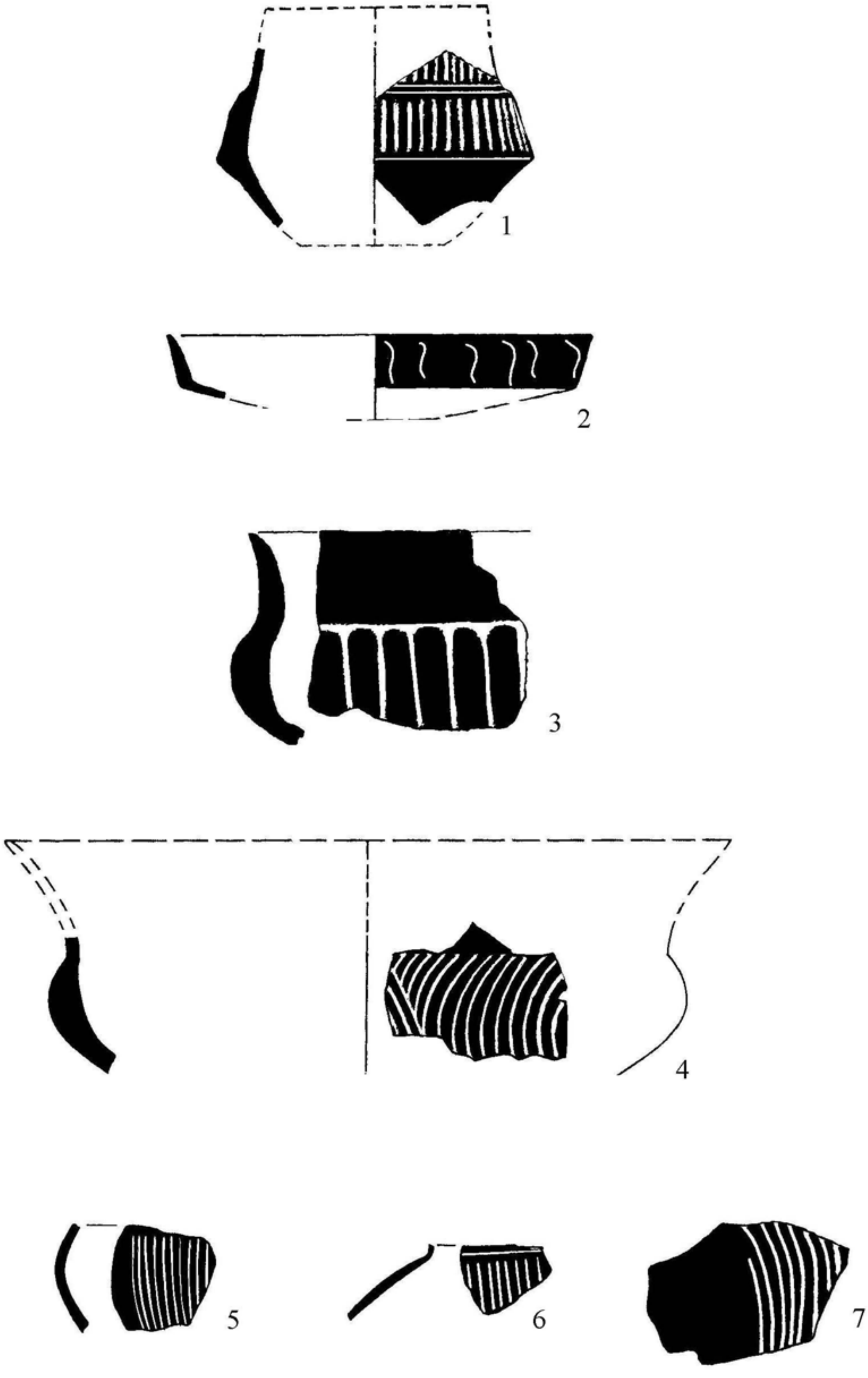


Peloponnese: Γ1α3 Plastic Decoration on Black-burnished Pottery 1:3
Figure 48



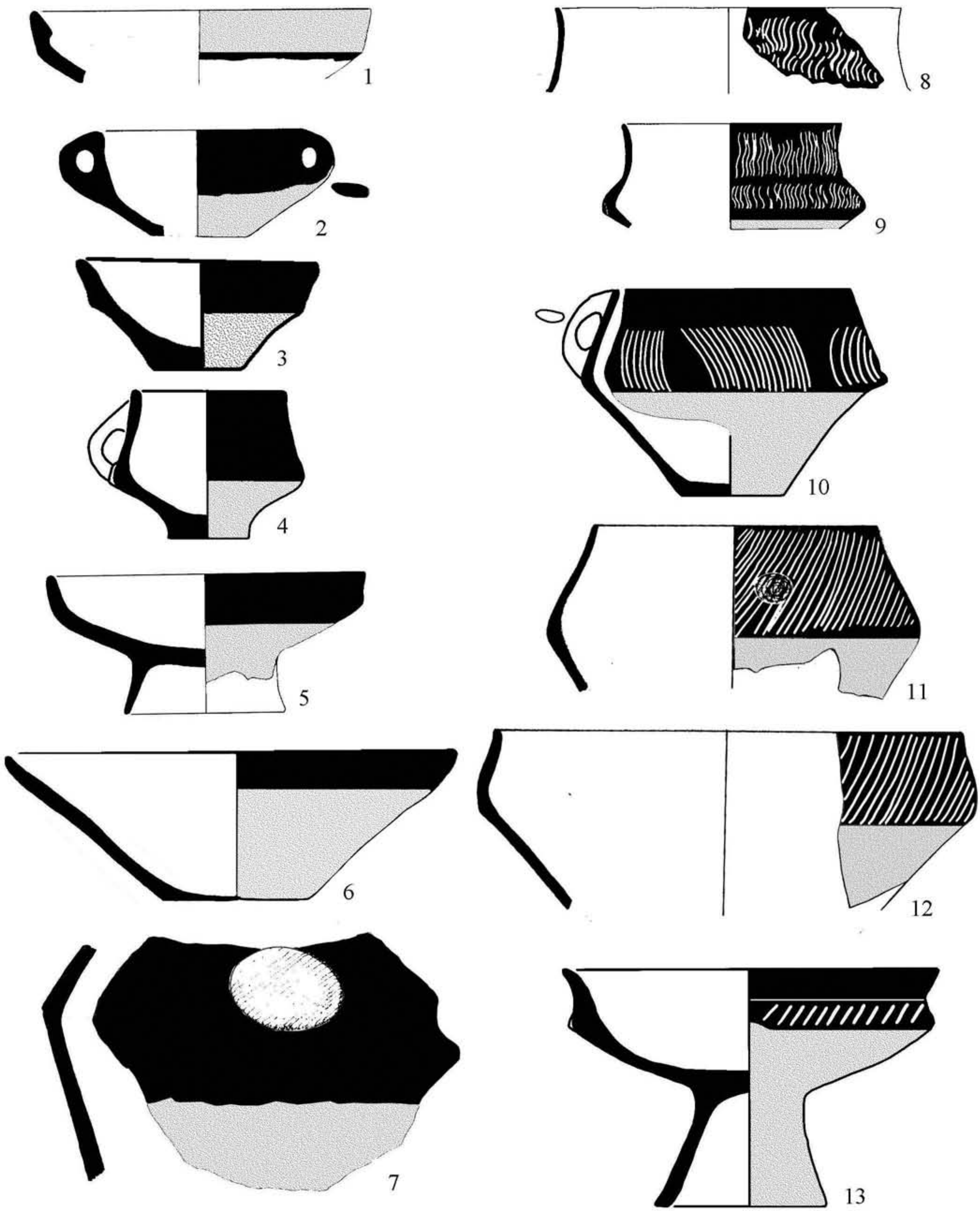
Thesaly: Γ1α3 Plastic Decoration on Black-burnished Pottery 1:3

Figure 49

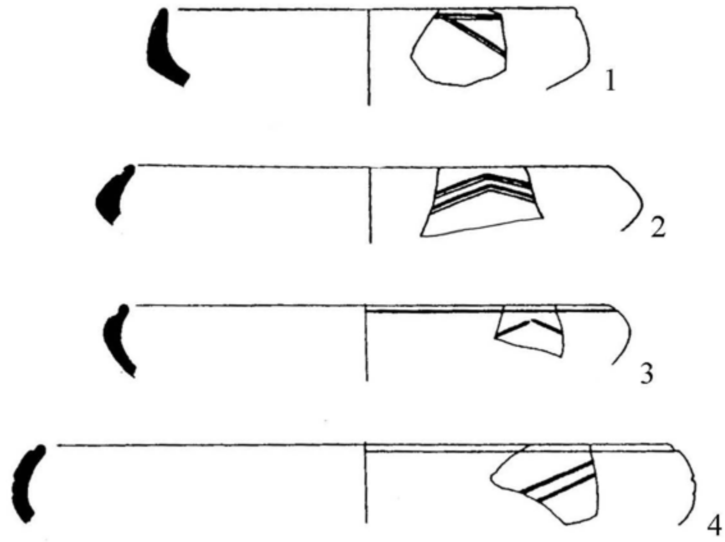


Thessaly and the Peloponnese: Γ1α3 Plastic Decoration on Black-burnished Pottery 1:3

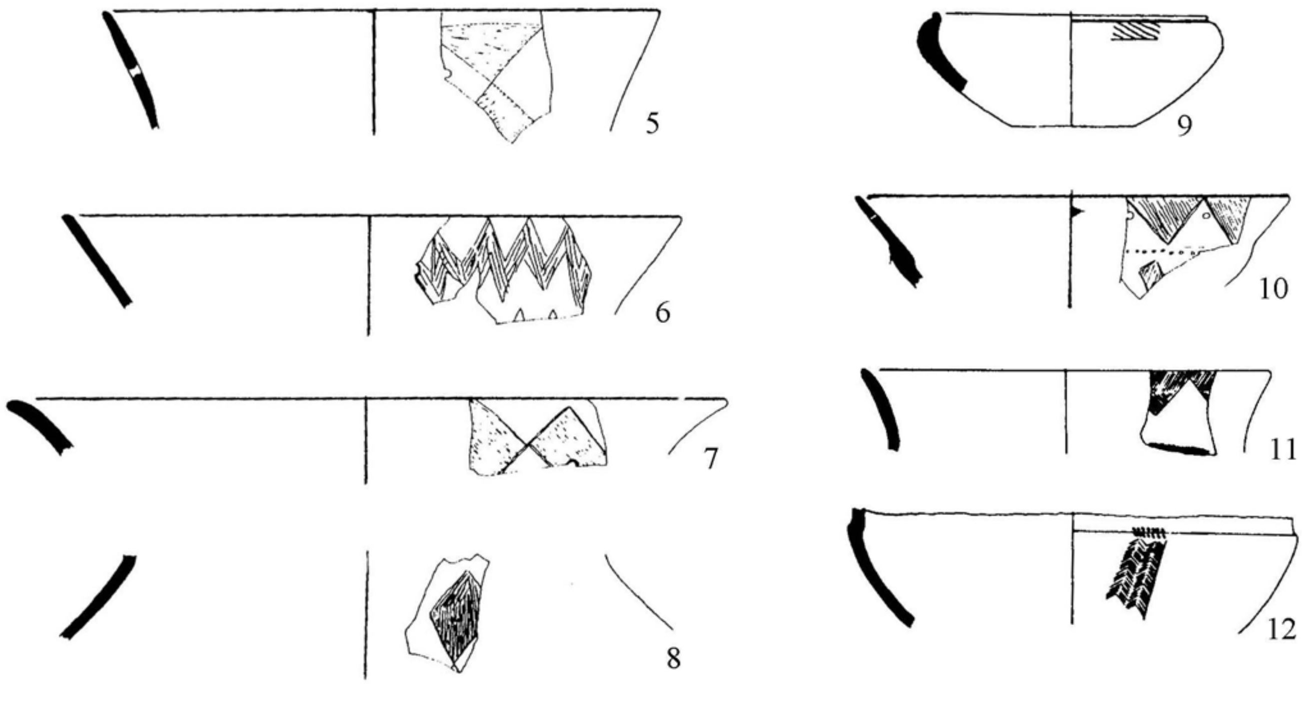
Figure 50



Northern Greece: Black-topped, Black-topped with Rippling and Channeling, and Red-topped 1:3
Figure 51

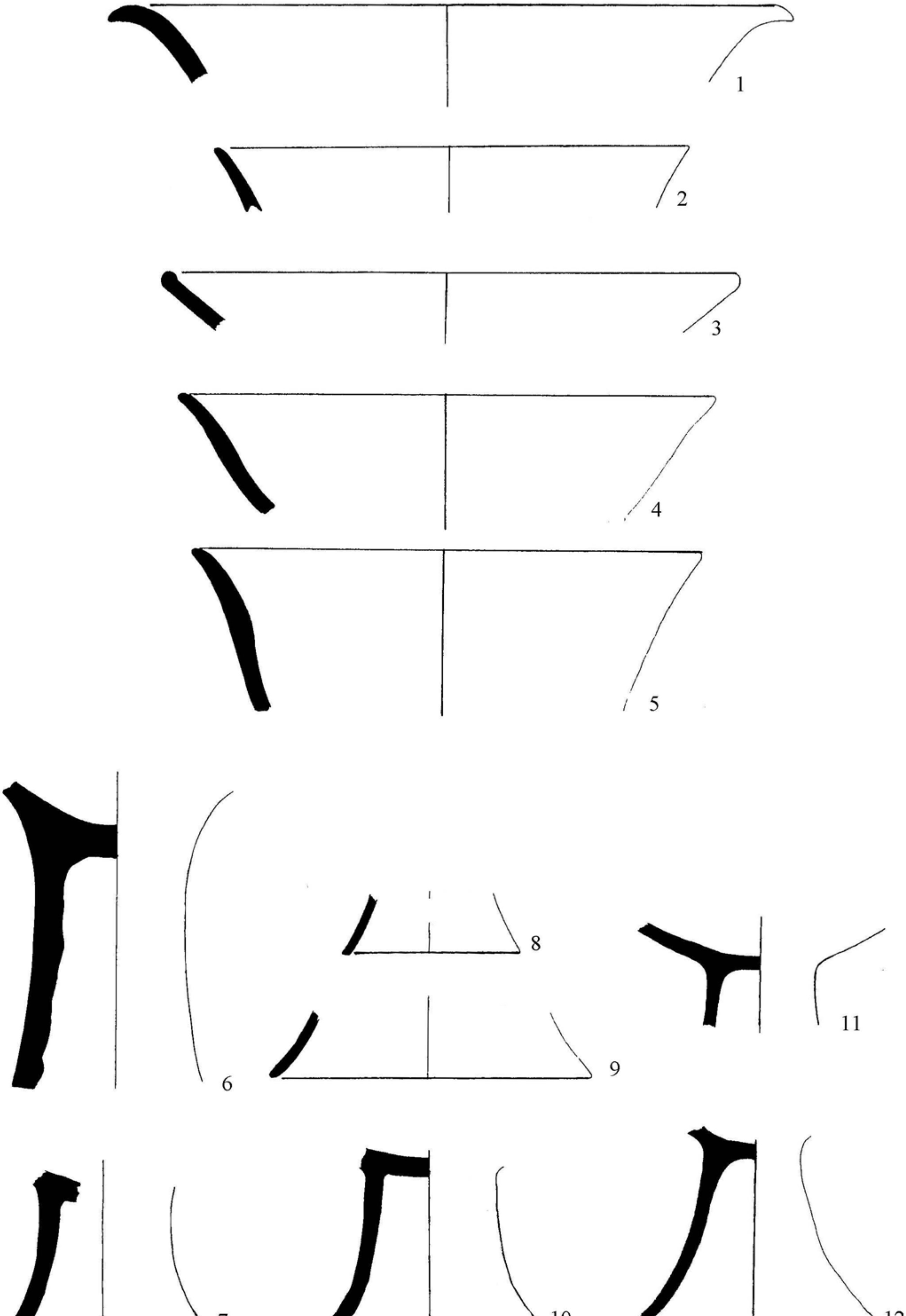


Peloponnese: Black-burnished Incised Bowls 1:3



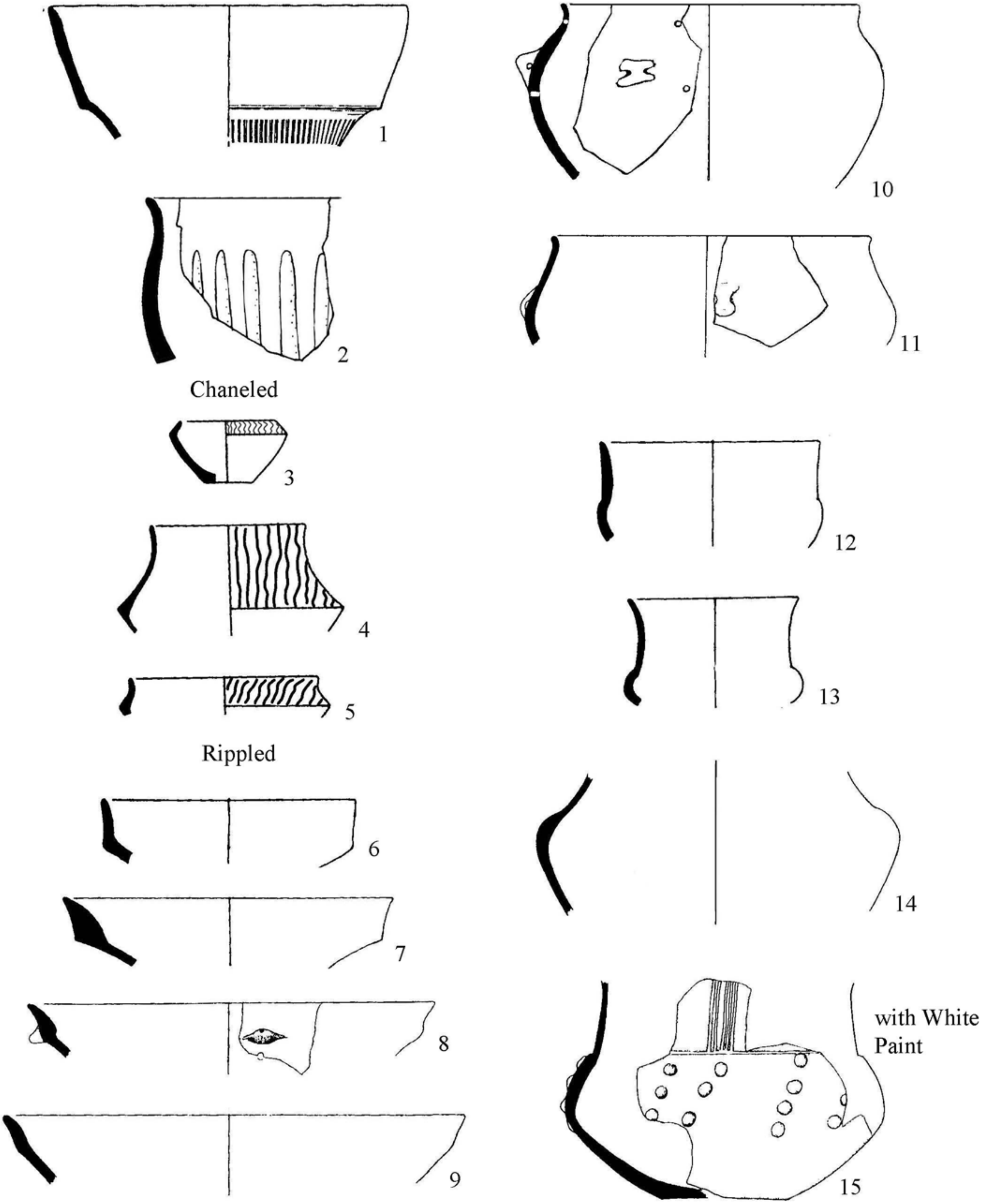
Peloponnese: Black-burnished with "Scratch-incised" Decoration 1:3

Figure 52

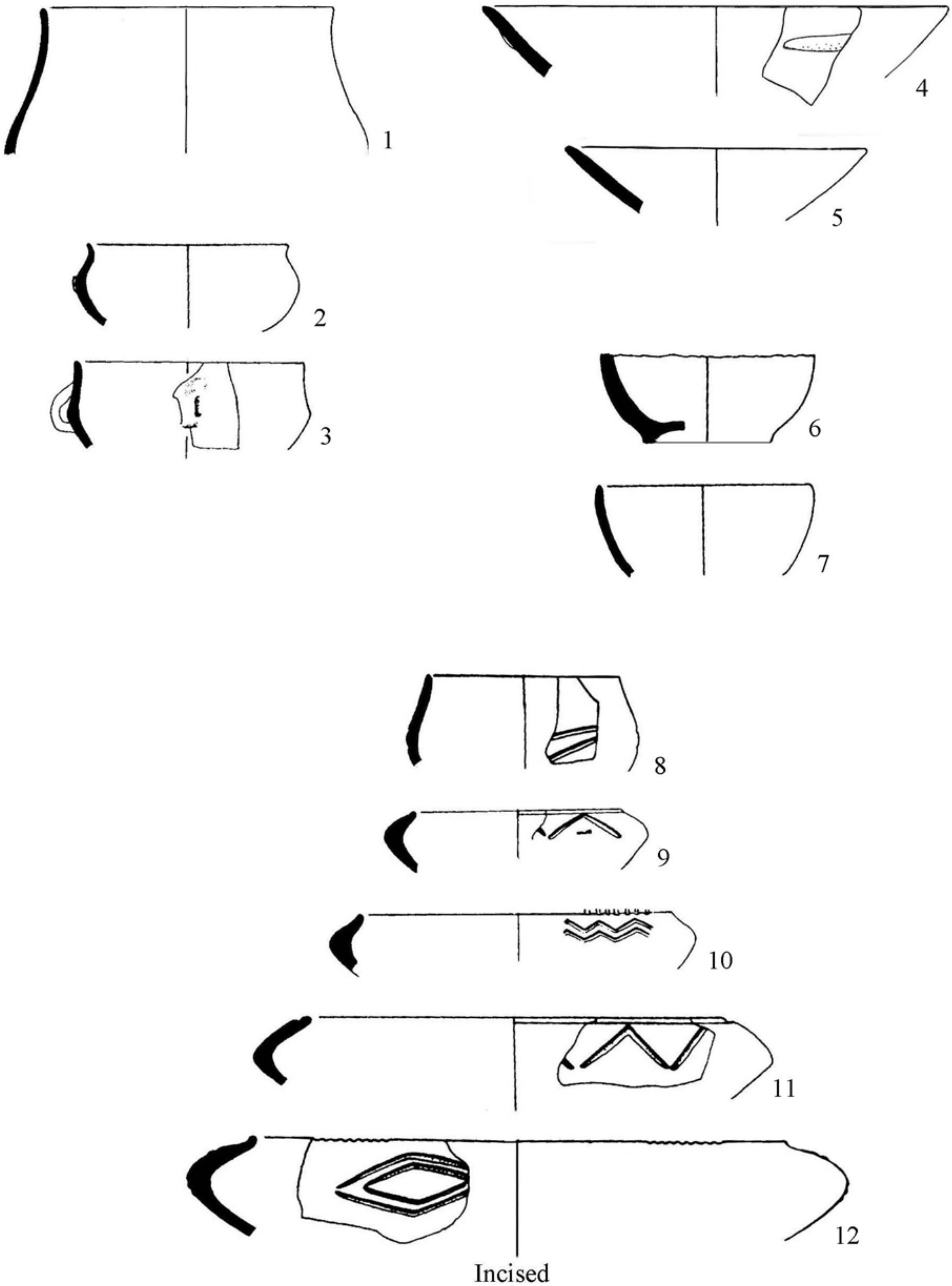


Central Greece: Black-burnished Fruit-stands 1:3

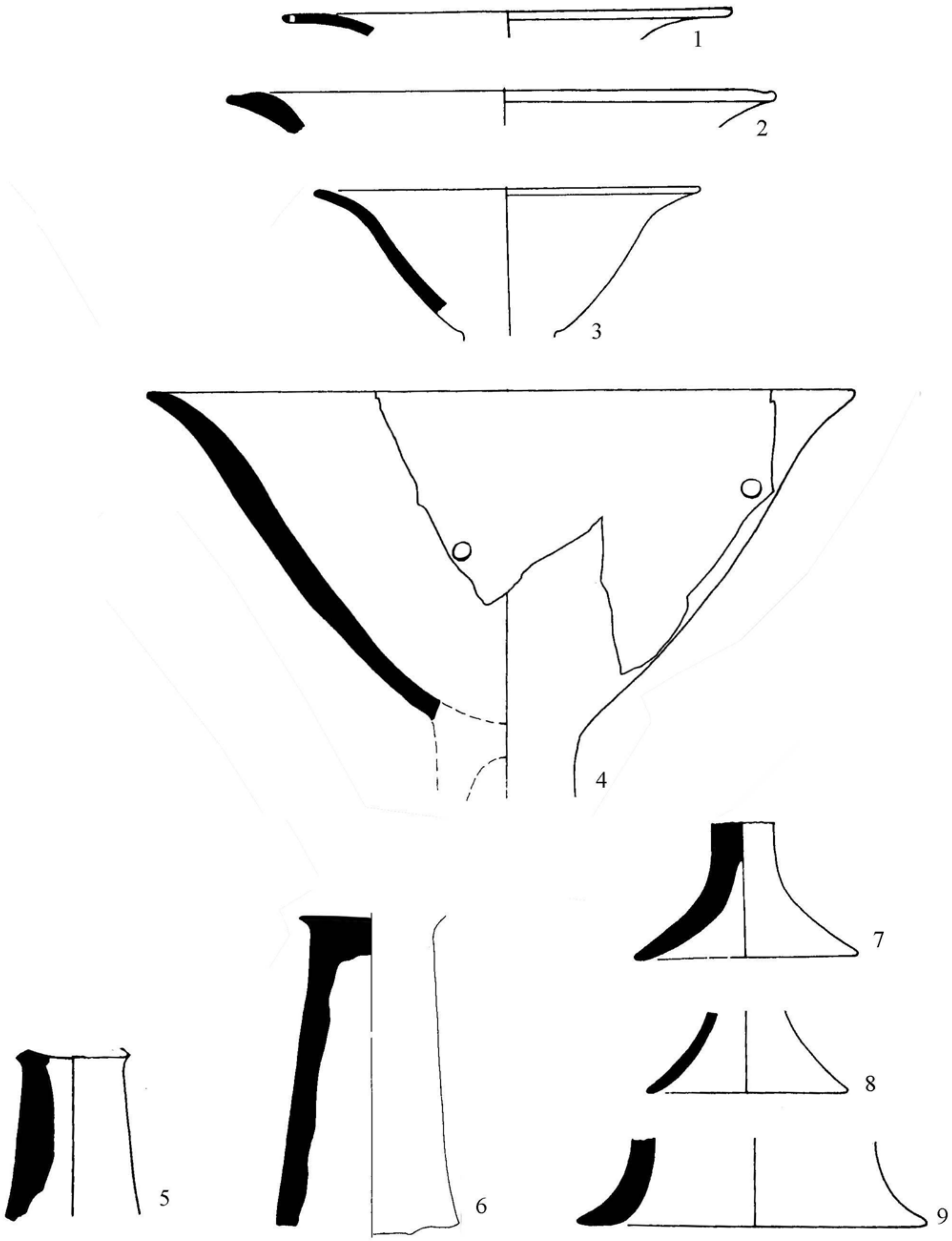
Figure 53



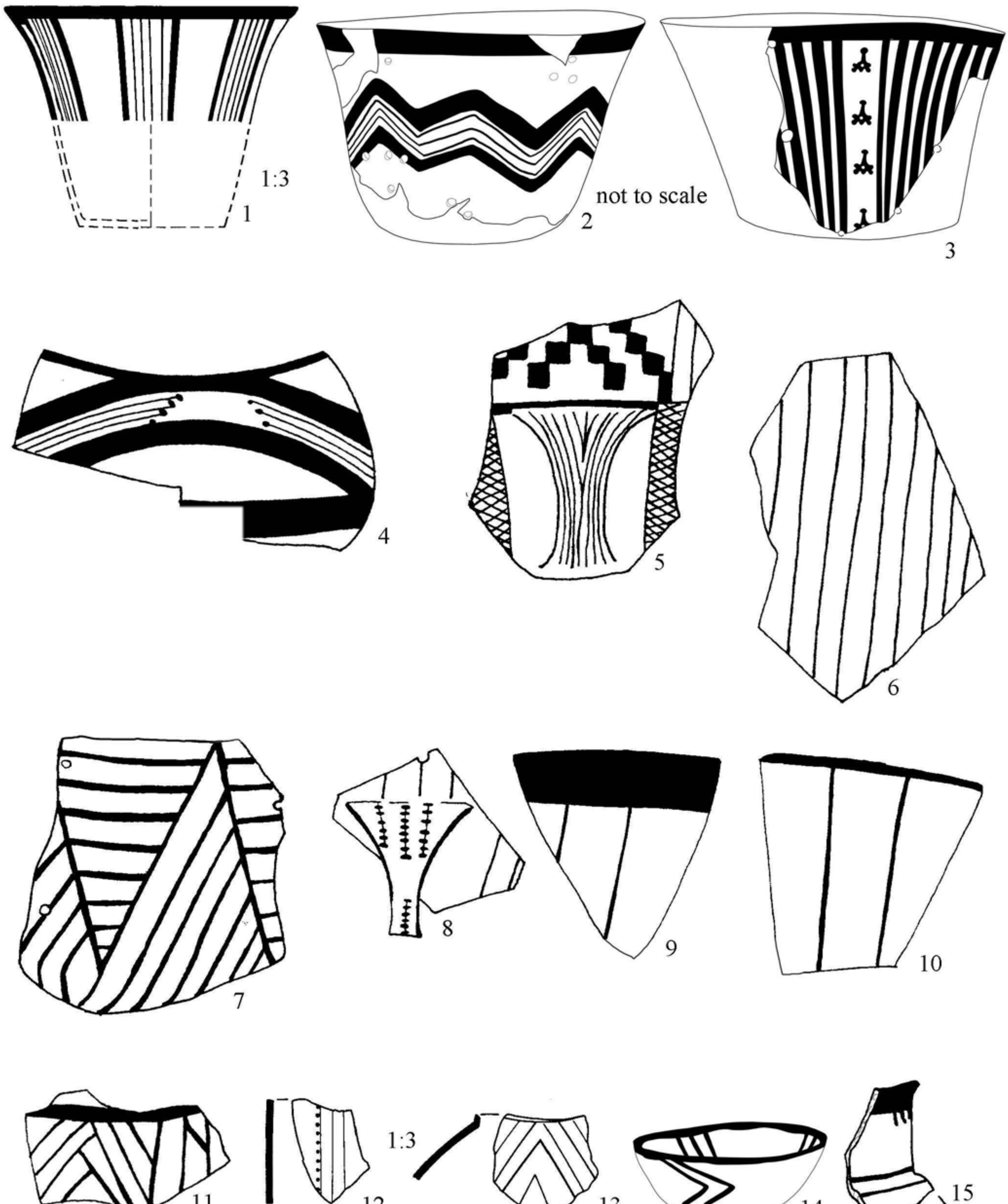
Gray-burnished Pottery from Central and Southern Greece 1:3
Figure 54



Gray-burnished Pottery from the Peloponnese 1:3
Figure 55

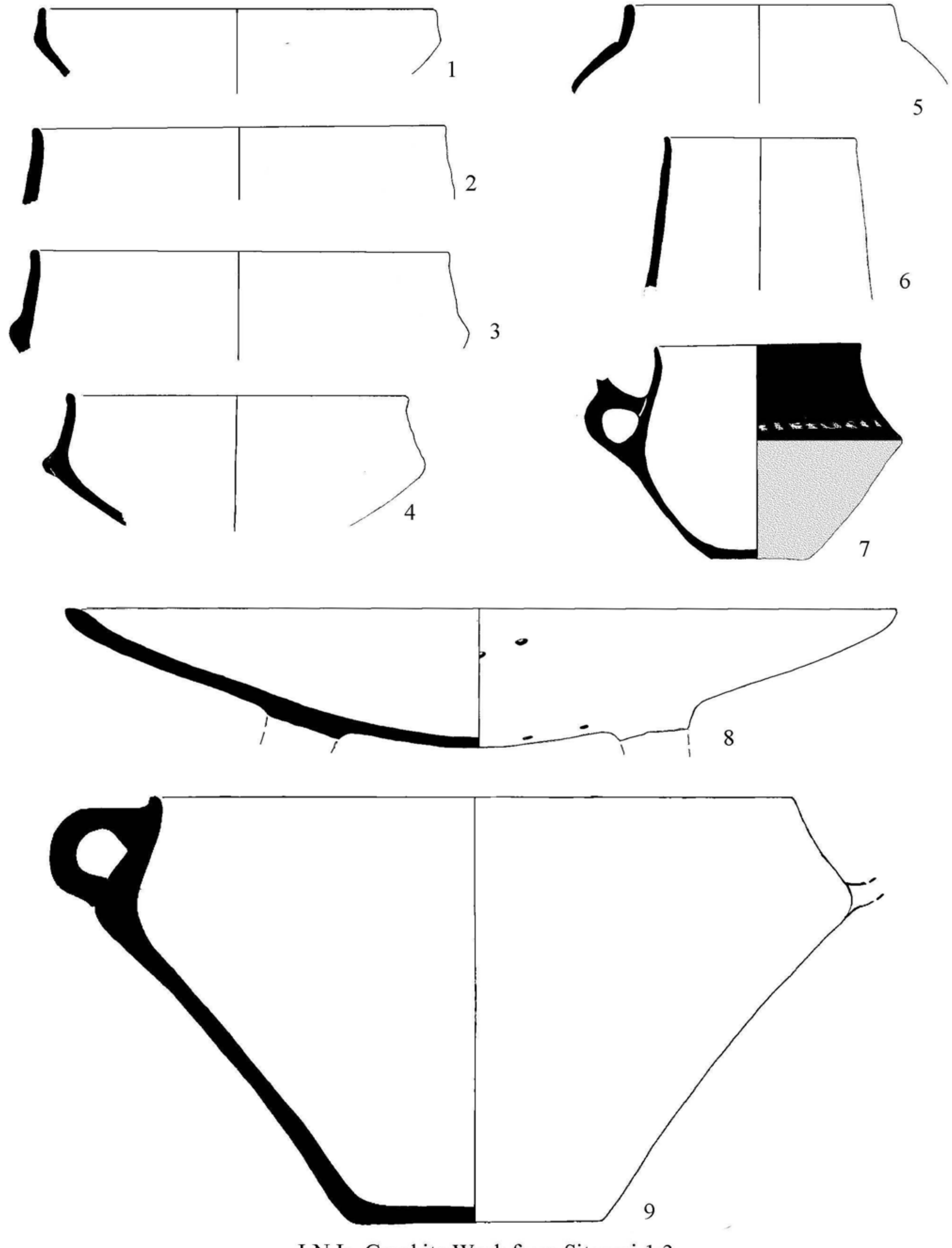


Gray-burnished Fruit-stands from Central and Southern Greece 1:3
Figure 56

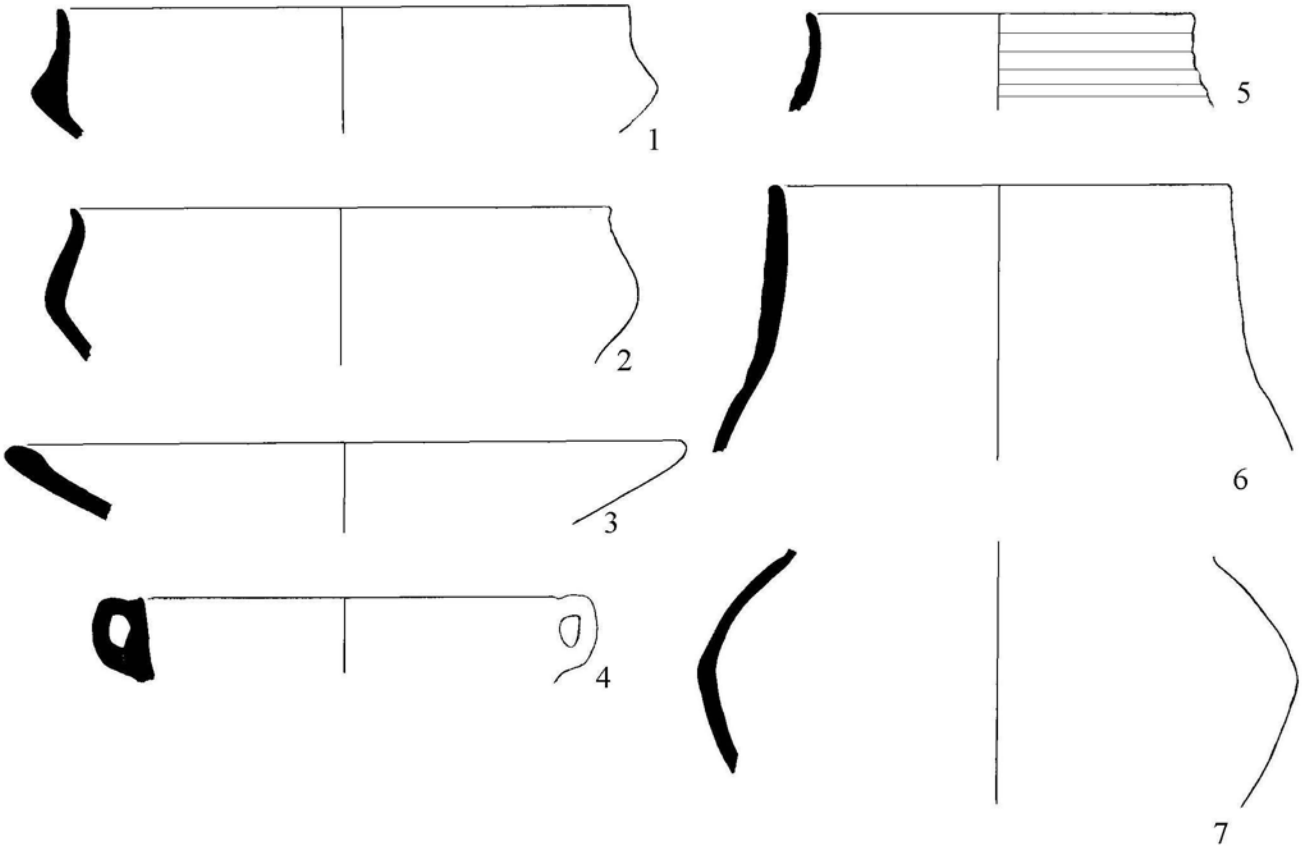


Gray-on-gray (Γ1β) Painted Pottery from Thessaly and Servia 2:3

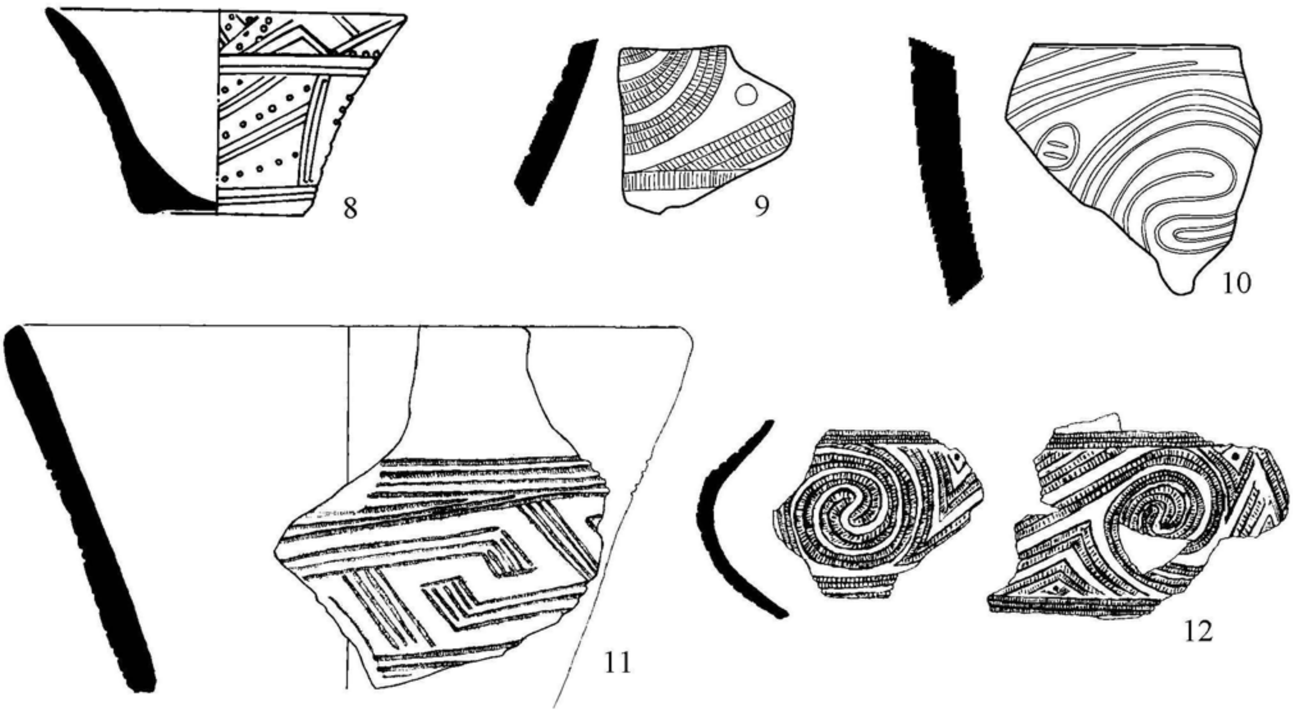
Figure 57



LN Ia Graphite Wash from Sitagroi 1:3
Figure 58

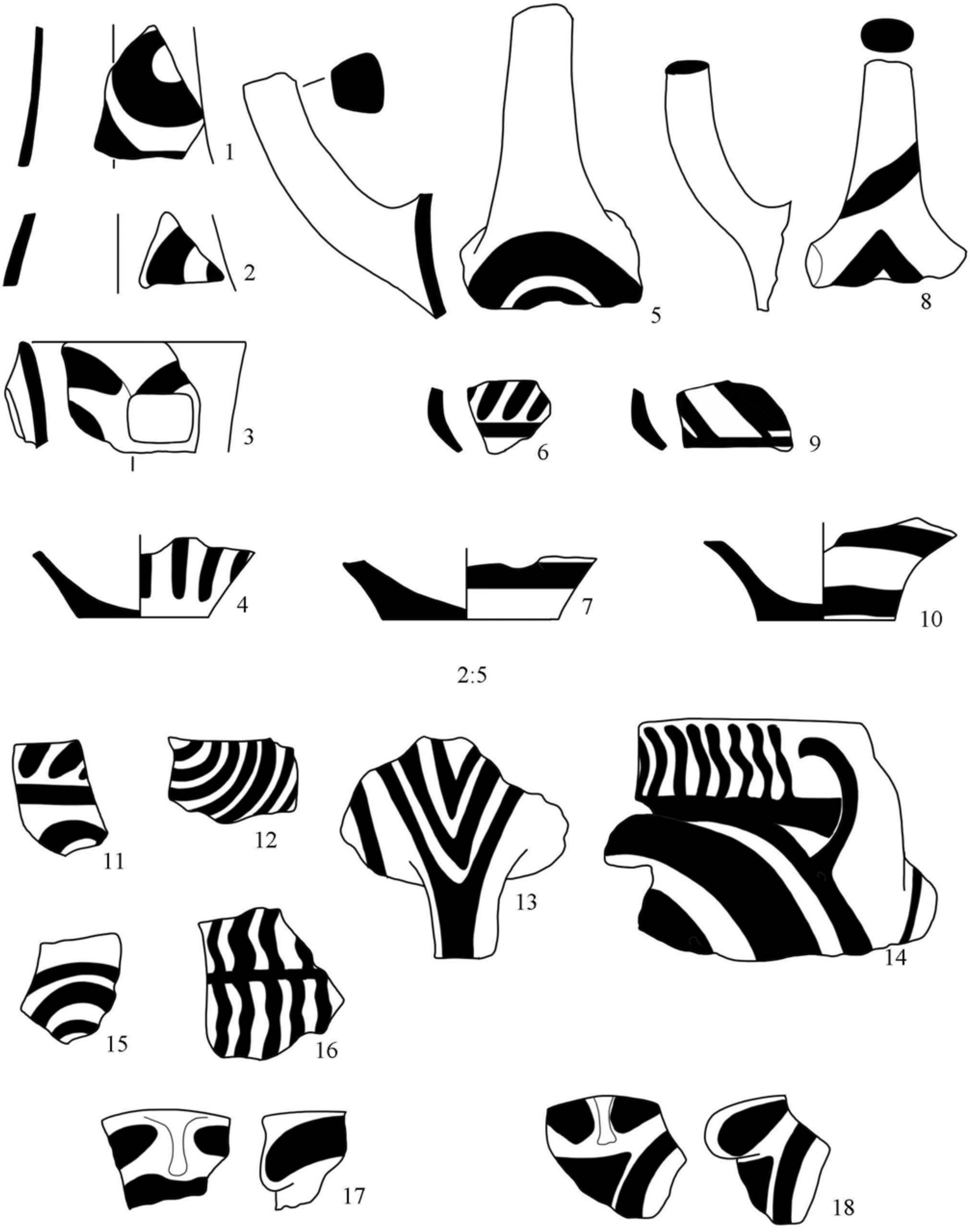


Sitagroi: LN Ia Graphite Wash Channeled 1:3



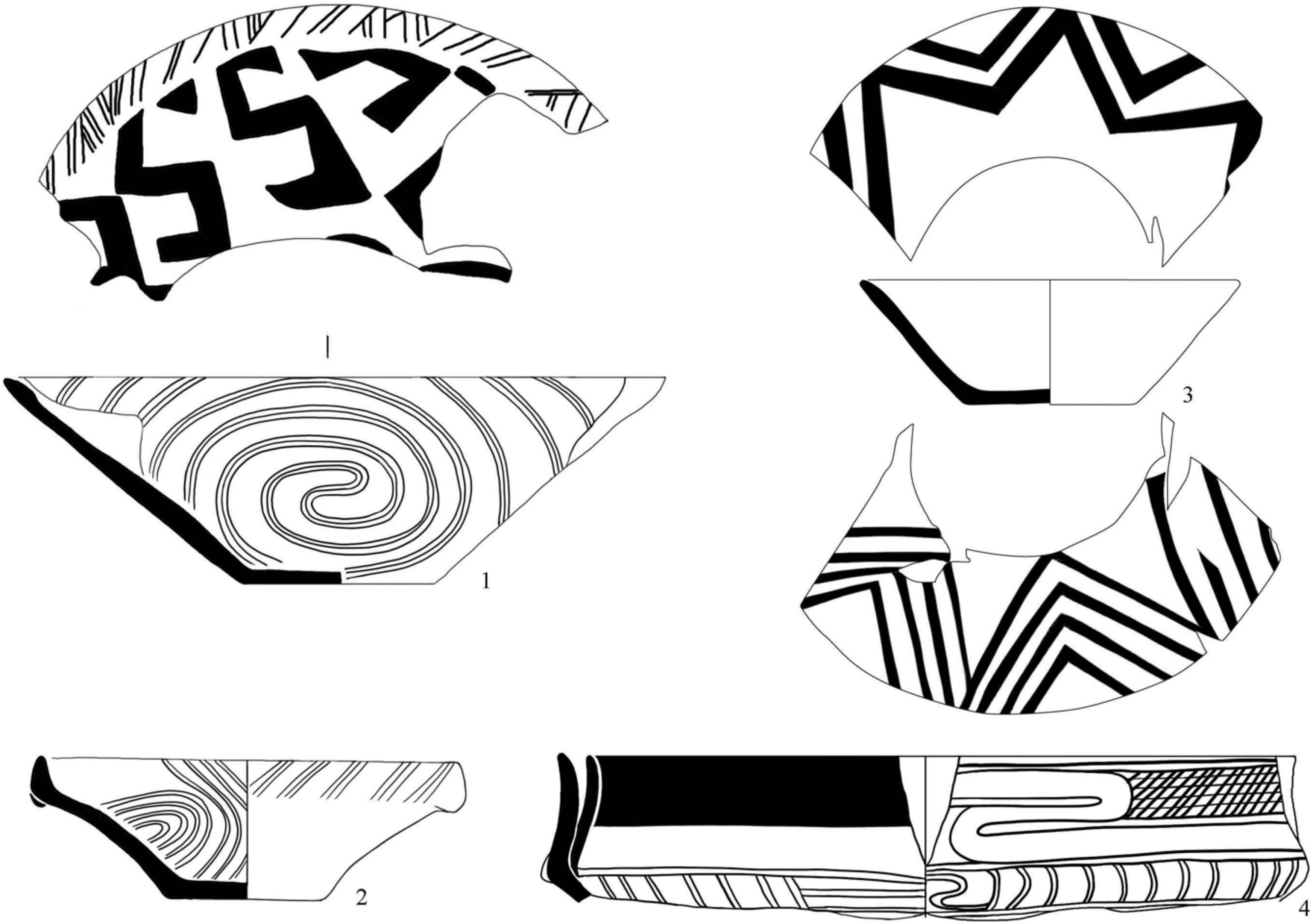
Macedonia: LN Ib Graphite-painted and Incised Pottery 1:3

Figure 59



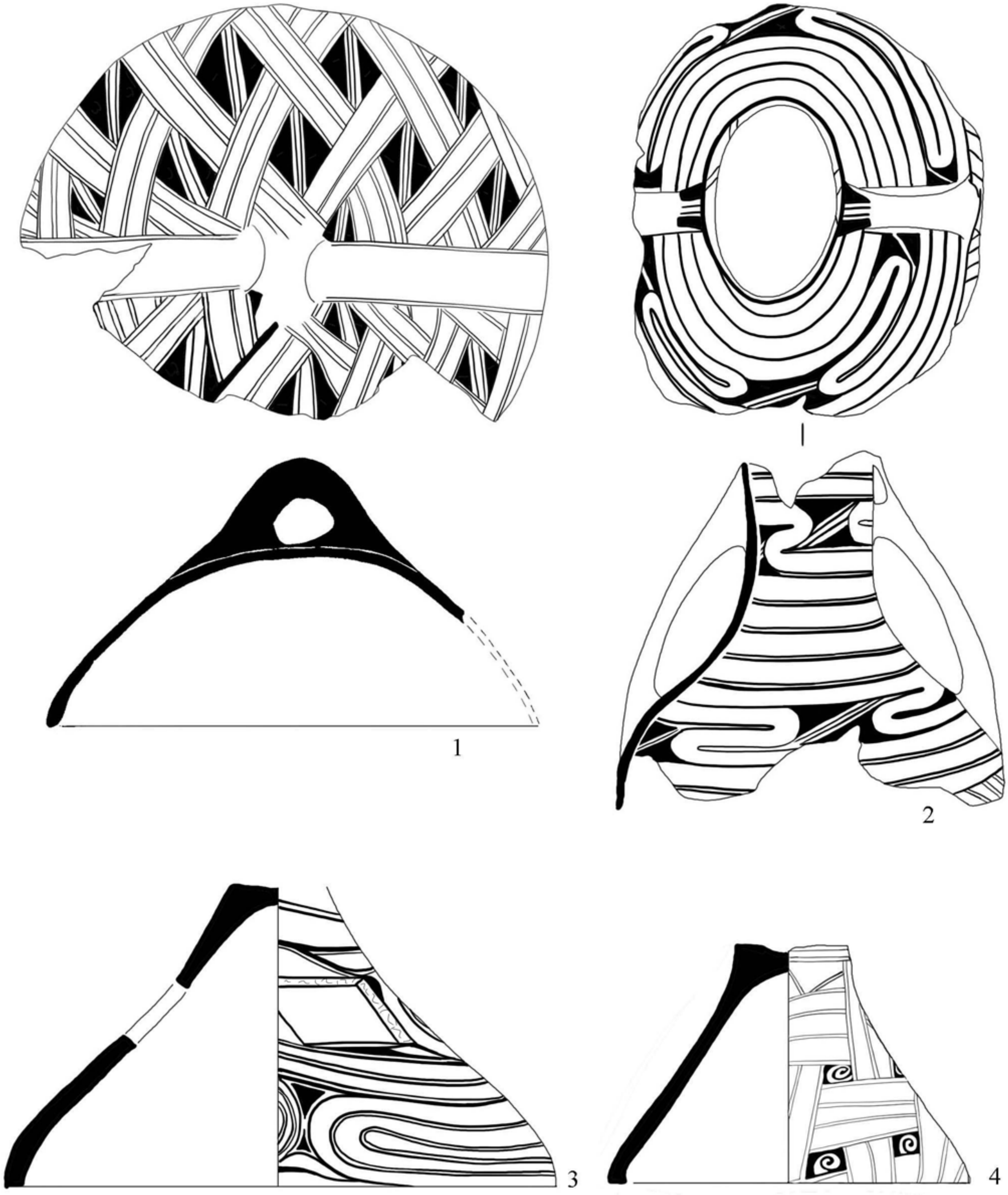
Promachon-Topolnica : LN Ib Graphite-painted Broad Style 1:2
Figure 60

Promachon-Topolnica: LN Ib Dikili Tash-Slatino Struma-style Painted Pottery 1:3
Figure 61



Sitagroi and Dikili Tash: LN Ib Dikili Tash-Slatino Struma-style Graphite-painted Bowls 1:3

Figure 62

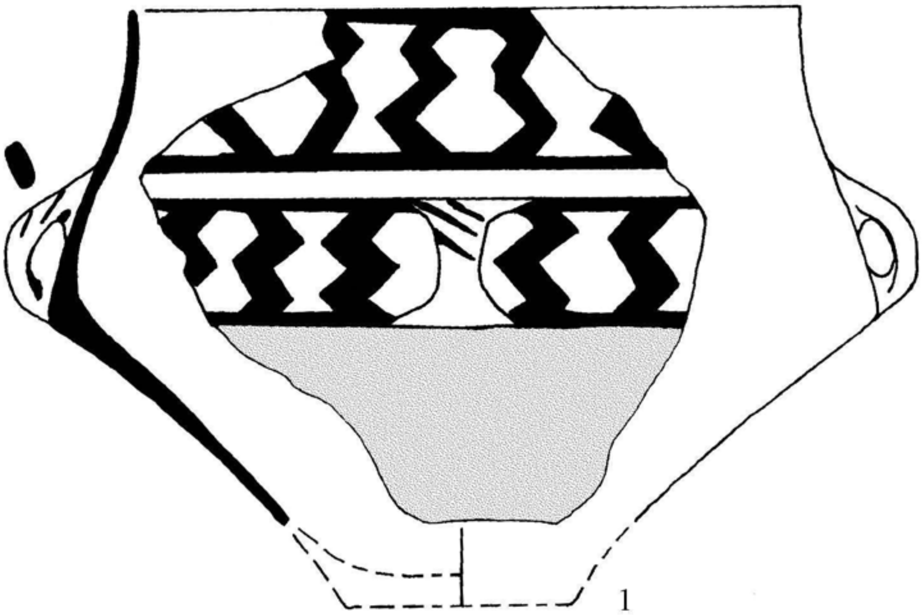


Sitagroi: LN Ib Dikili-Tash Slatino Struma Style Graphite-painted Pottery 1:3

Figure 63

Dikili Tash: LN Ib Dikili Tash-Slatino Struma-style Graphite-painted sherds 1:1

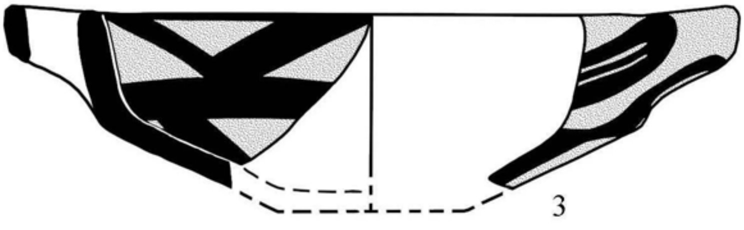
Figure 64



1

2

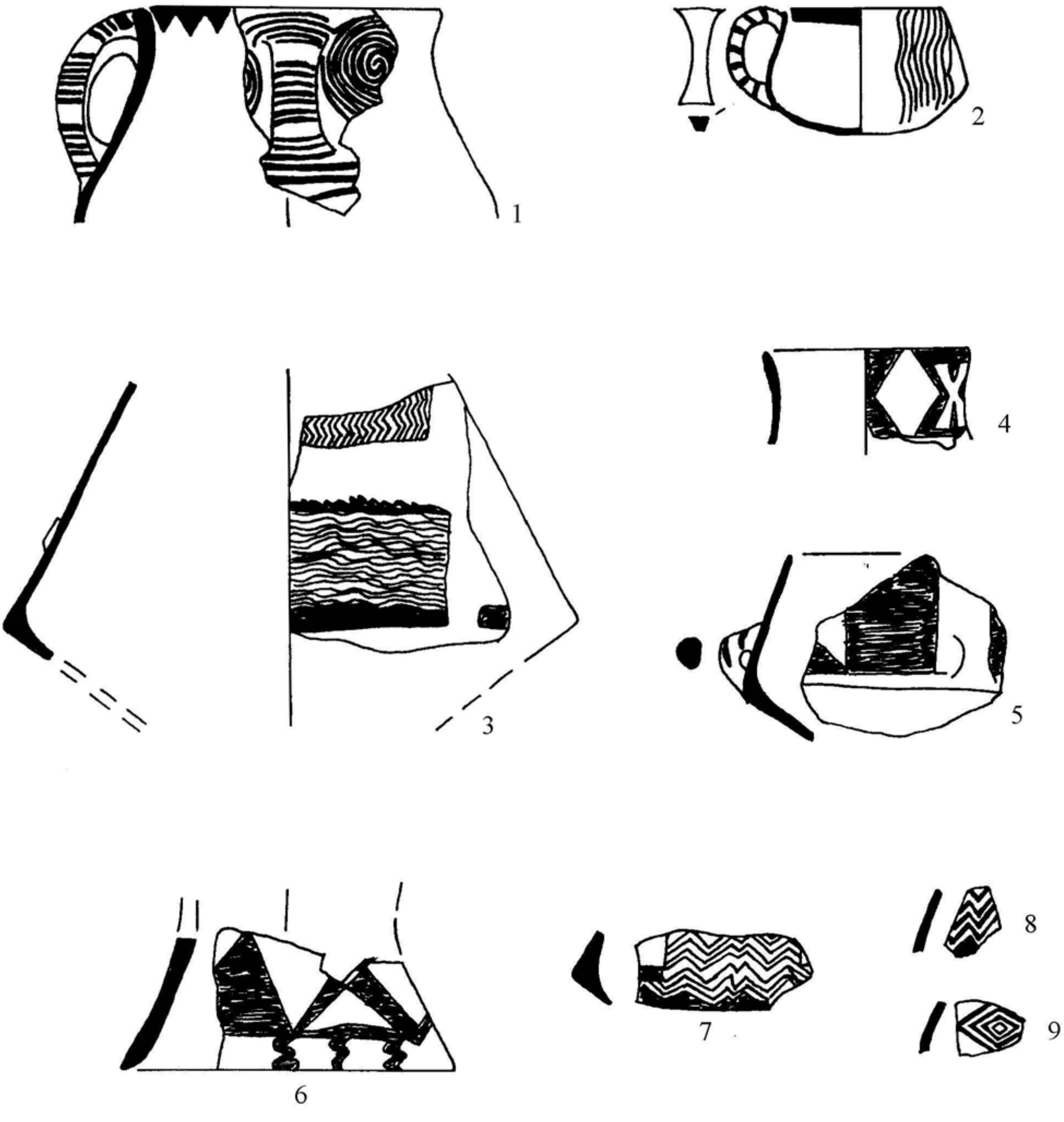
Promachon-Topolnica: LN Ia Bitumen Painted Pottery 2:5



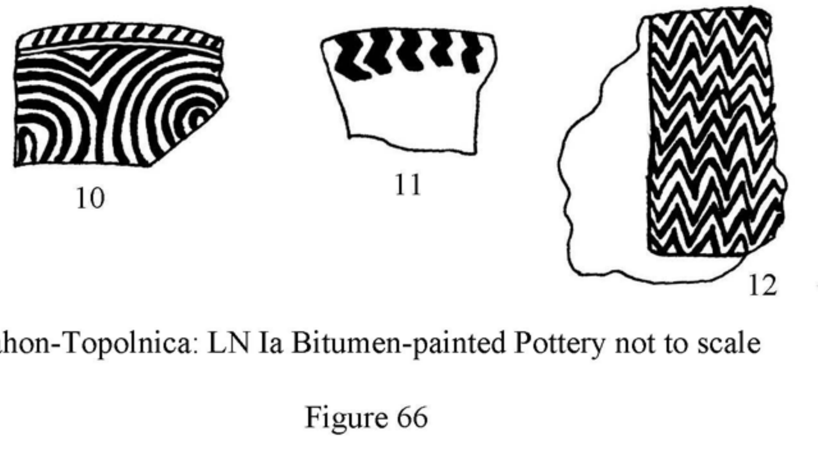
3

Stravropouli: LN Ia Bitumen Painted Pottery 2:5

Figure 65

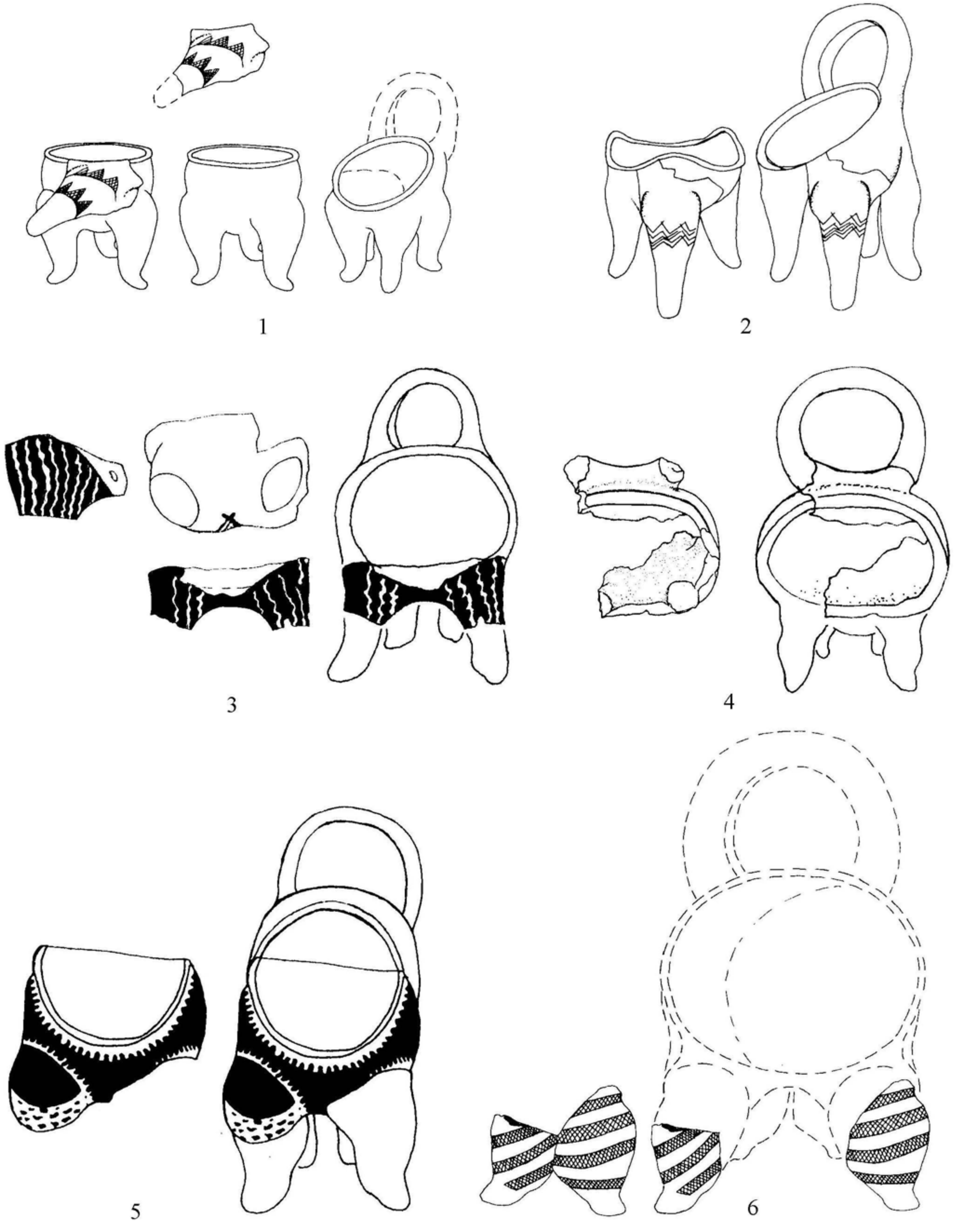


Promahon-Topolnica: LN Ia Bitumen-painted Pottery 1:3



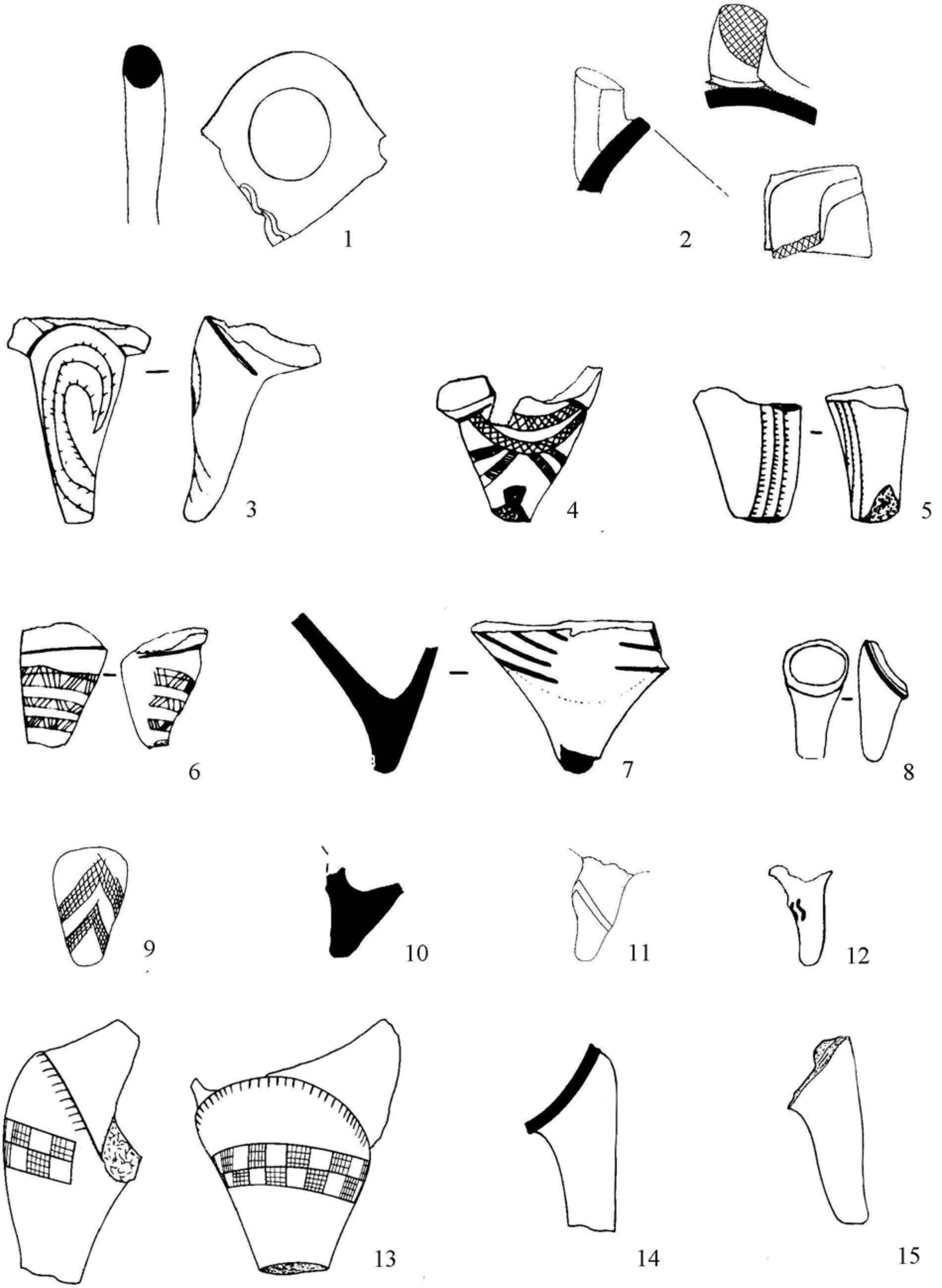
Promahon-Topolnica: LN Ia Bitumen-painted Pottery not to scale

Figure 66

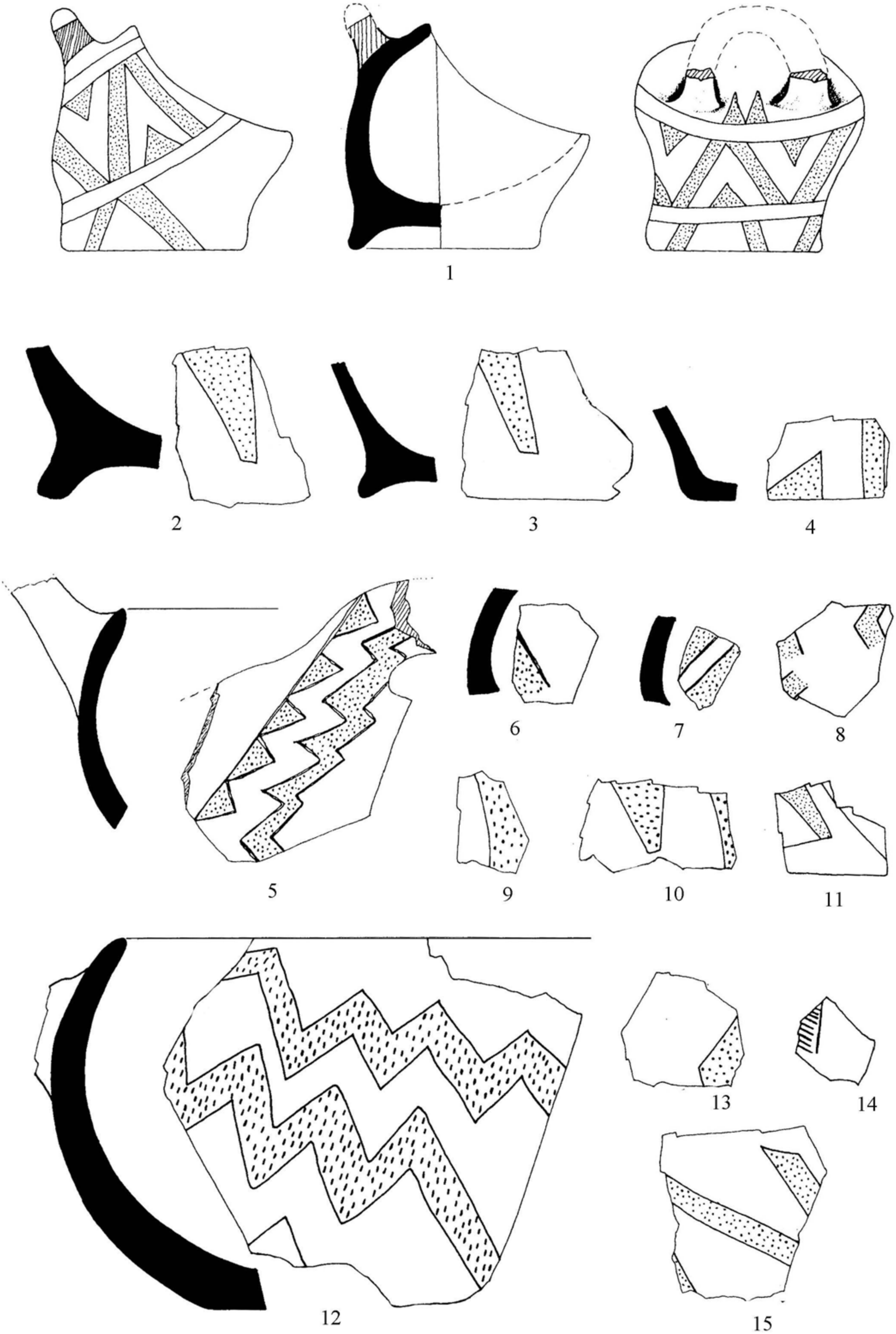


Reconstructions of LN Ia Rhyta

Figure 68

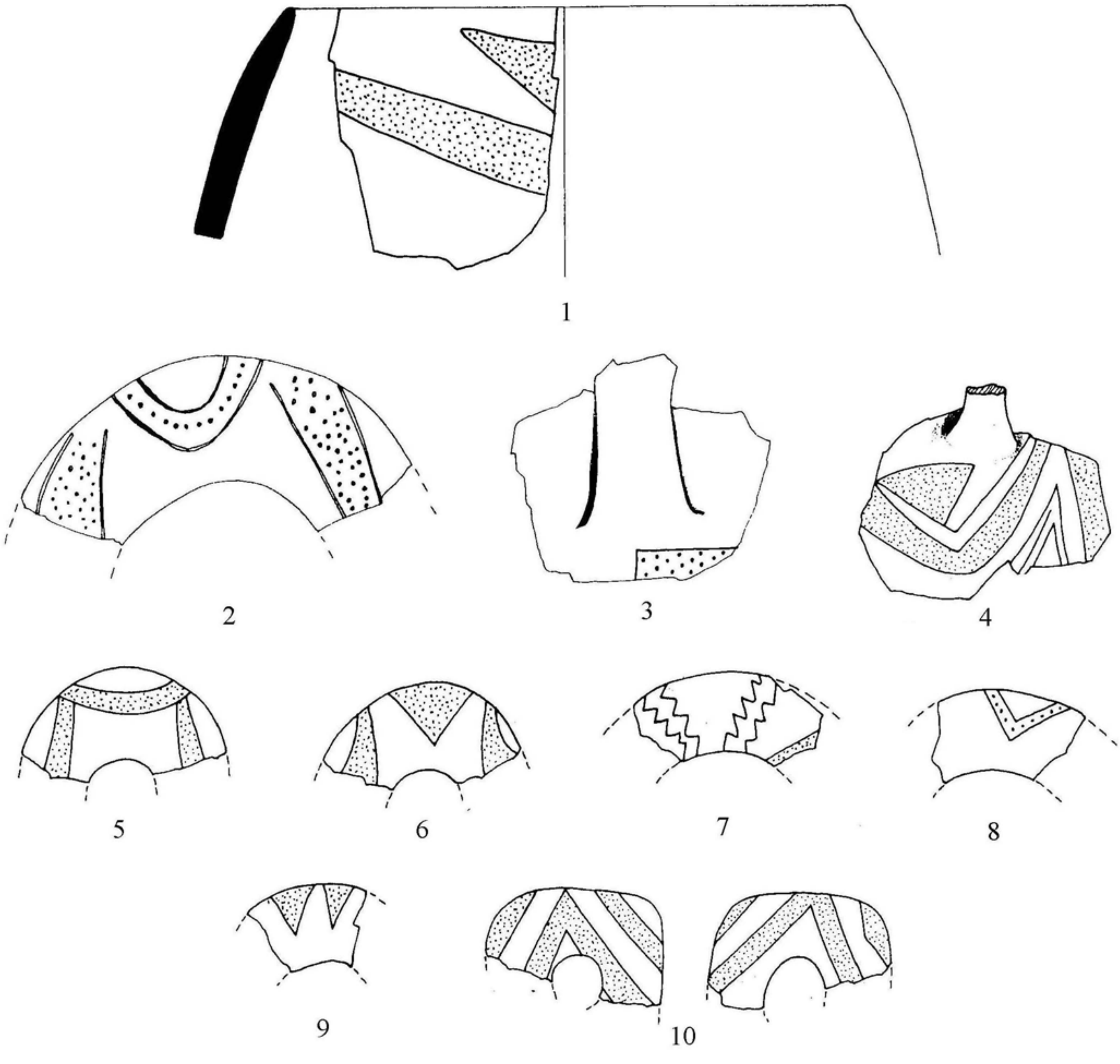


Thessaly and Southern Greece: LN Ia Rhyta Handles and Legs
Figure 67



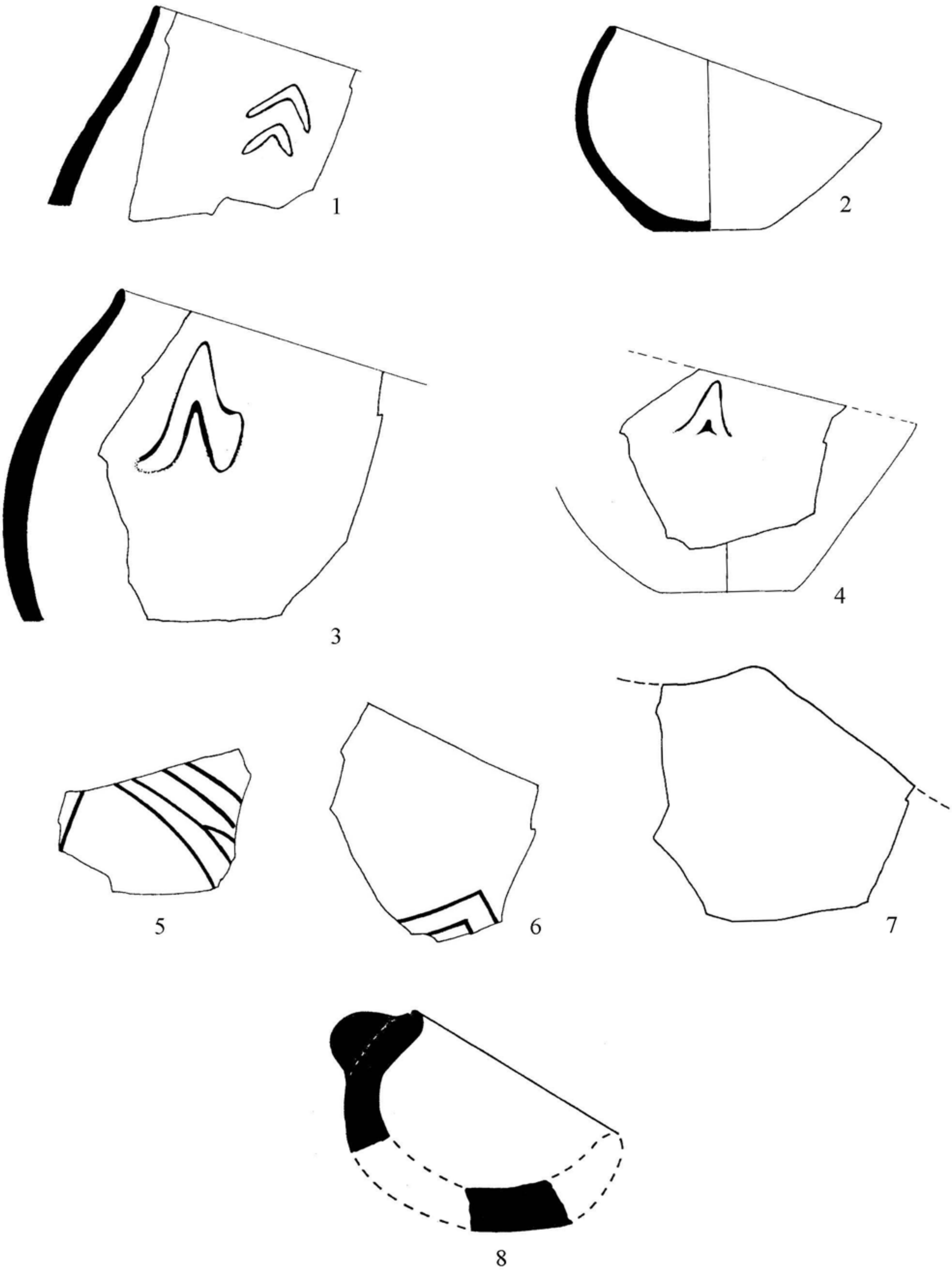
Late Neolithic Ia Scoops from the Skoteini Cave 1:3

Figure 69



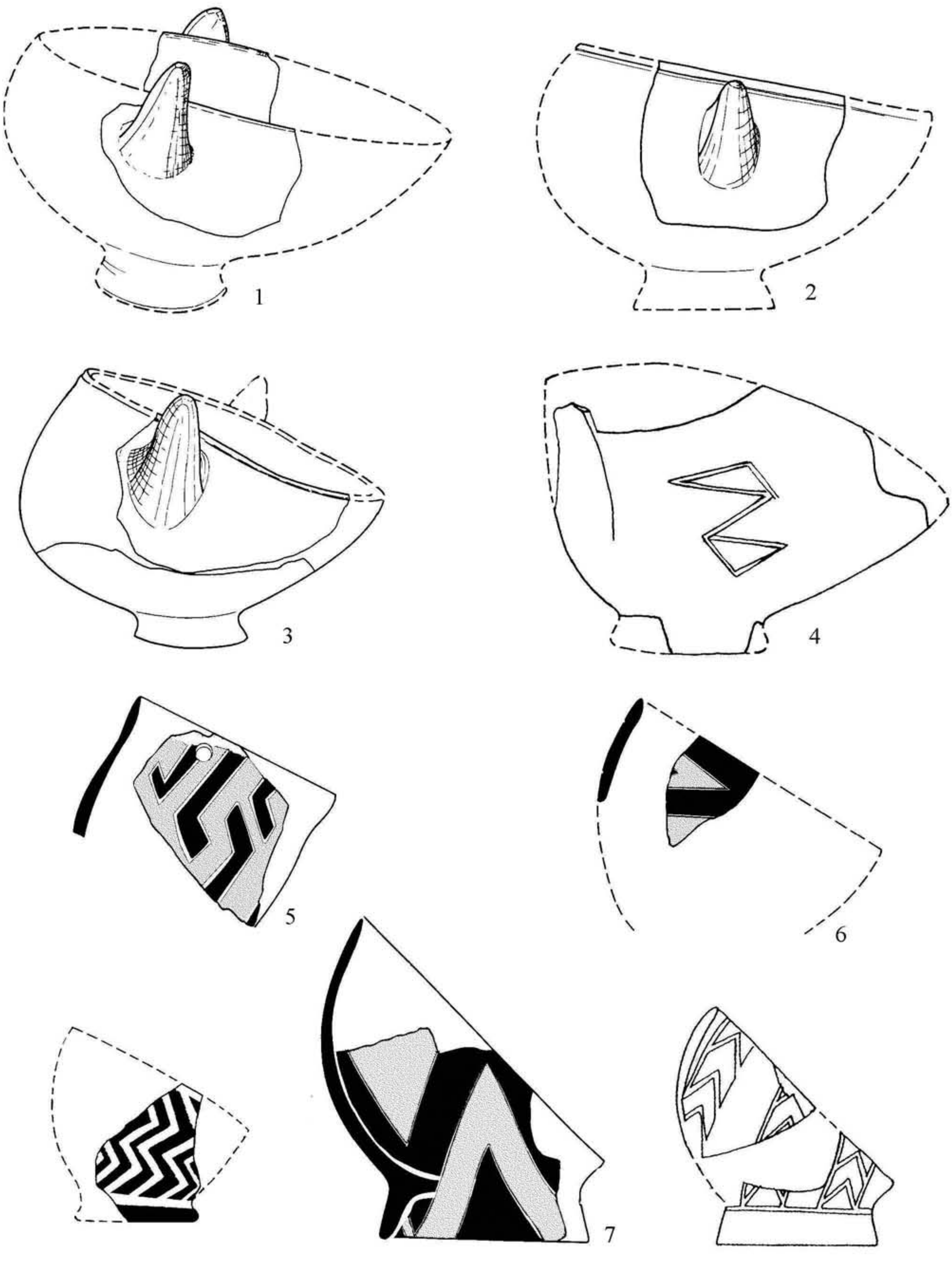
Late Neolithic Ia Scoops from Central Greece 1:3

Figure 70

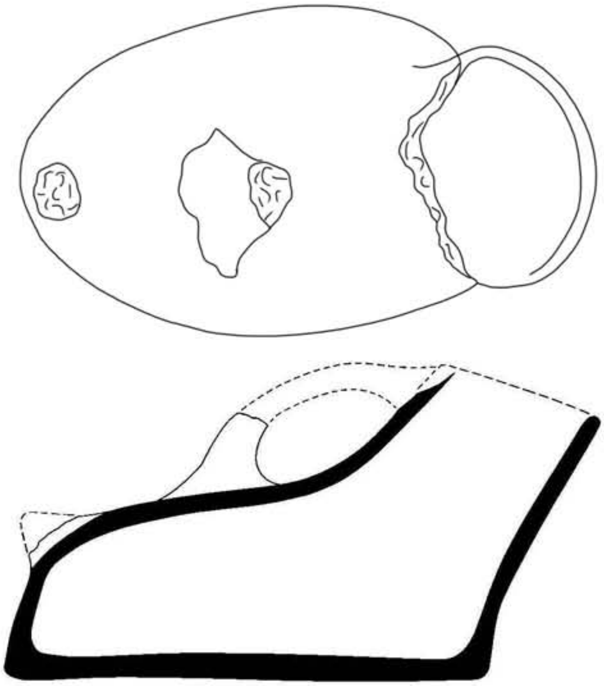


Late Neolithic Ib Scoops from Central Greece 1:3

Figure 71

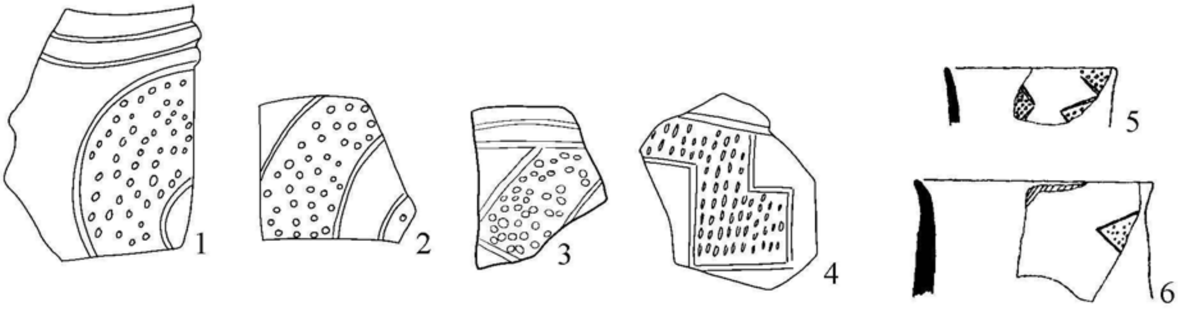


Late Neolithic Ib Thessalian Scoops 1:3
Figure 72



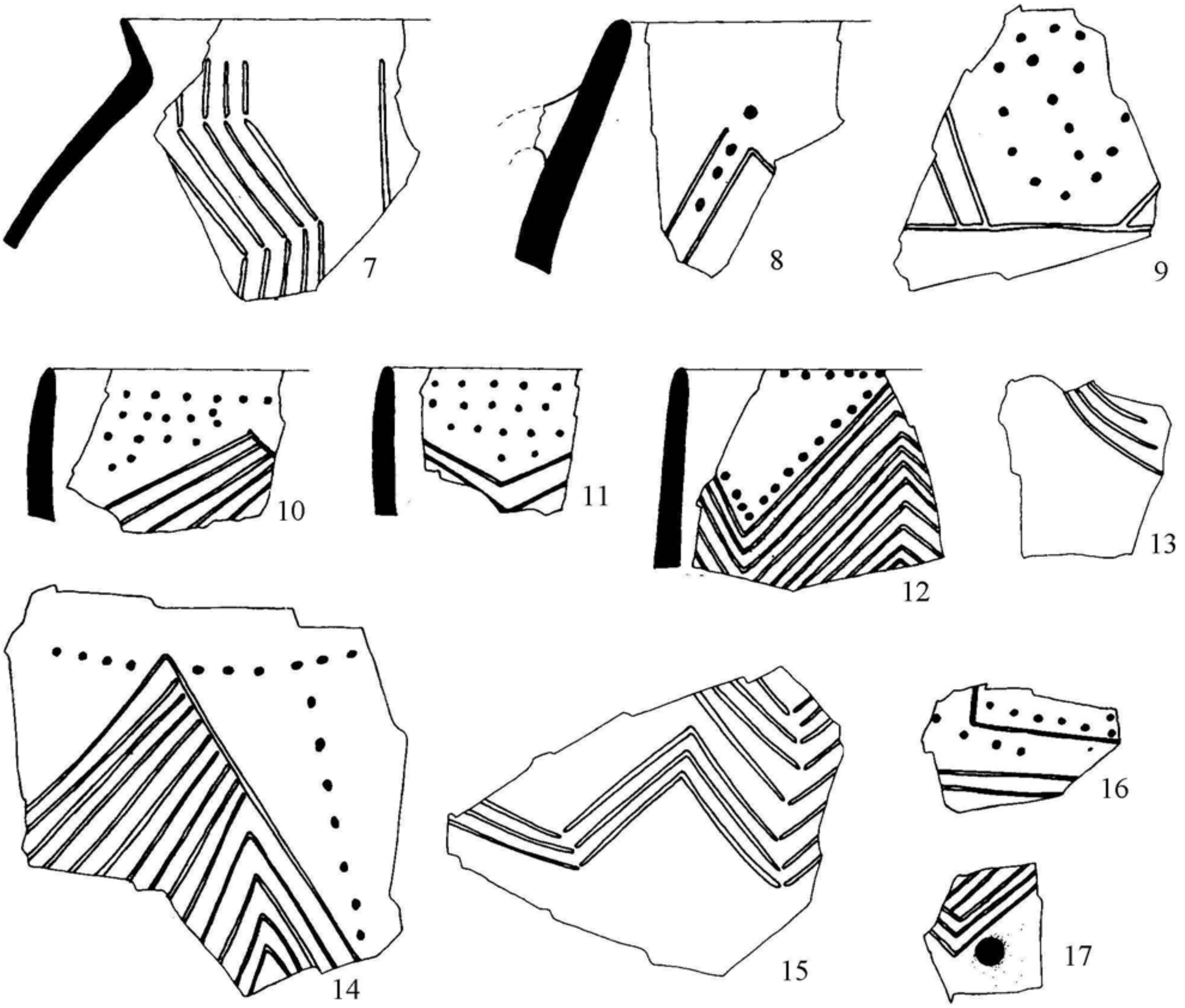
Late Neolithic Ia Askoi 1:3

Figure 73



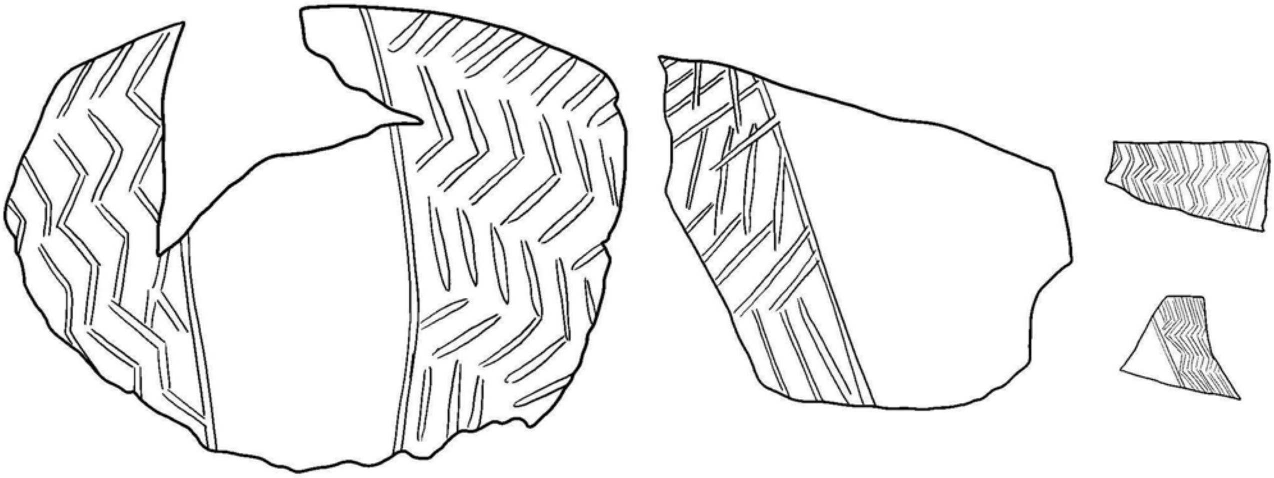
2:3 1:3

Skoteini Type 1 (Dot Incised Ware) from Thessaly and Southern Greece

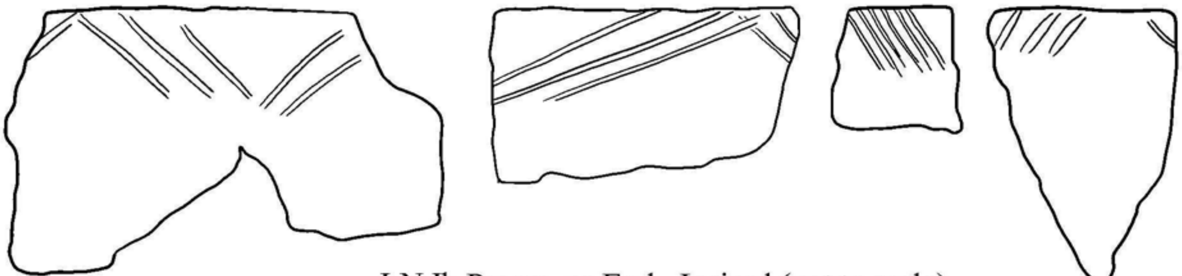


Skoteini: LN Ia Skoteini Type 2 (Incision and Punctation) 1:3

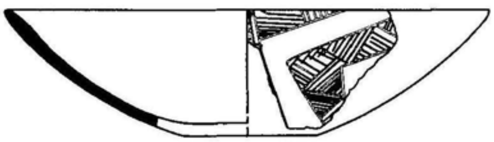
Figure 74



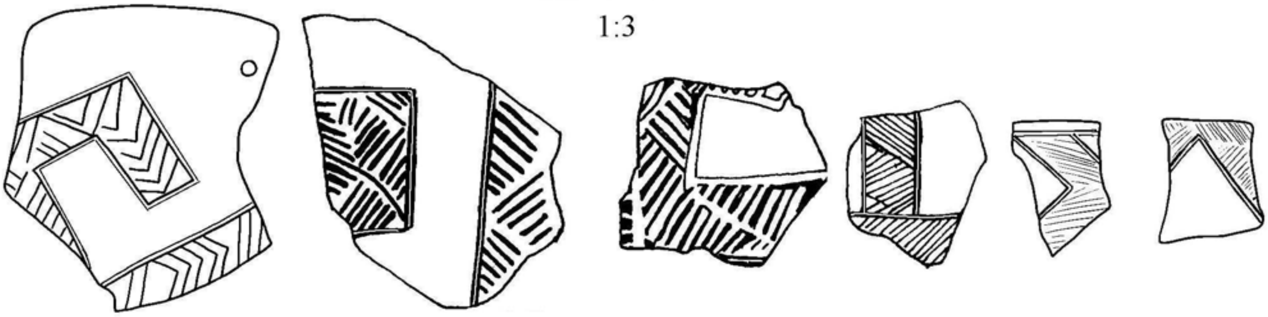
LN Ia Fine Incised Ware of Central Greece (not to scale)



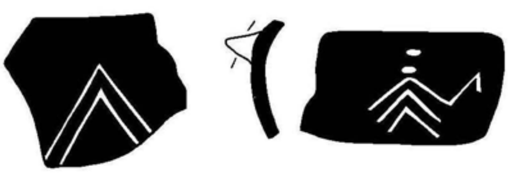
LN Ib Prosmyna Early Incised (not to scale)



1:3

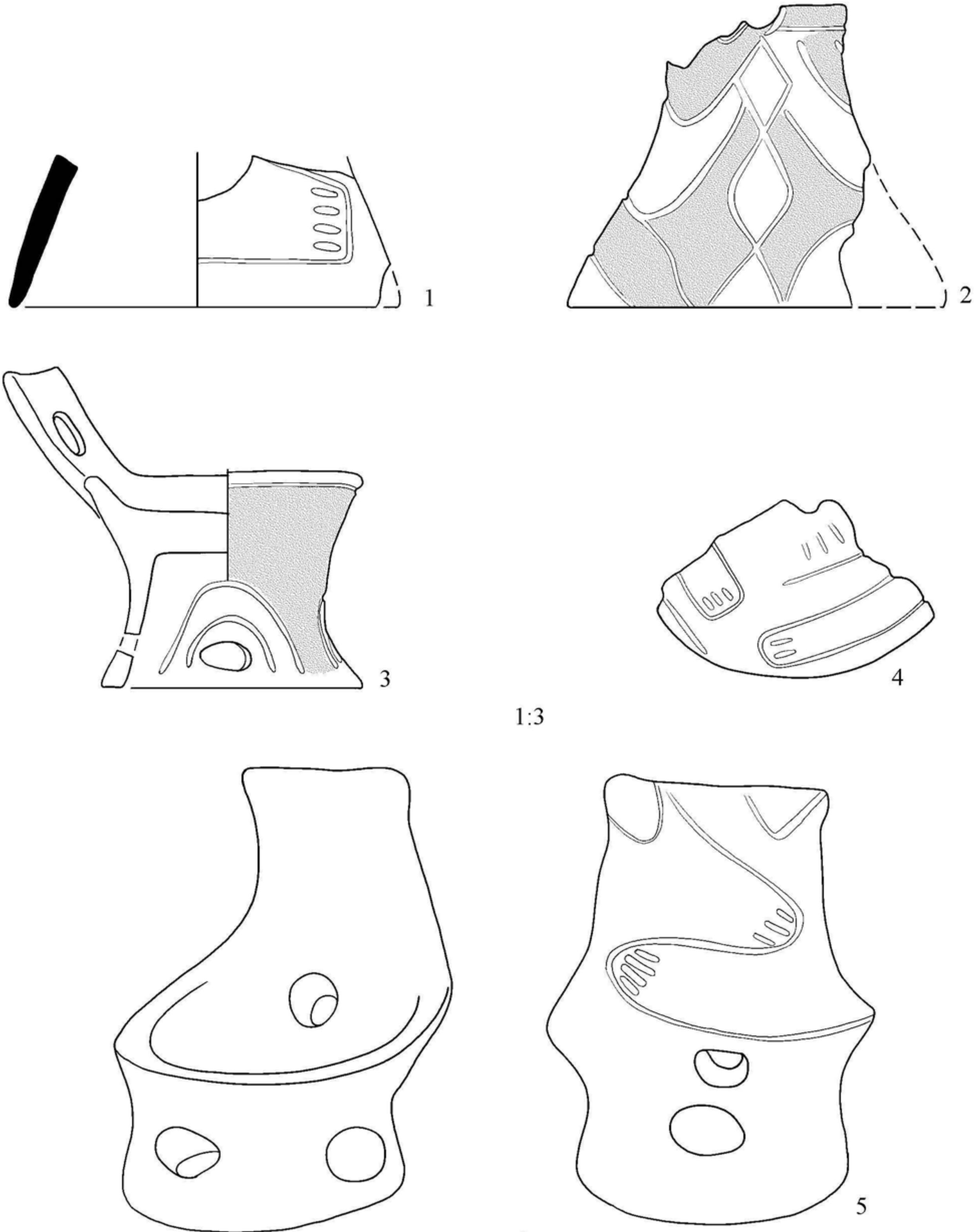


LN Ia Basketry Band Incised Bowl Sherds 2:3



LN Ib Promachon-Topolnica “Larisa” Type (not to scale)

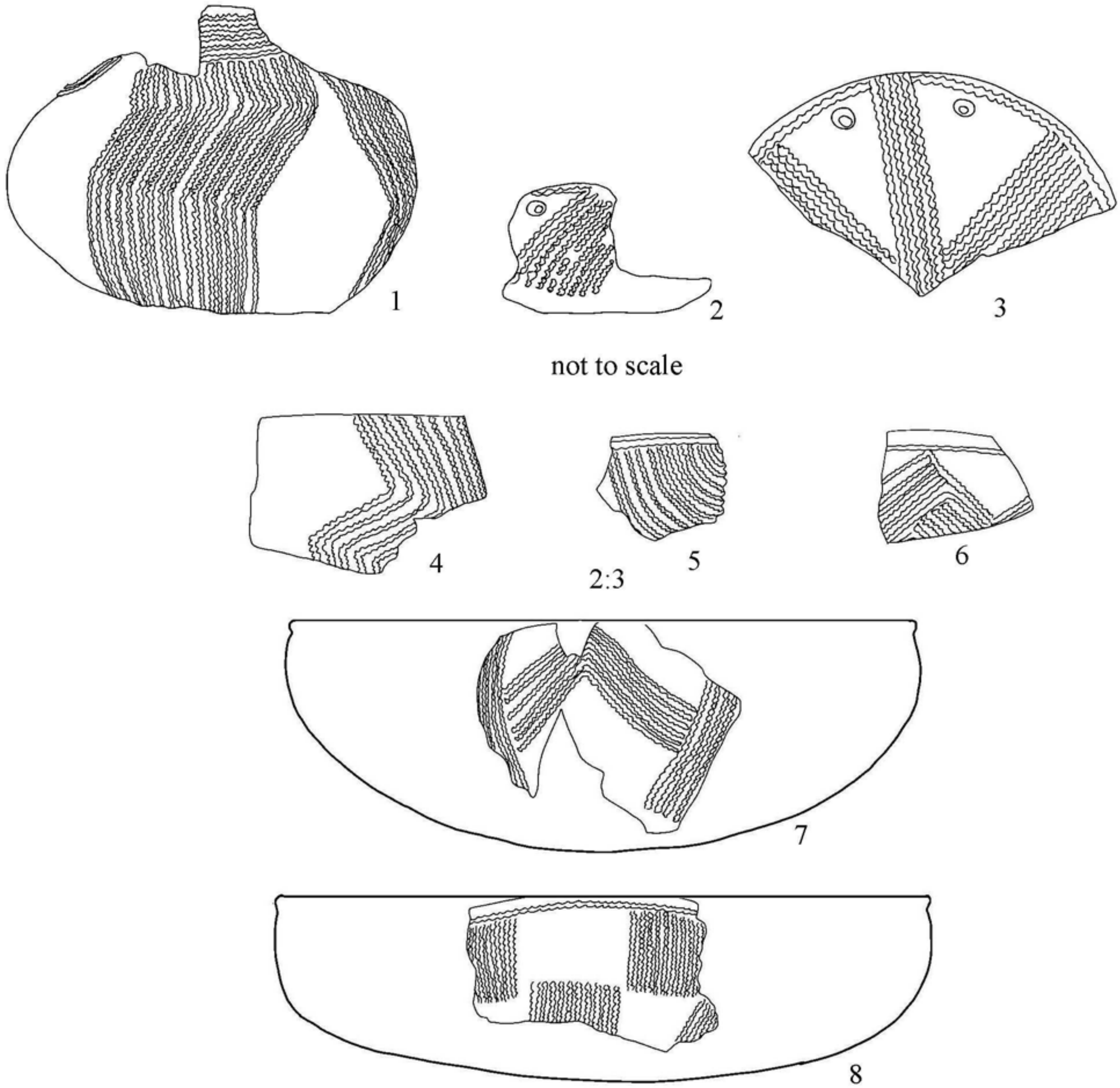
Figure 75



not to scale

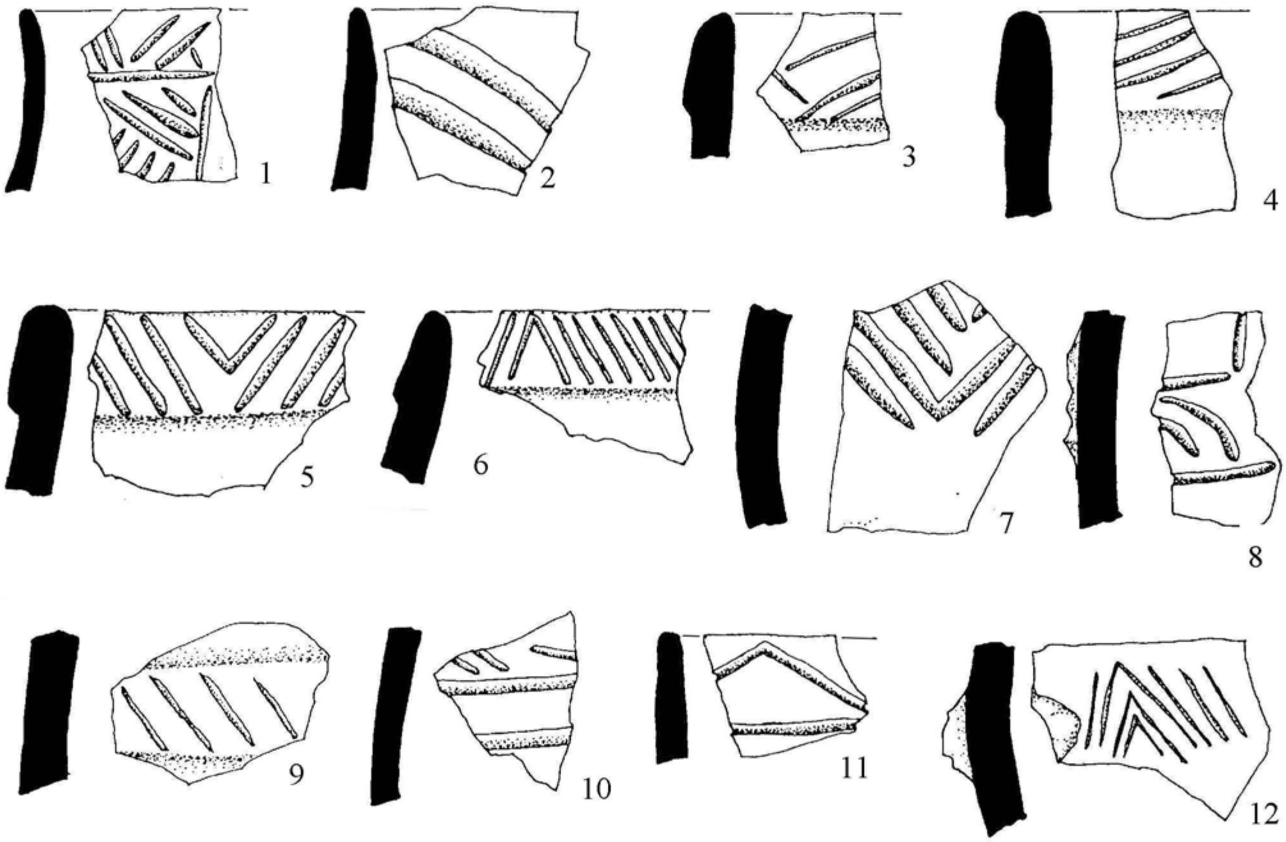
LN Ia-b Promachon-Topolnica Incised Decoration Type A1

Figure 76

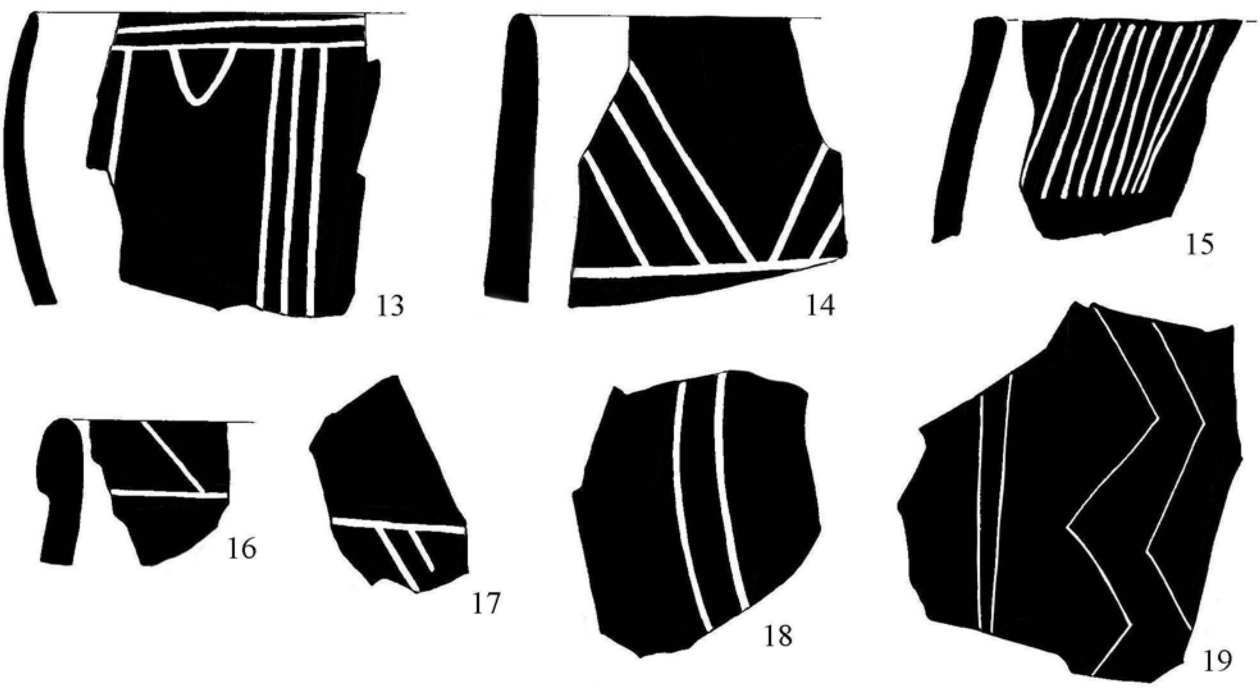


LN Ia Čakran Style of Incised Pottery 1:3

Figure 77

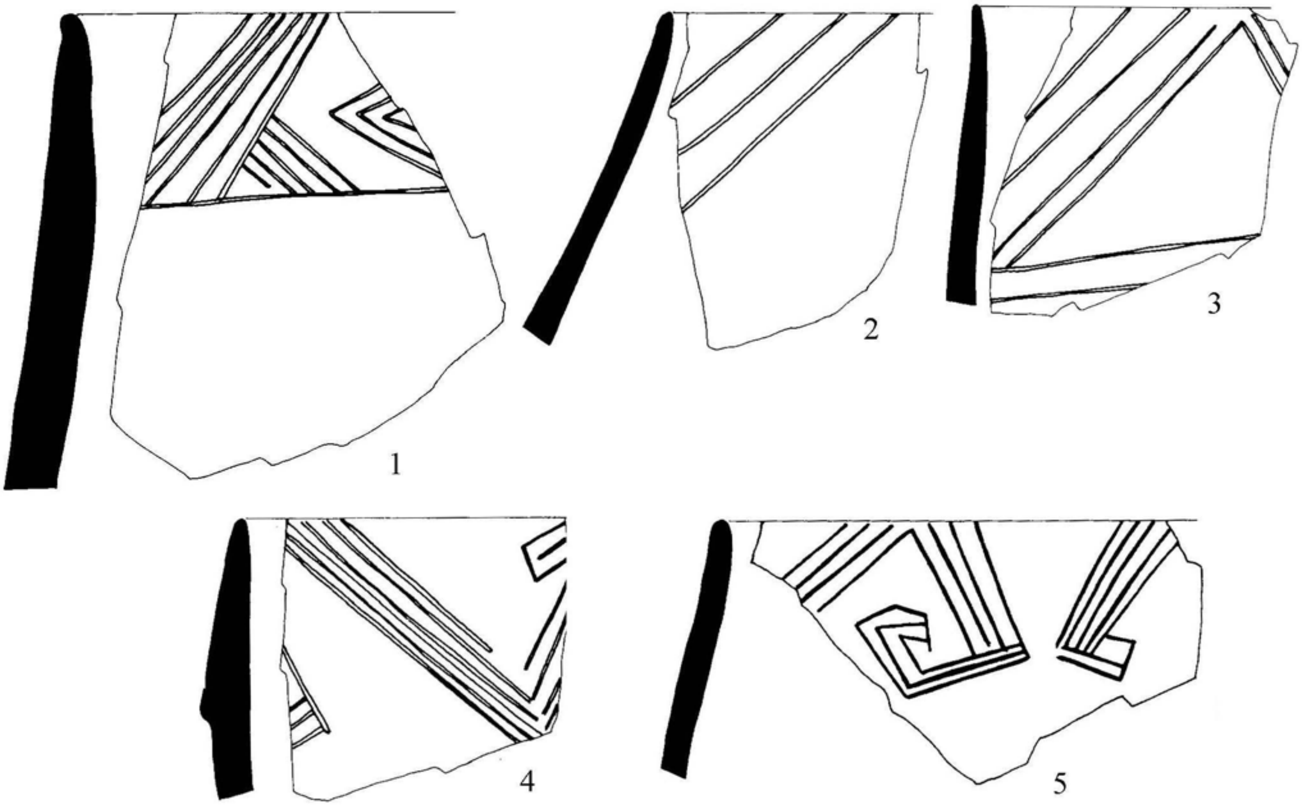


LN Ib Sarakenos Type 1: Incision on a High Relief Band 1:3

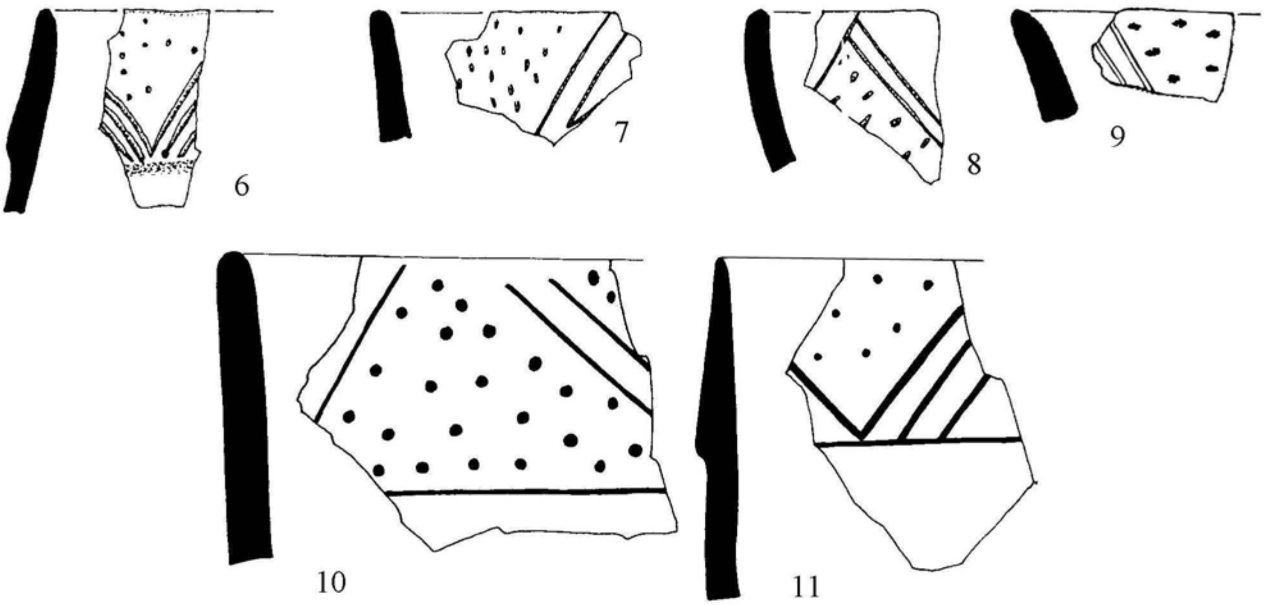


LN Ib Skoteini Type 3 (Sarakenos Type 2): Black Burnished Incision 1:3

Figure 78

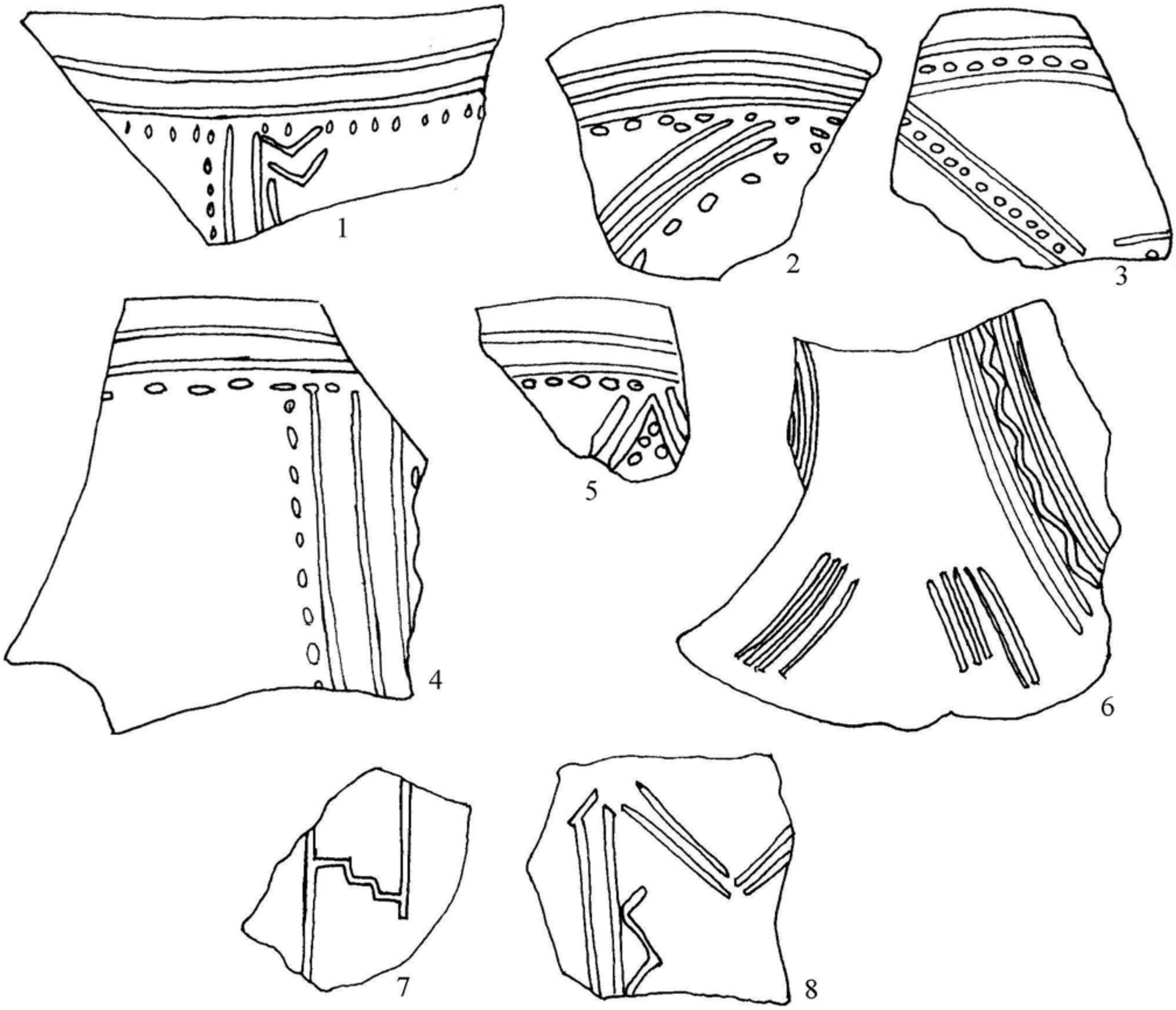


LN Ib Skoteini Type 4: Incision on the Vessel Body 1:3



LN Ib Skoteini Type 4 Subtype 1:3

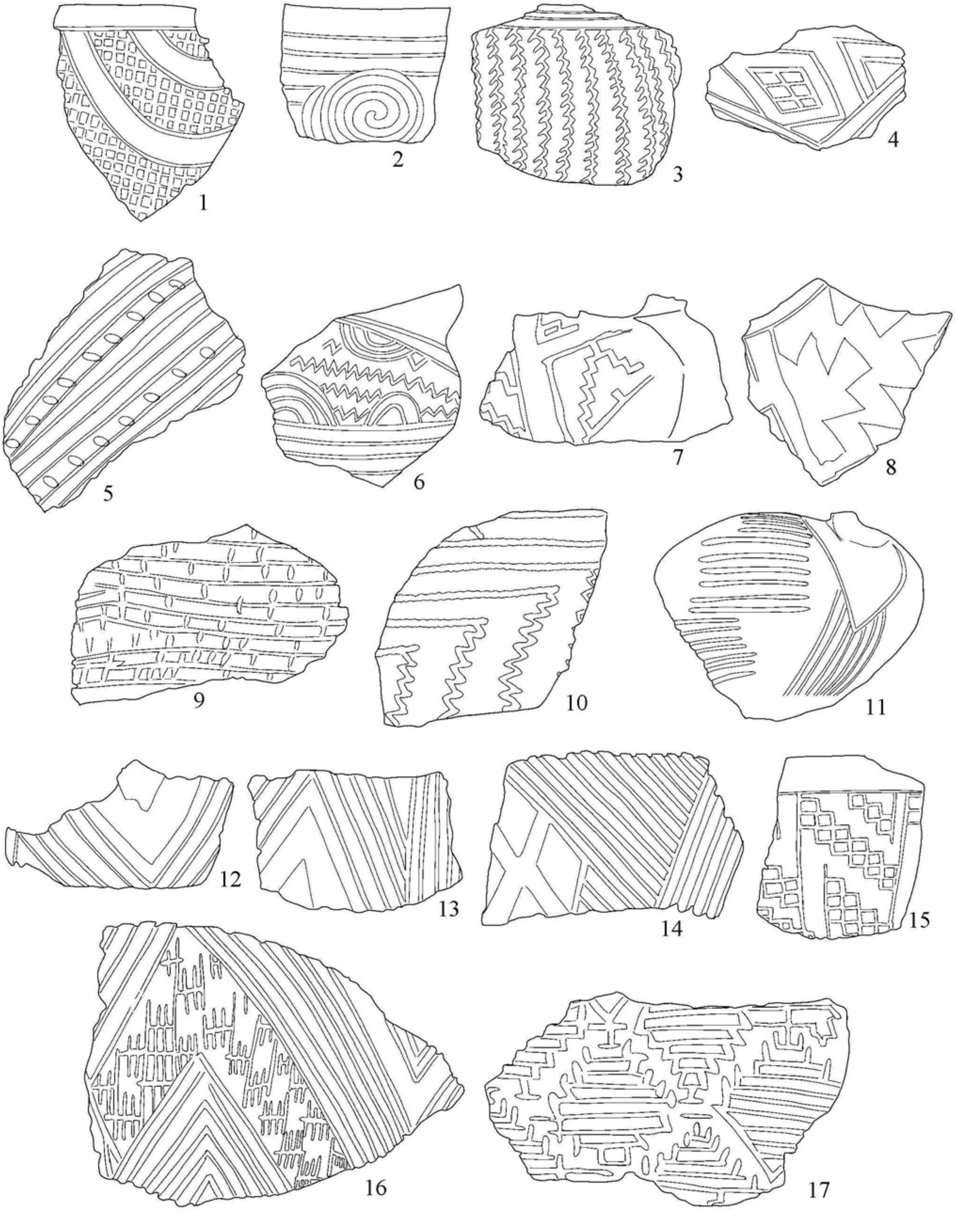
Figure 79



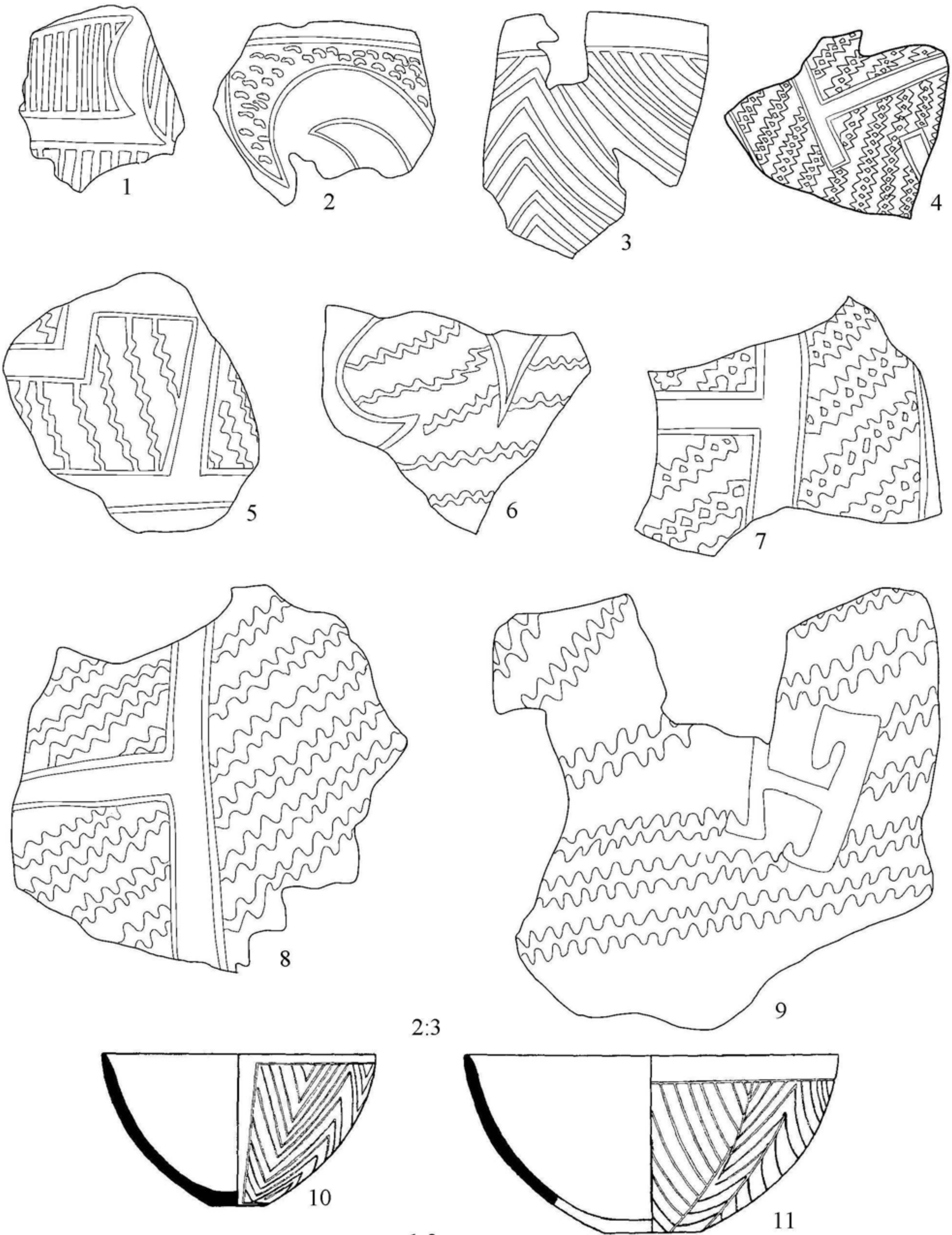
LN Ib Γ2 (Incised and White Filled) from Thessaly 2:3

Figure 80

Thessaly: LN Ib Classic Dimini Style of Incised Pottery 2:3
Figure 81



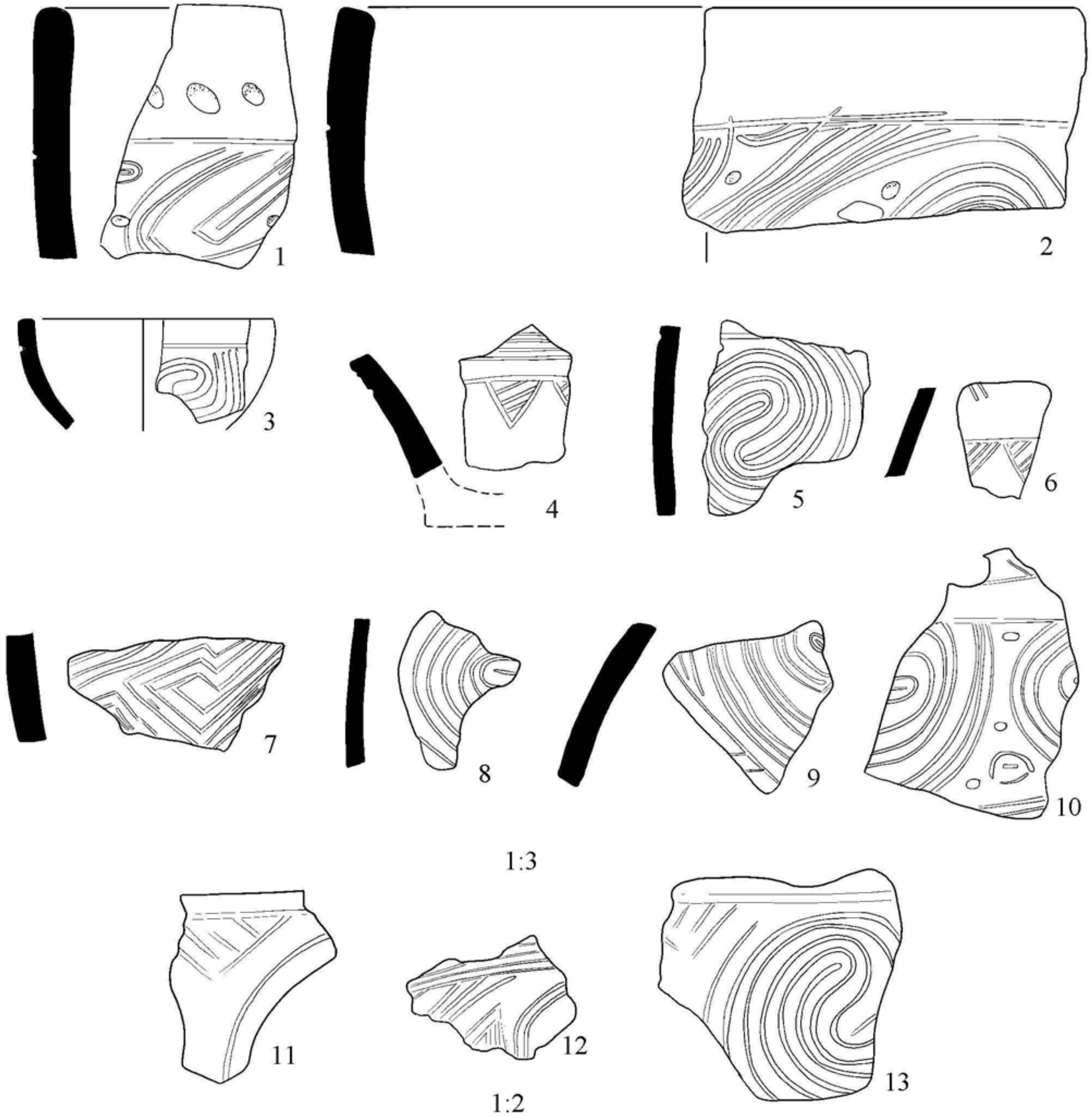
Dimini: LN Ib Classic Dimini Style of Incised Pottery 2:3
Figure 82



1:3

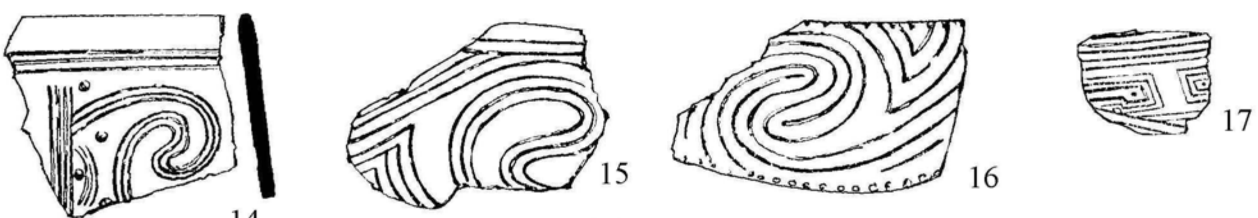
Phthiotic Thebes: Imitation LN Ib Classic Dimini Style of Incised Pottery

Figure 83



1:2

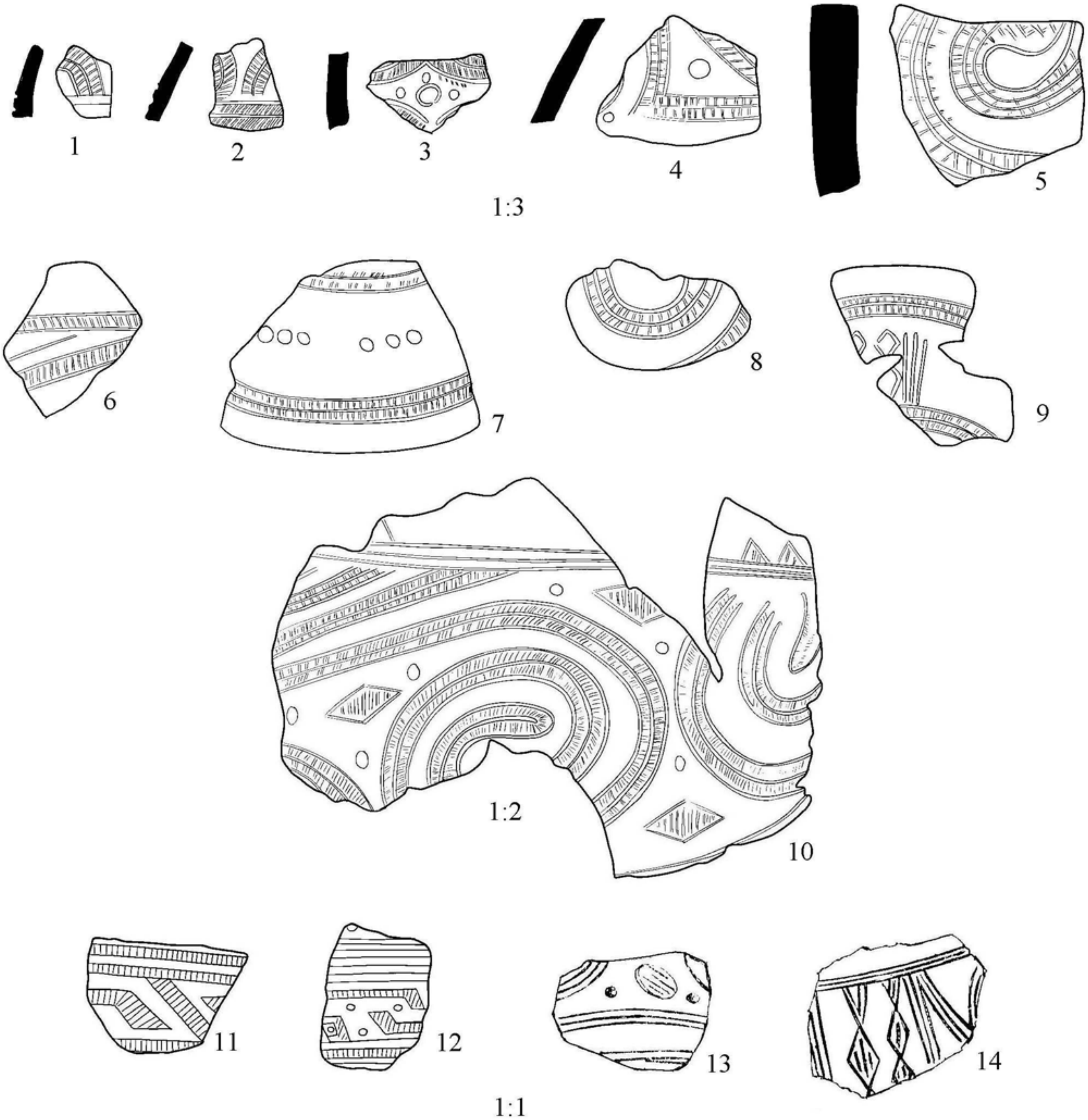
Promachon-Topolnica: LN Ib Gradešnica Style of Incised Pottery



1:1

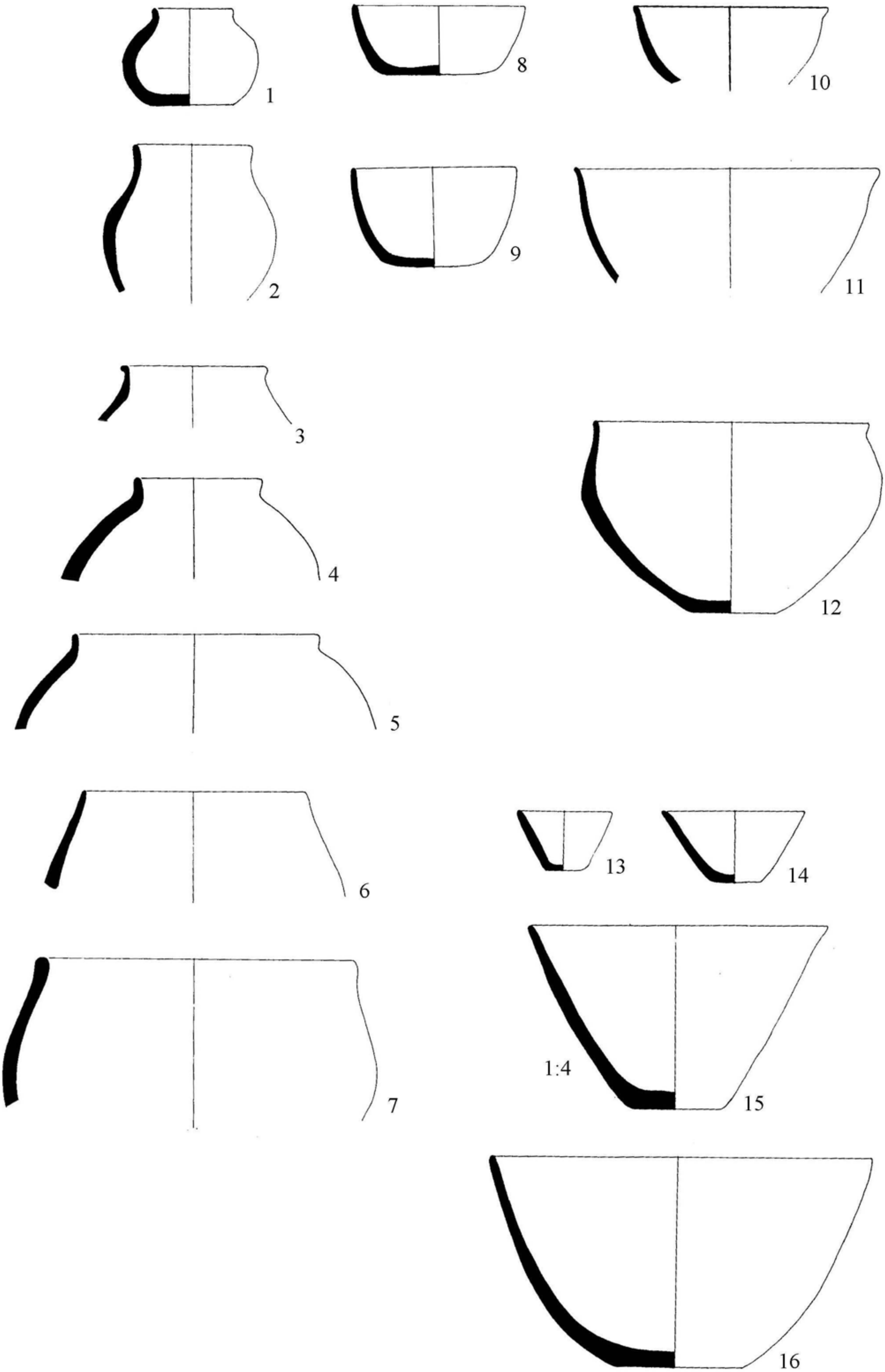
Macedonia: LN Ib Gradešnica Style of Incised Pottery

Figure 84



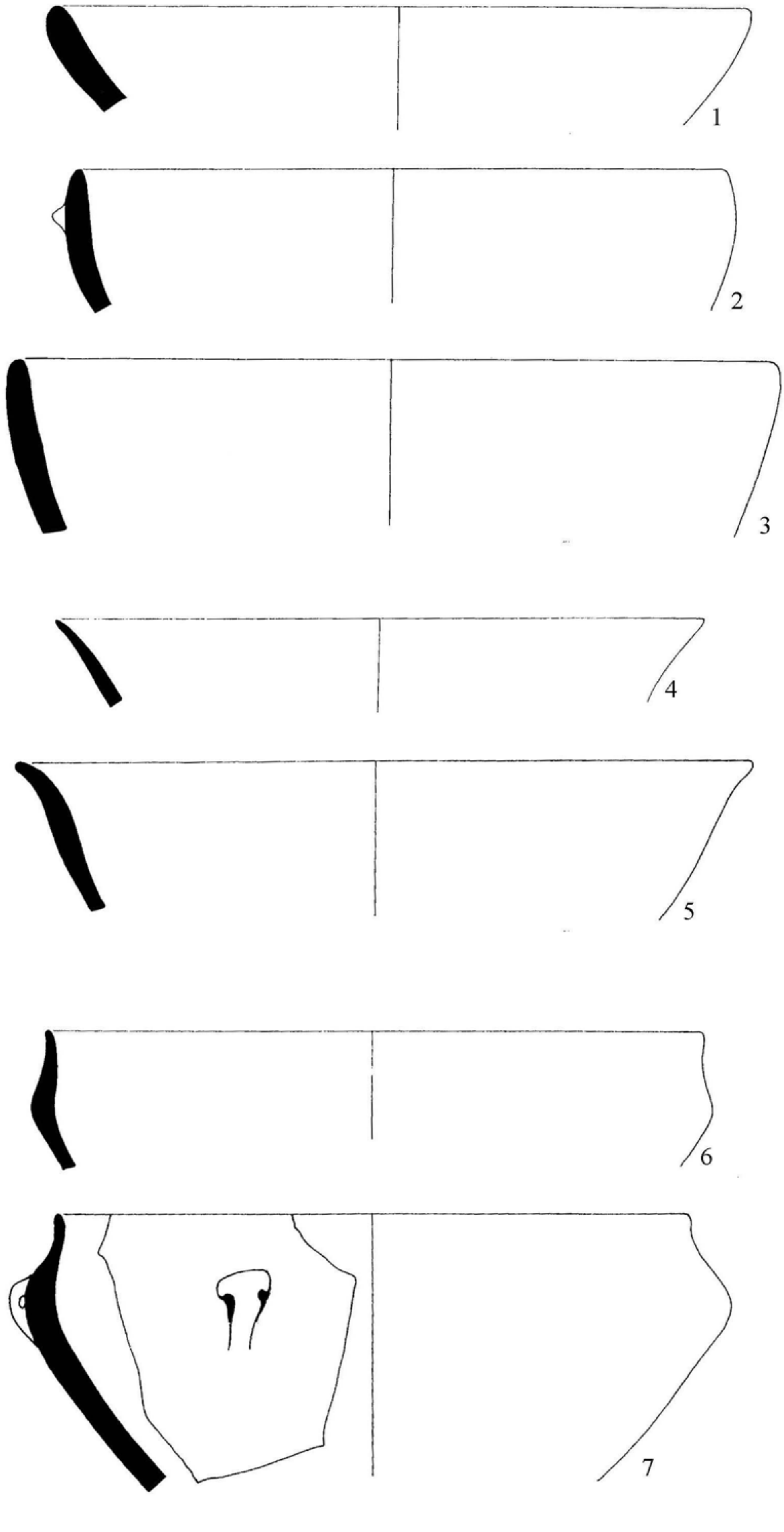
Macedonia: LN Ib Marcia I Style of Incised Pottery

Figure 85

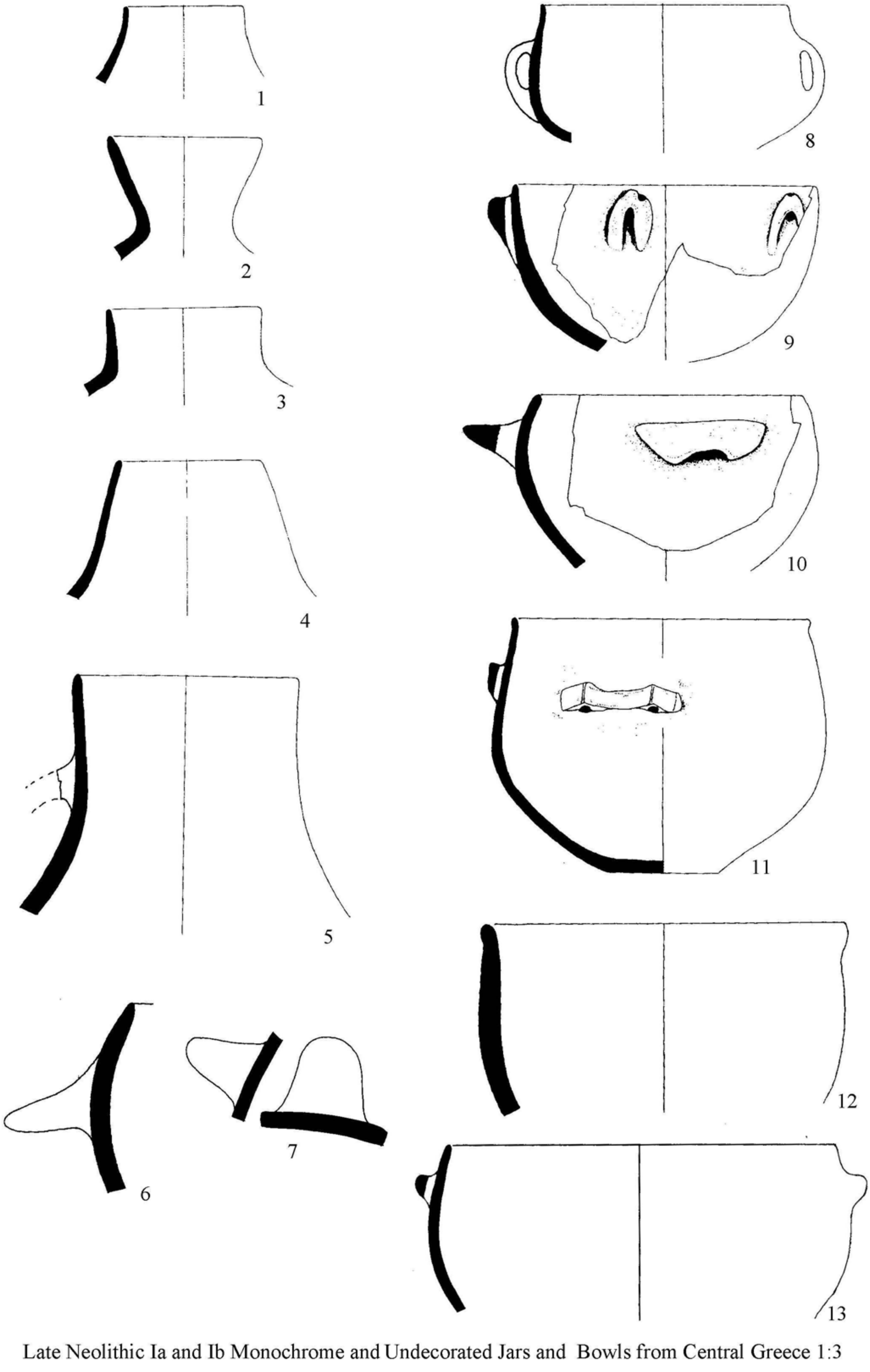


Late Neolithic Ia and Ib Monochrome and Undecorated Bowls from Central Greece 1:3

Figure 86

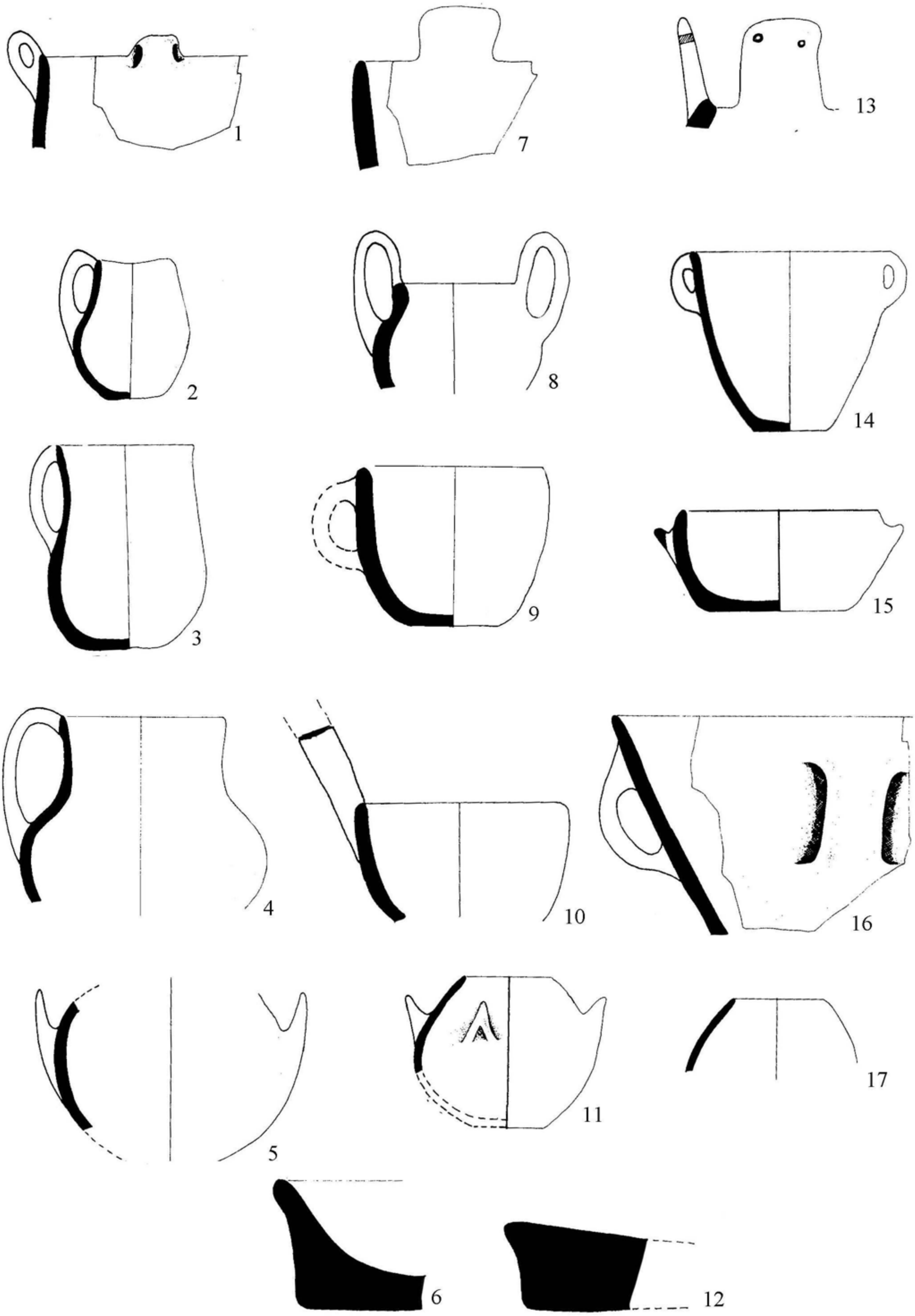


Late Neolithic Ia and Ib Monochrome and Undecorated Bowls from Central Greece 1:3
Figure 87



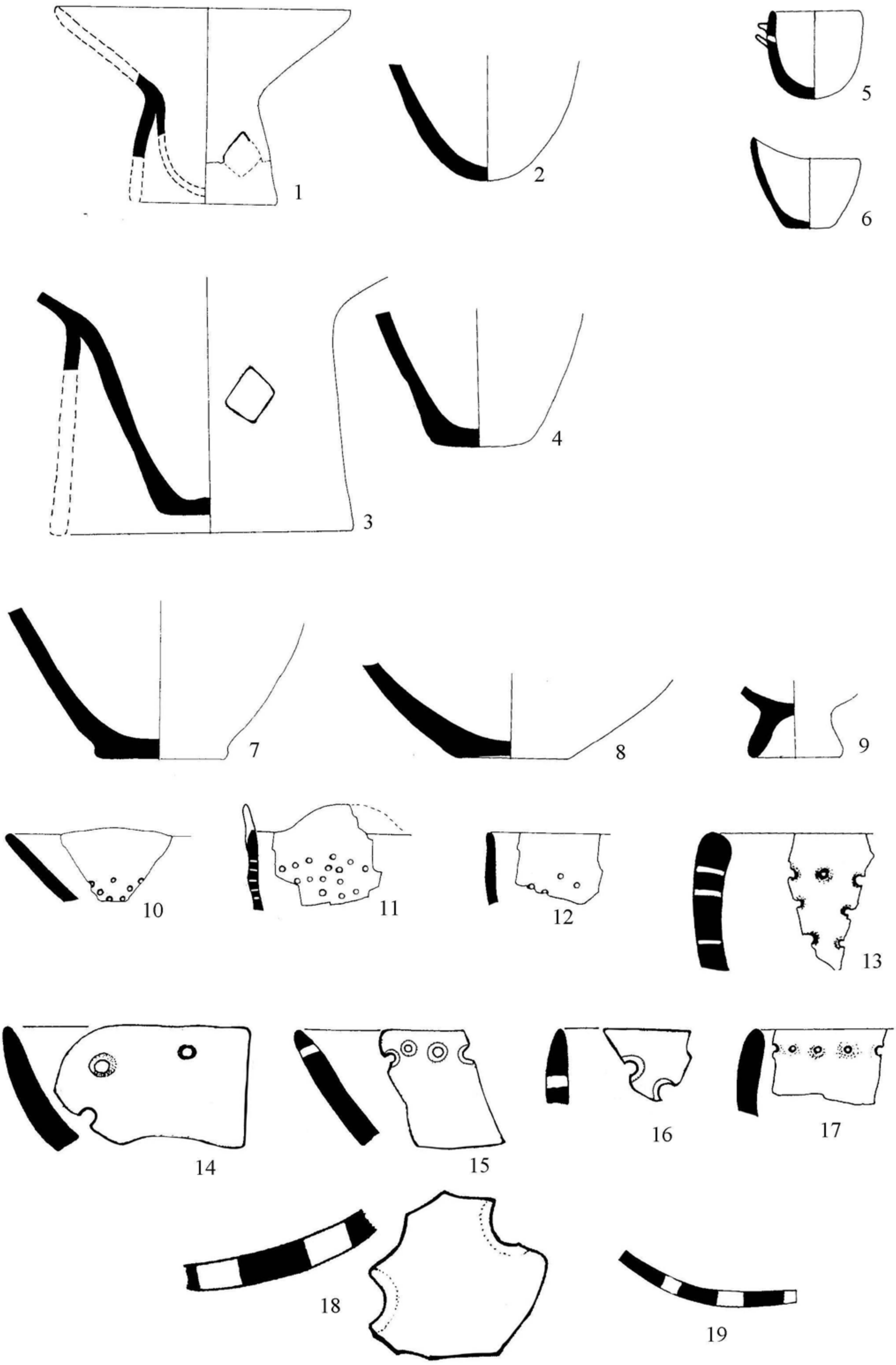
Late Neolithic Ia and Ib Monochrome and Undecorated Jars and Bowls from Central Greece 1:3

Figure 88



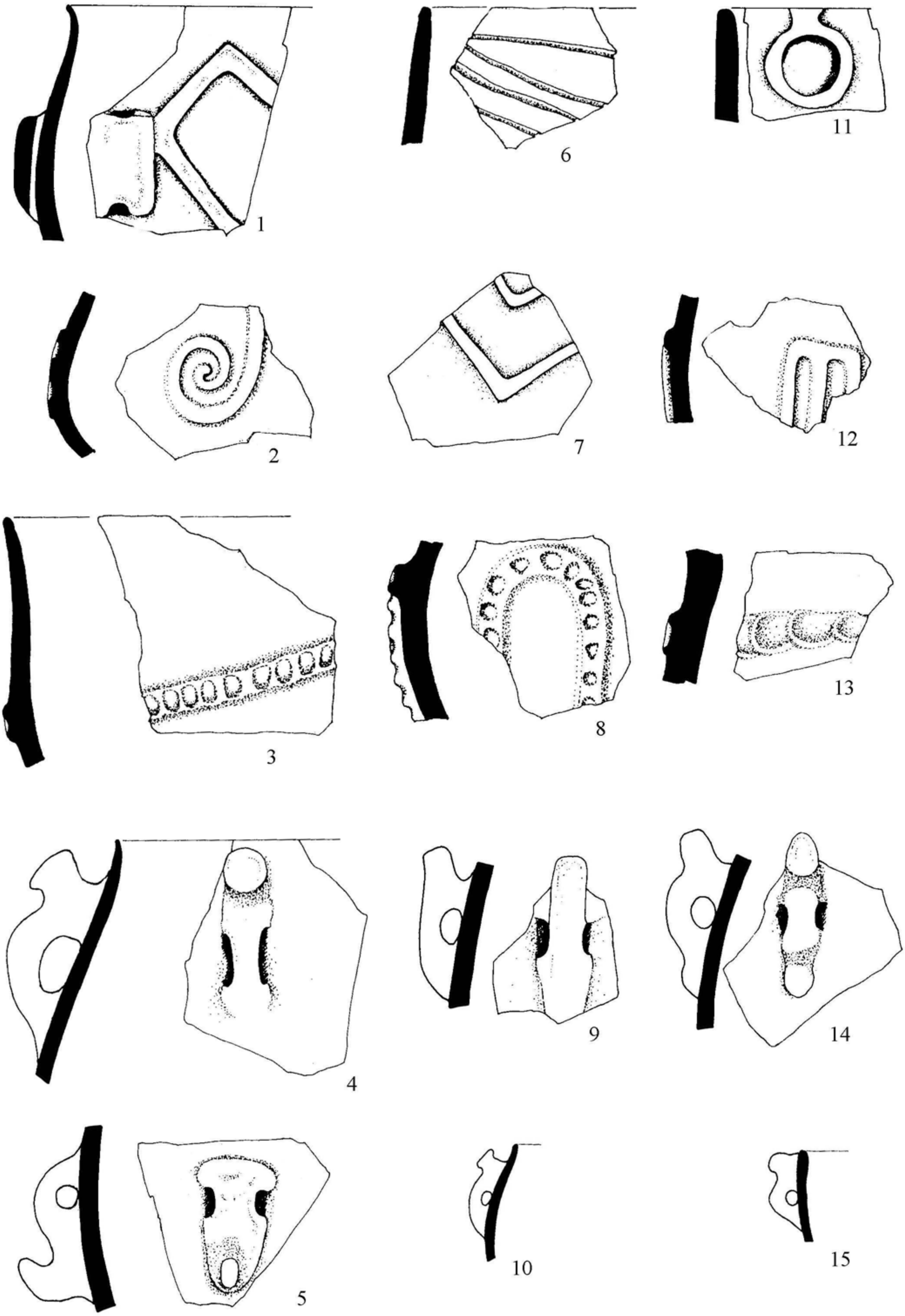
Late Neolithic Ia and Ib Monochrome and Undecorated
Handled Vessels and Baking Pans from Central Greece 1:3

Figure 89



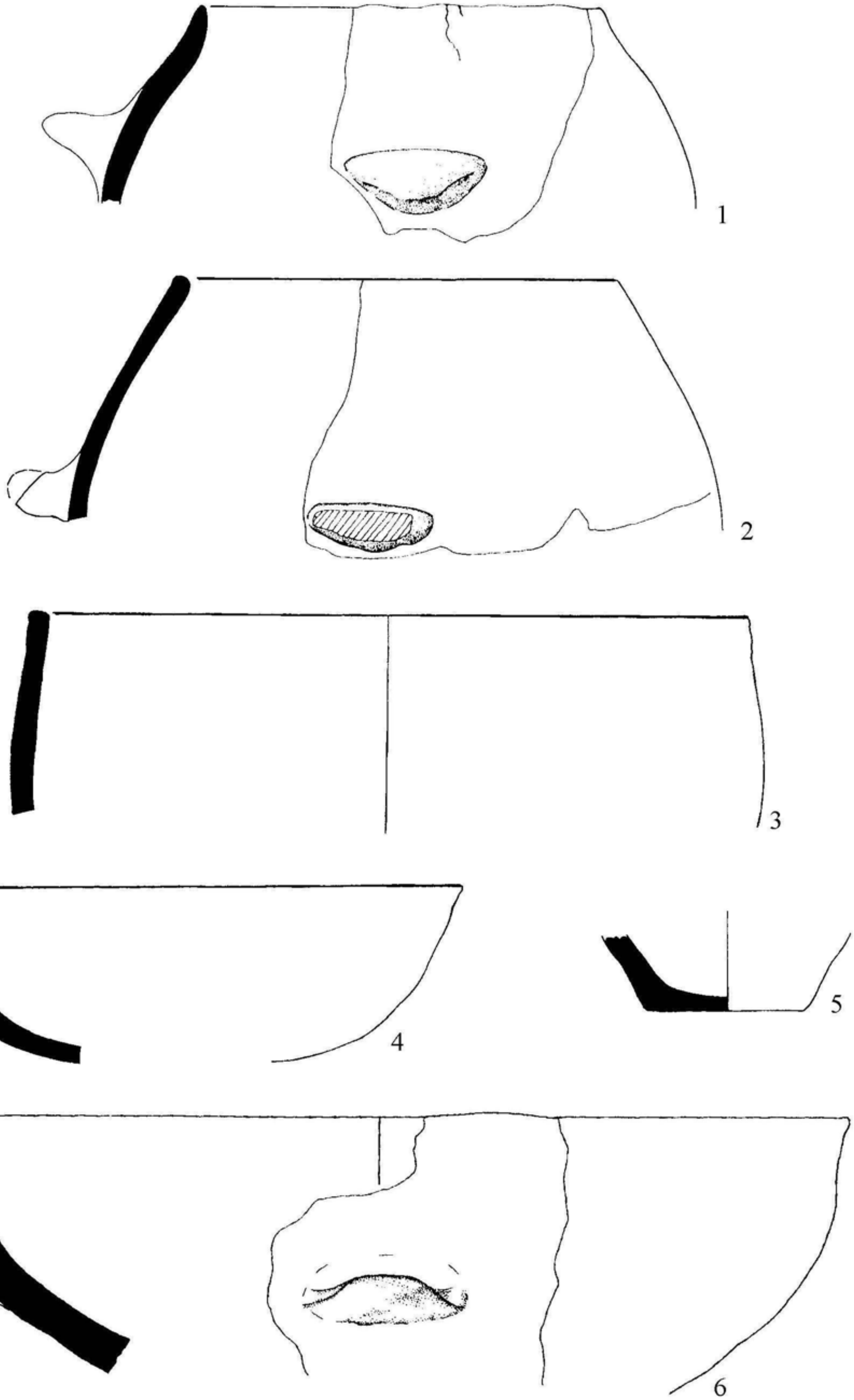
Late Neolithic Ia and Ib Monochrome and Undecorated
Pedastal Bowls (Réchauds) and Perforated Sherds Central Greece 1:3

Figure 90



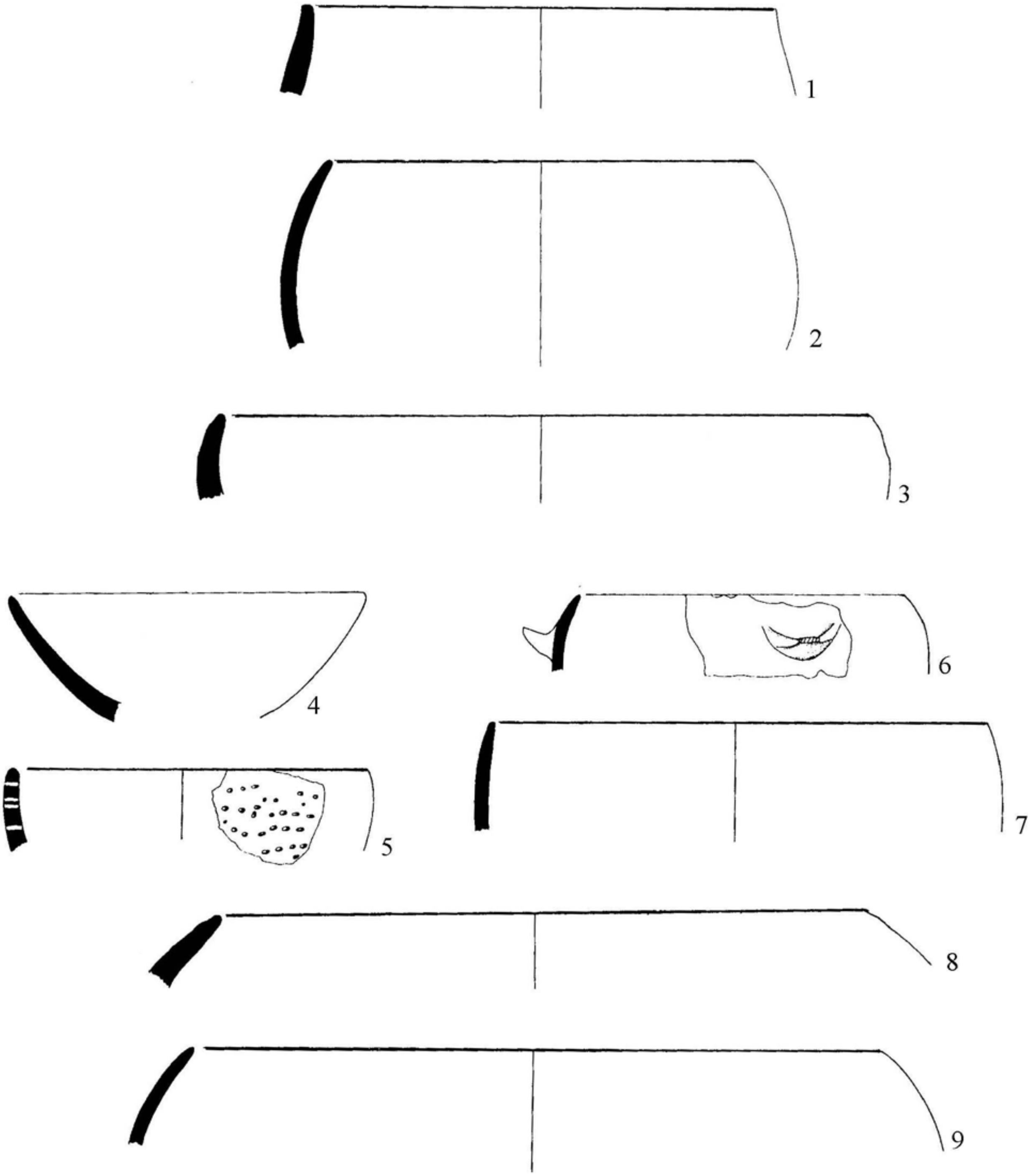
Central Greece: Late Neolithic Ib Monochrome with Plastic Decoration and Handles 1:3

Figure 91



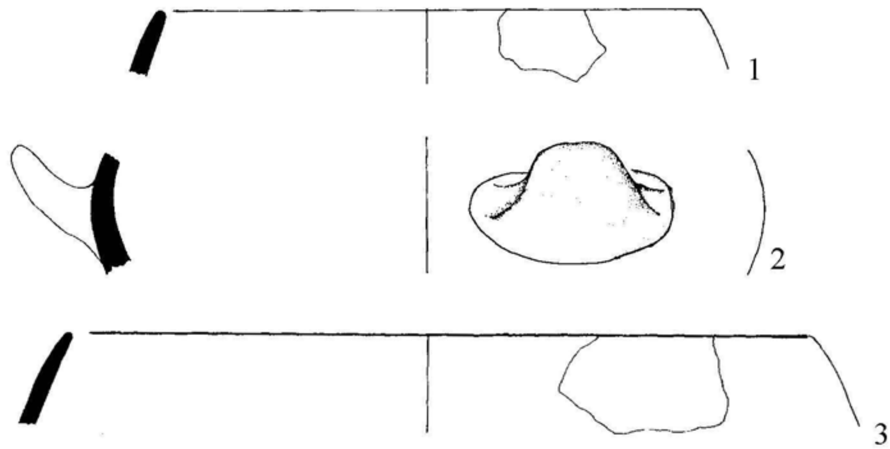
Franchthi Cave: Late Neolithic Ia Undecorated Bowls and Jars 1:3

Figure 92

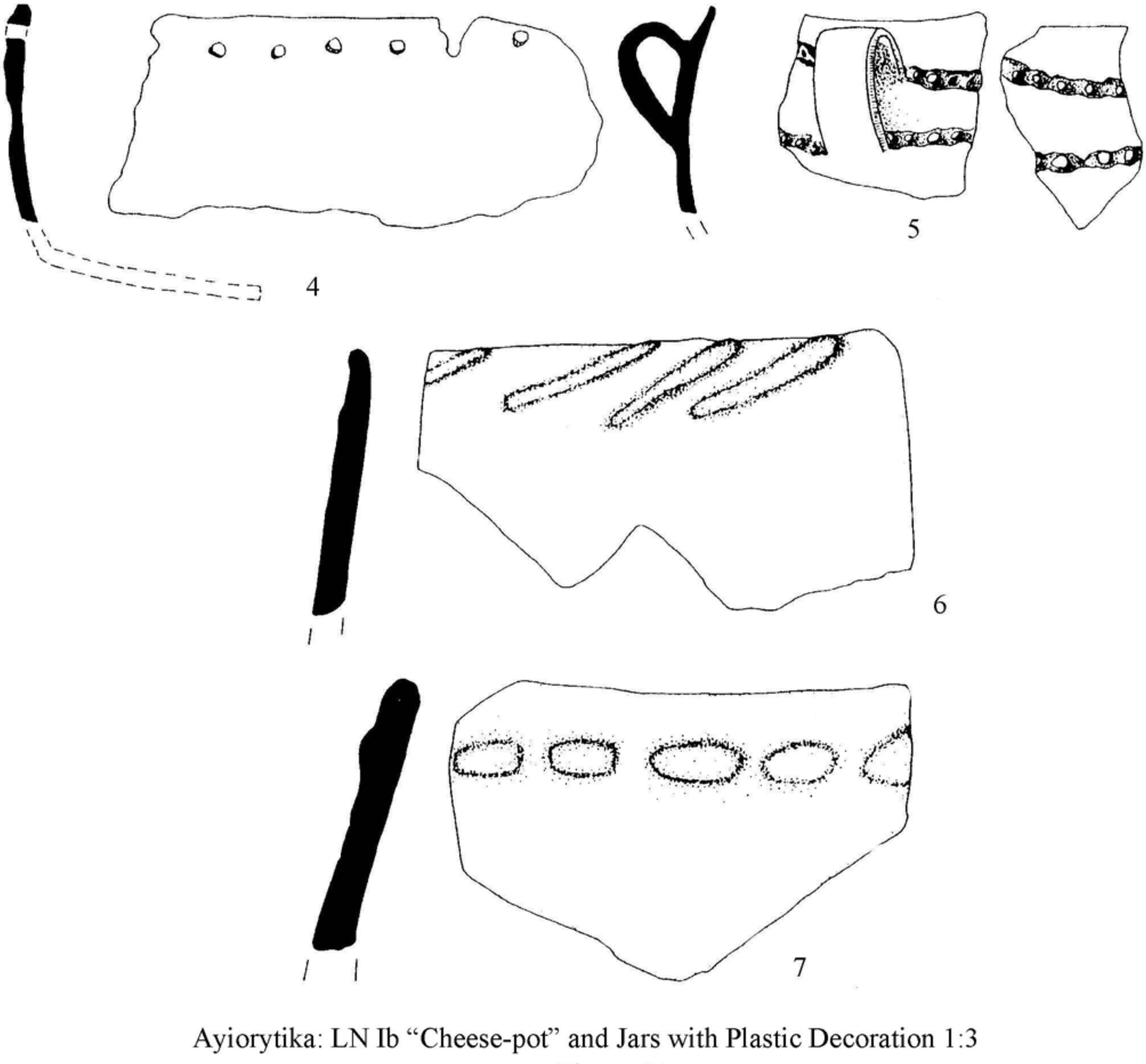


Franchthi Cave Late Neolithic Ib Monochrome and Undecorated Bowls and Jars 1:3

Figure 93

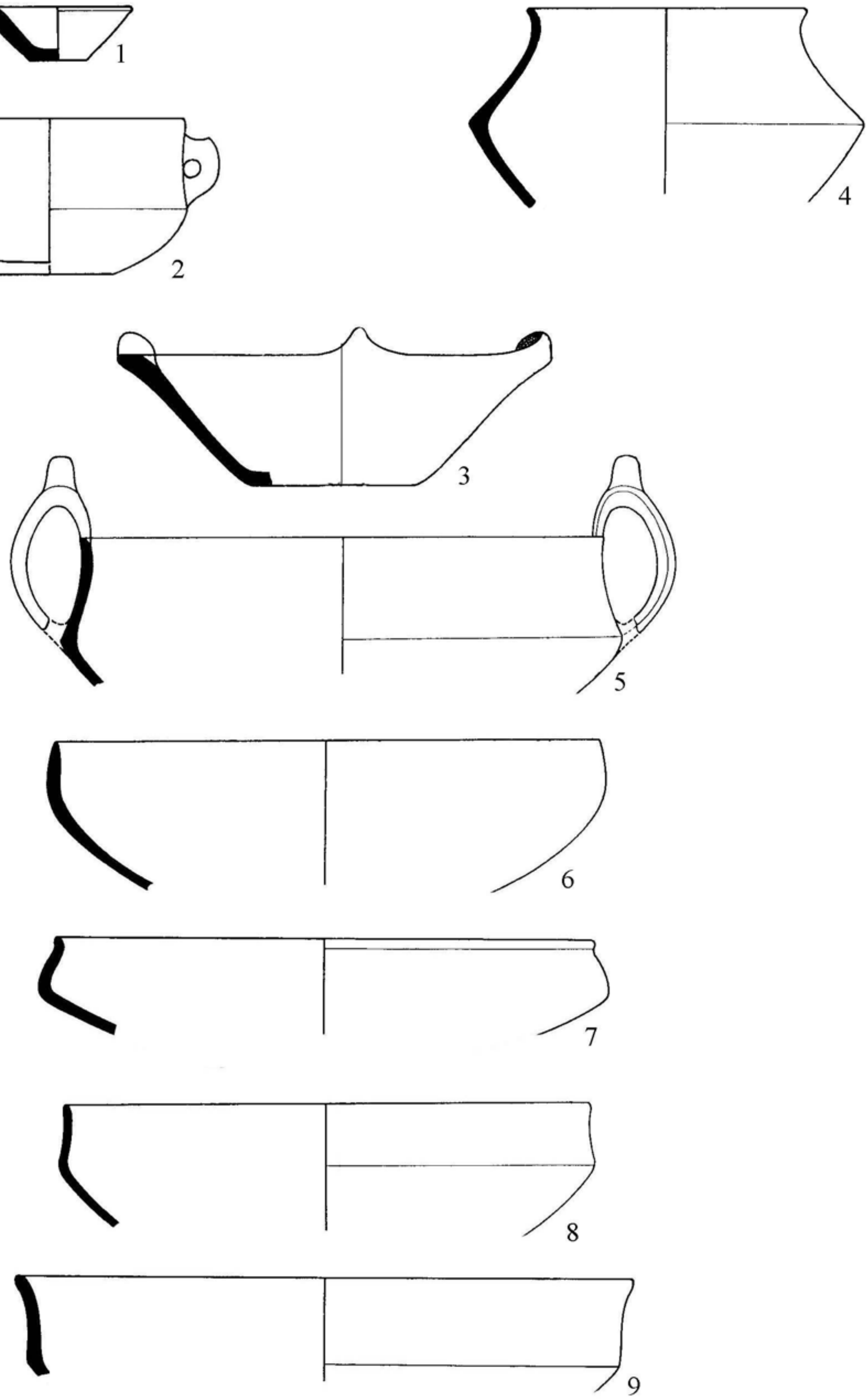


Franchthi Cave: Late Neolithic Ib Coarse Ware Bowls and Jars 1:3



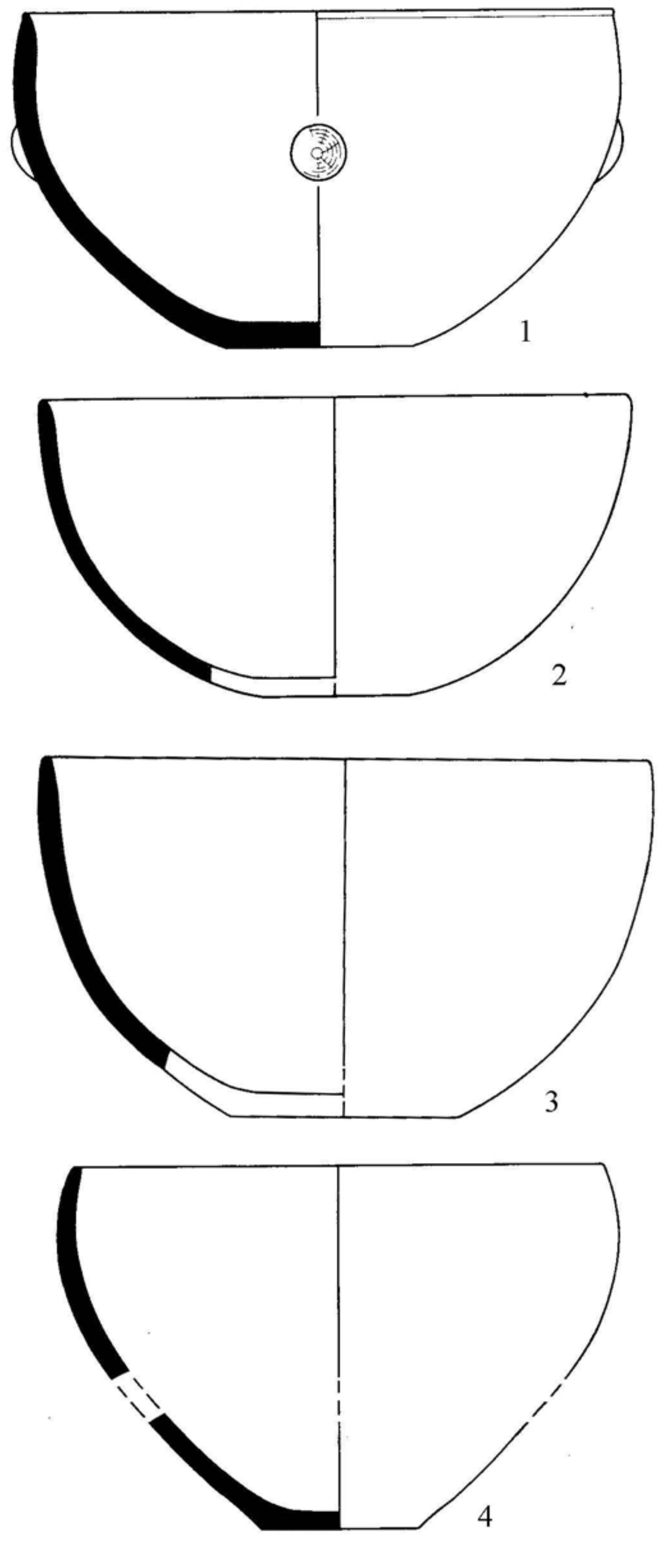
Ayiorytika: LN Ib "Cheese-pot" and Jars with Plastic Decoration 1:3

Figure 94



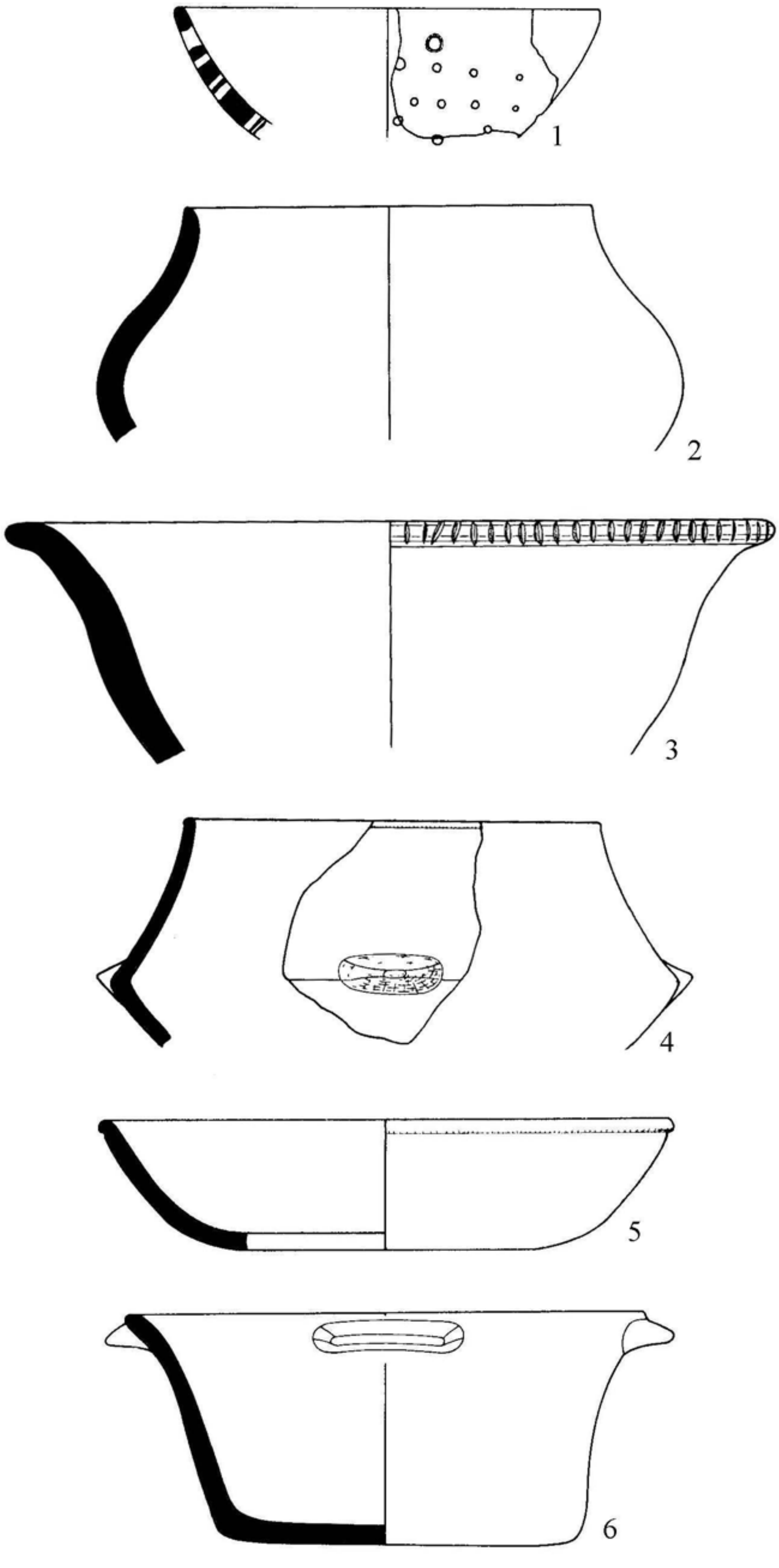
Late Neolithic Ia and Ib Monochrome Bowls and Jars from Thessaly 1:3

Figure 95



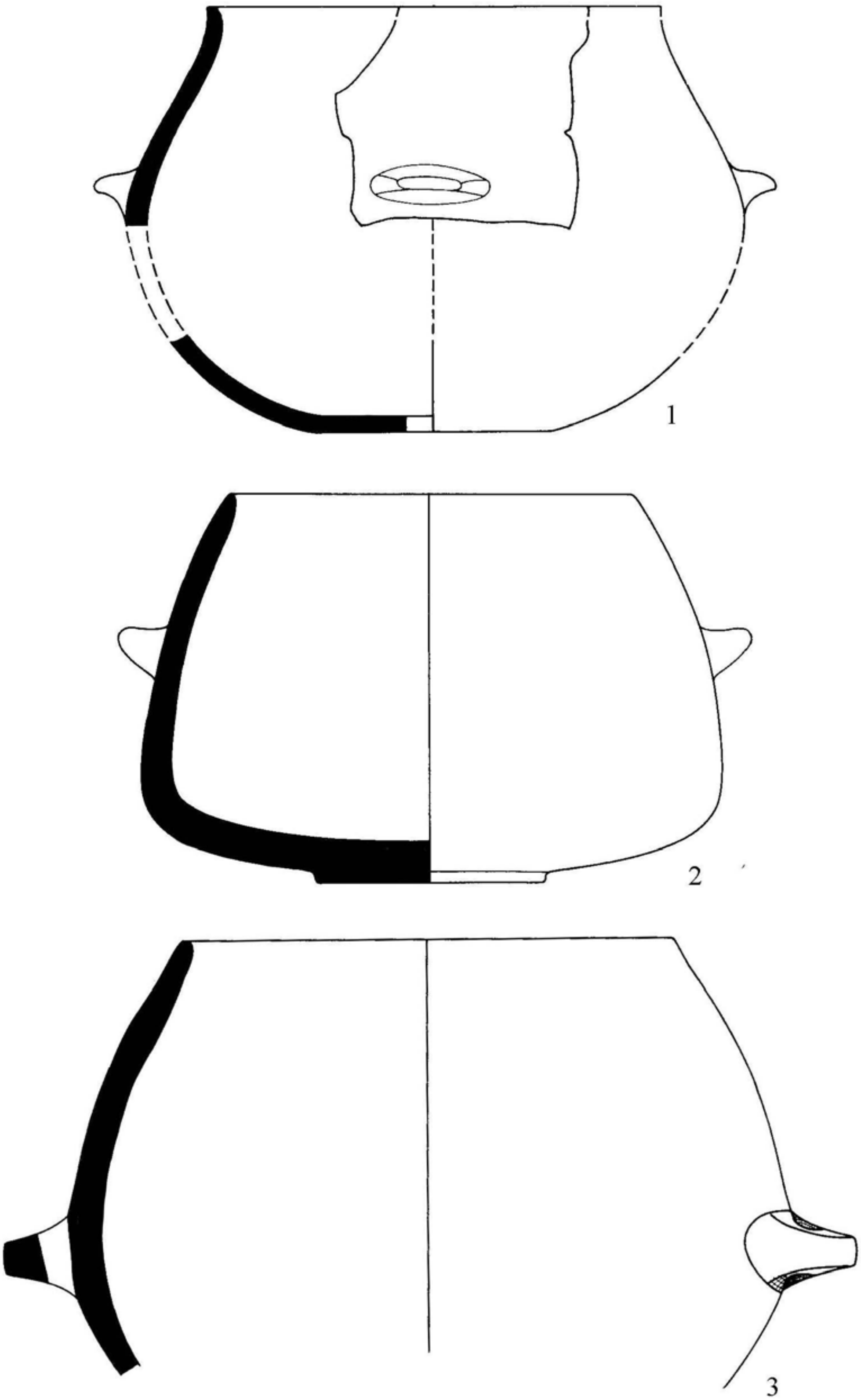
Thesssaly: Late Neolithic Ia and Ib Monocrhome Deep Bowls 1:3

Figure 96



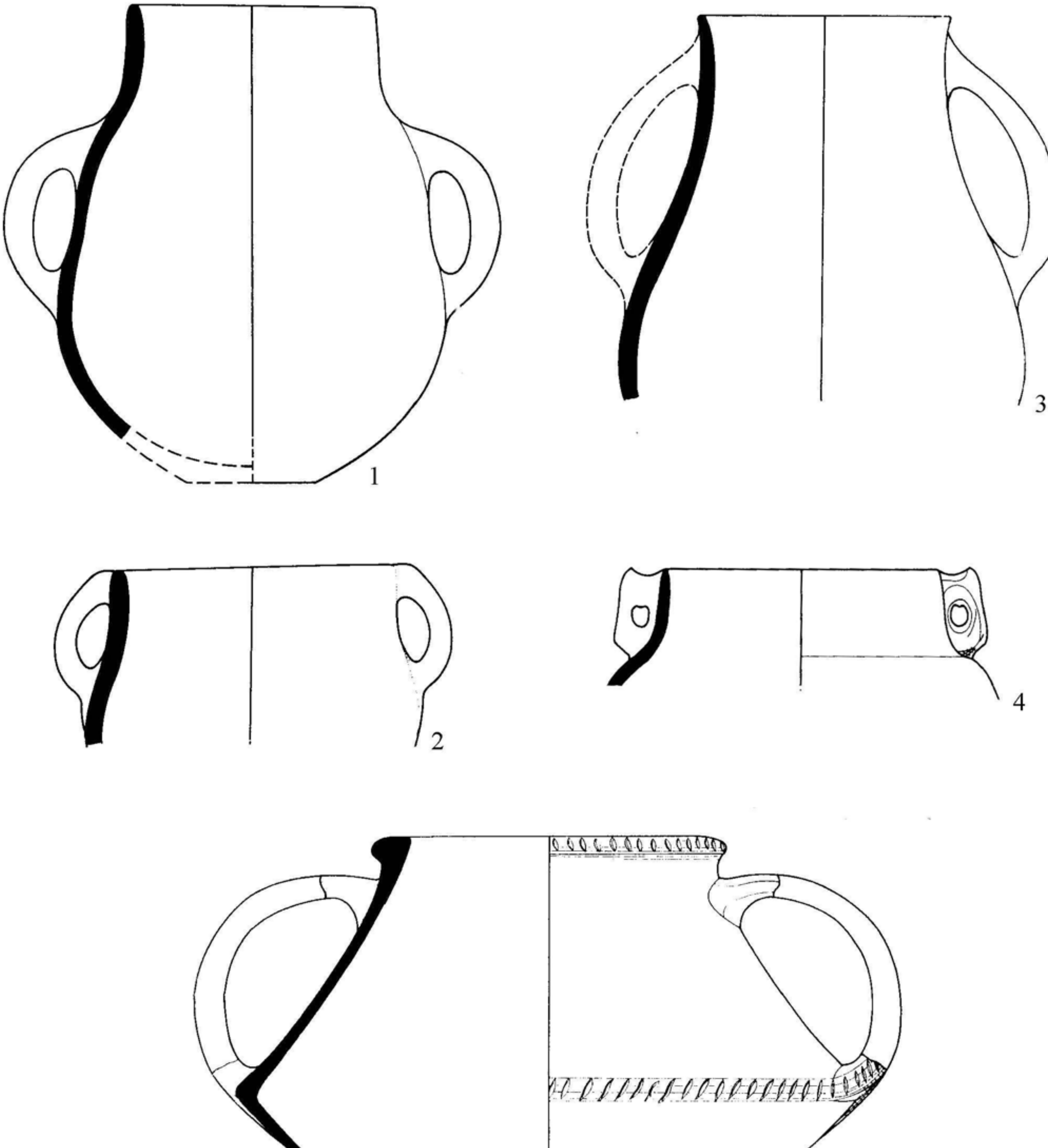
Thessaly: Late Neolithic Ia and Ib Undecorated Pottery, Various Shapes 1:3

Figure 97



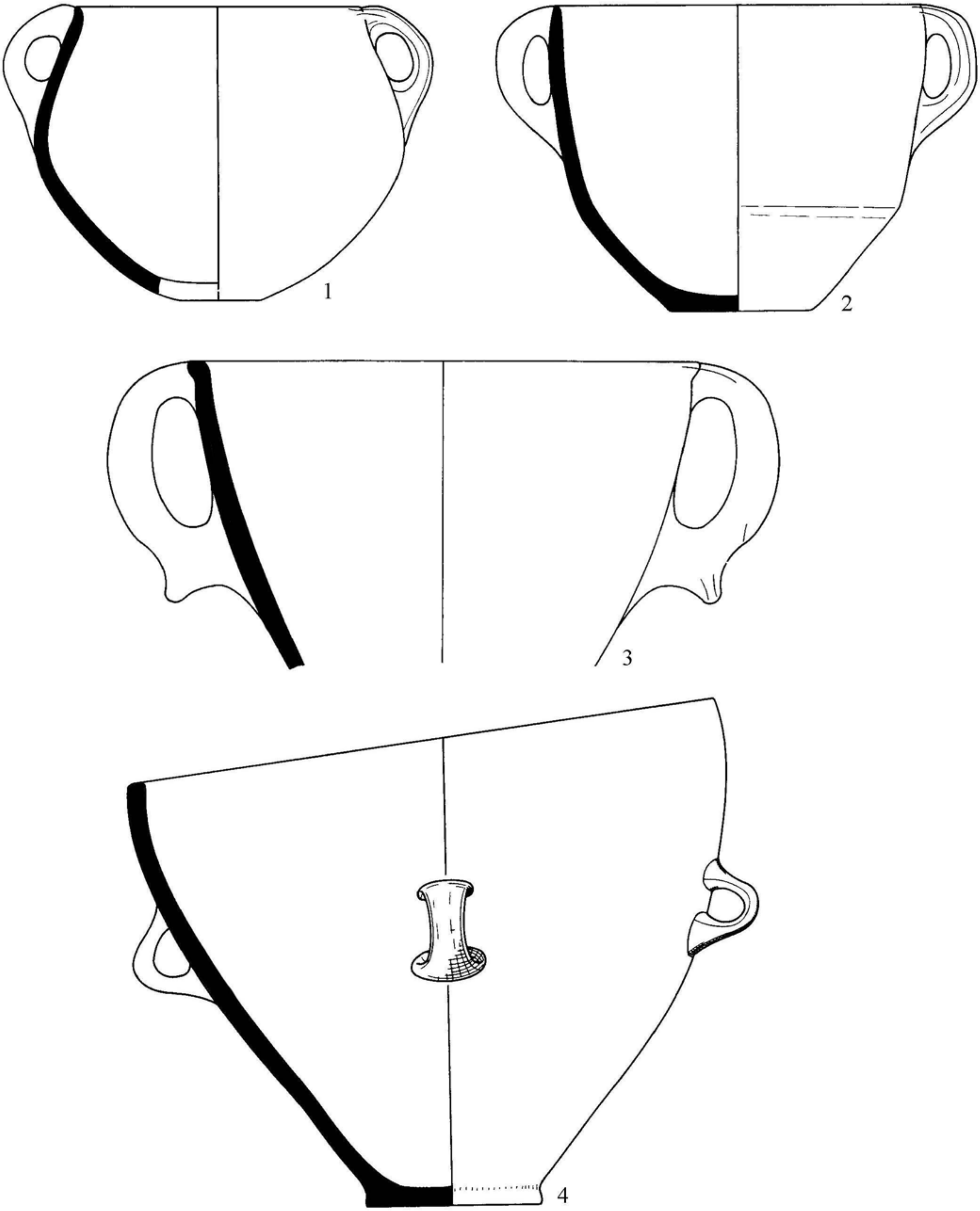
Late Neolithic Ia and Ib Undecorated Jars from Thessaly 1:3

Figure 98



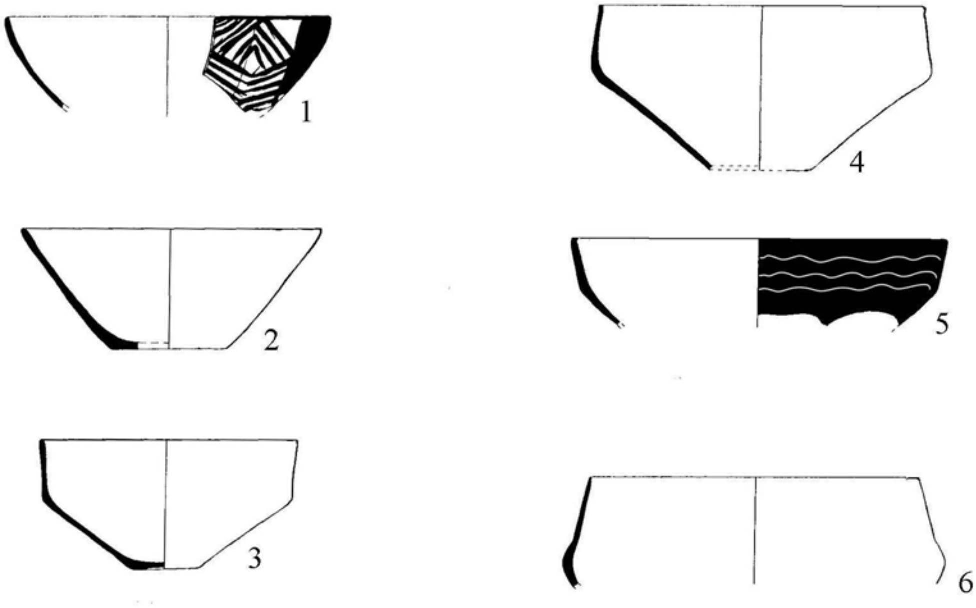
Thessaly: LN Ib Monochrome, Undecorated, and Sparsely Decorated Handled Jars 1:3

Figure 99

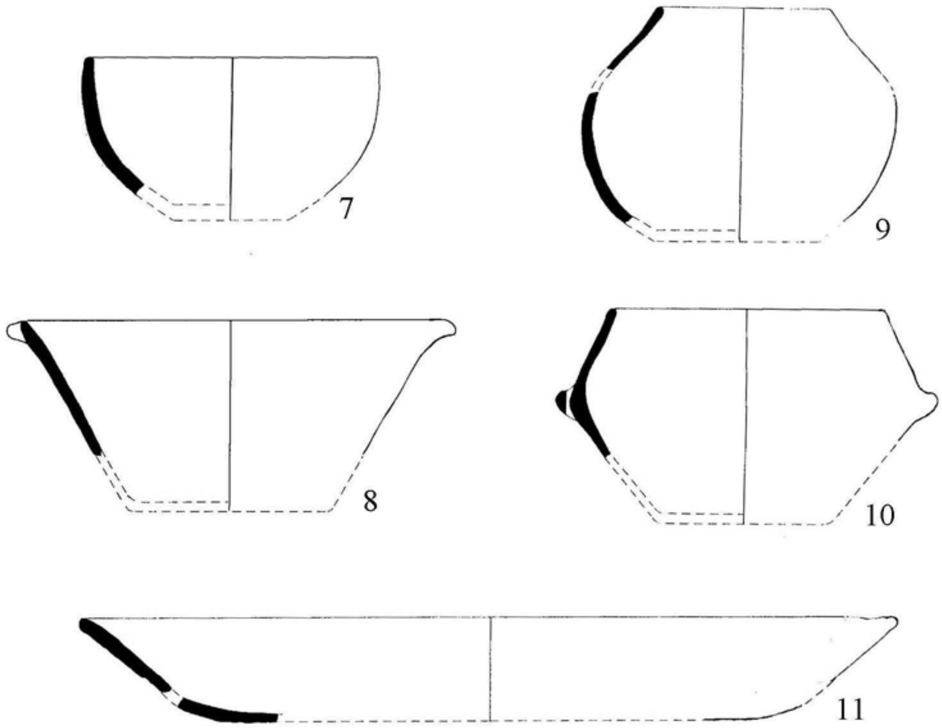


Thessaly: Late Neolithic Ib Undecorated Jars 1:3

Figure 100

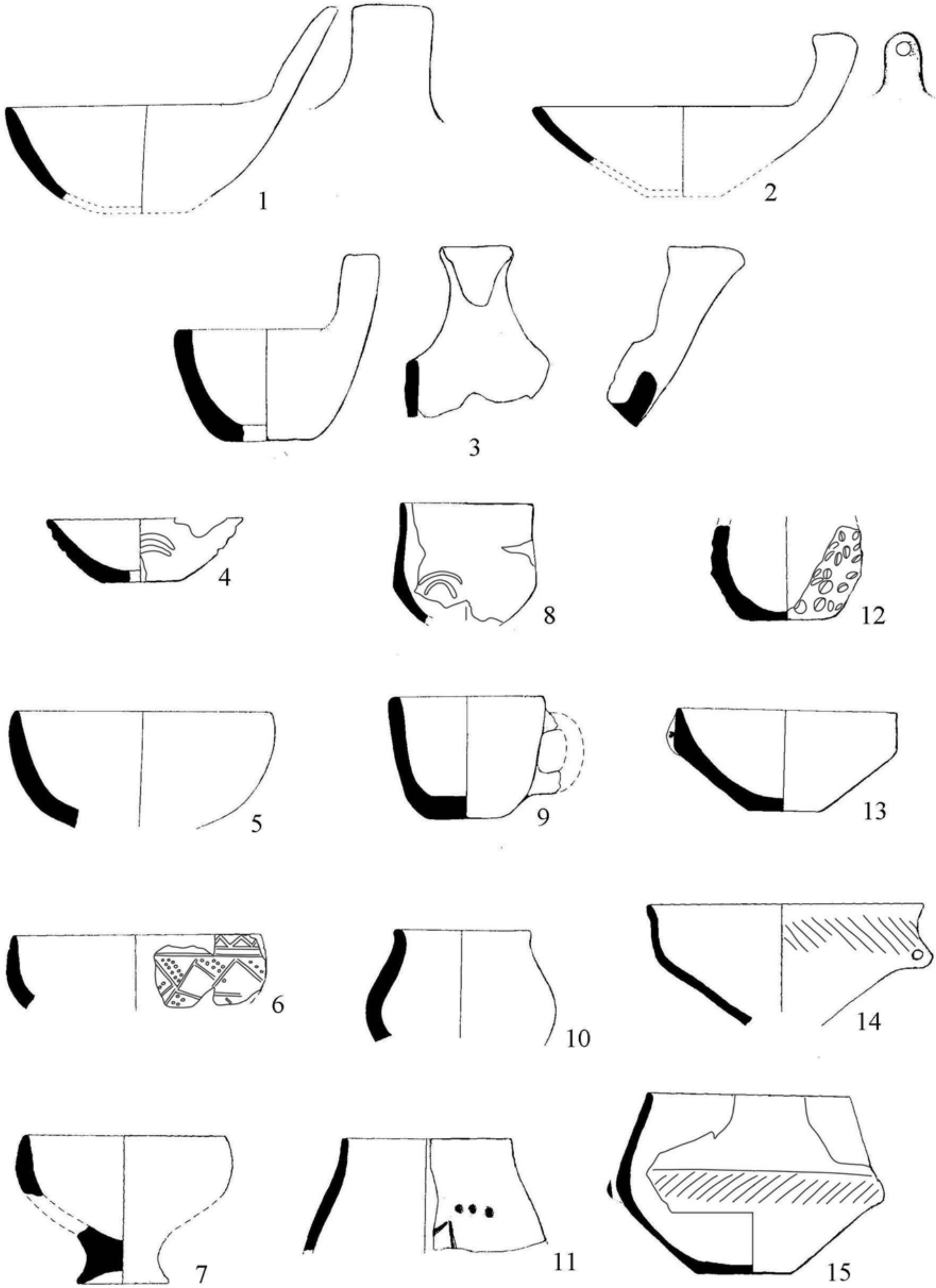


Makryialos : Late Neolithic Ia Serving Bowls approx.1:3

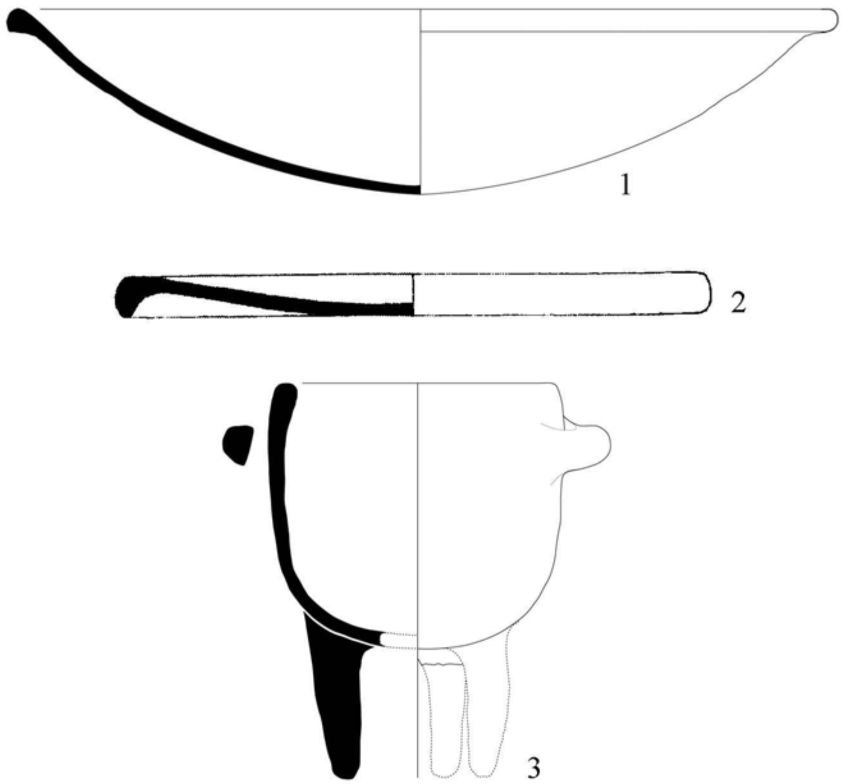


Makryialos: Late Neolithic Ia Cooking Vessels aprox.1:3

Figure 101

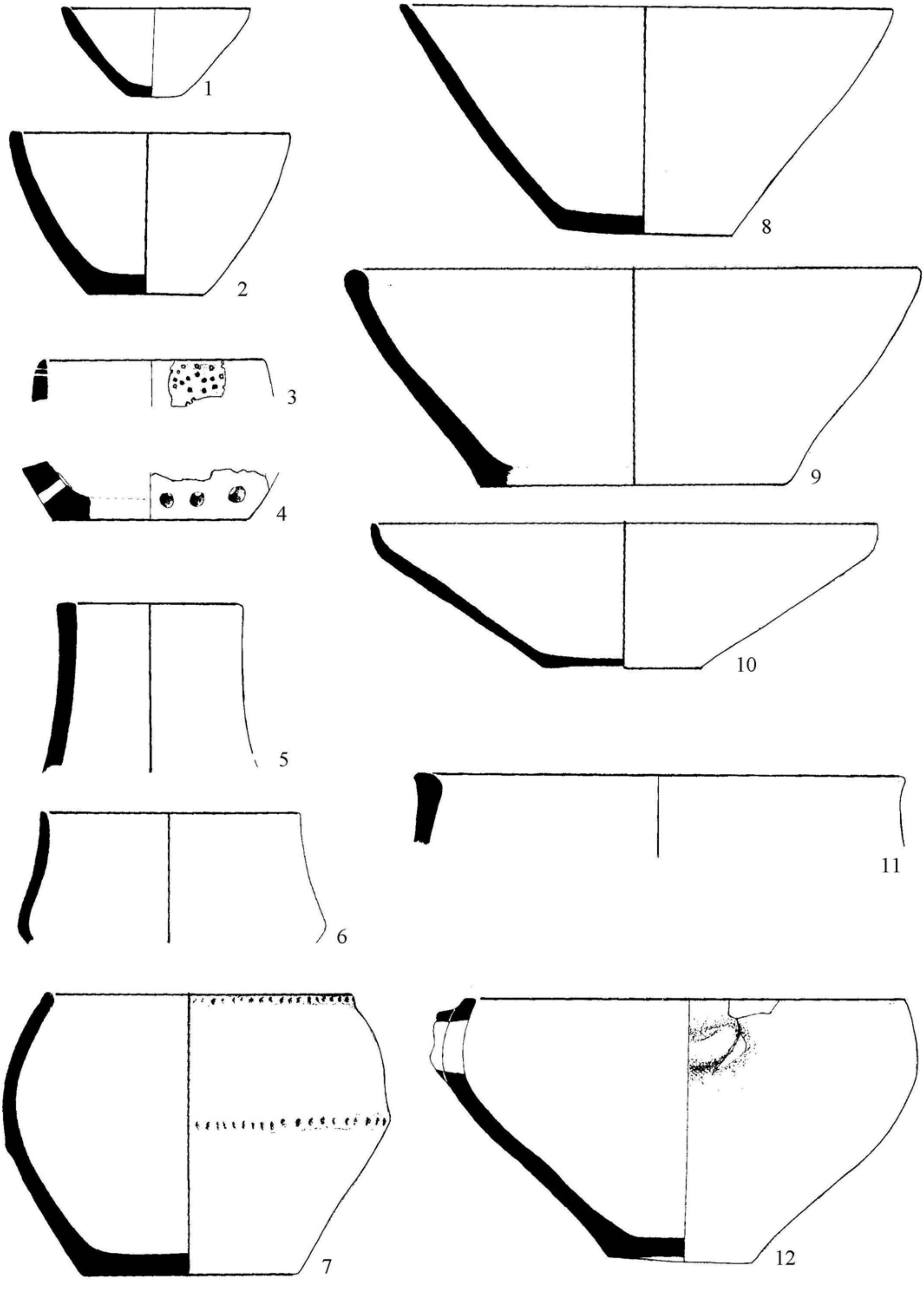


Makryialos : Late Neolithic Ia Cups approx. 1:3
Figure 102



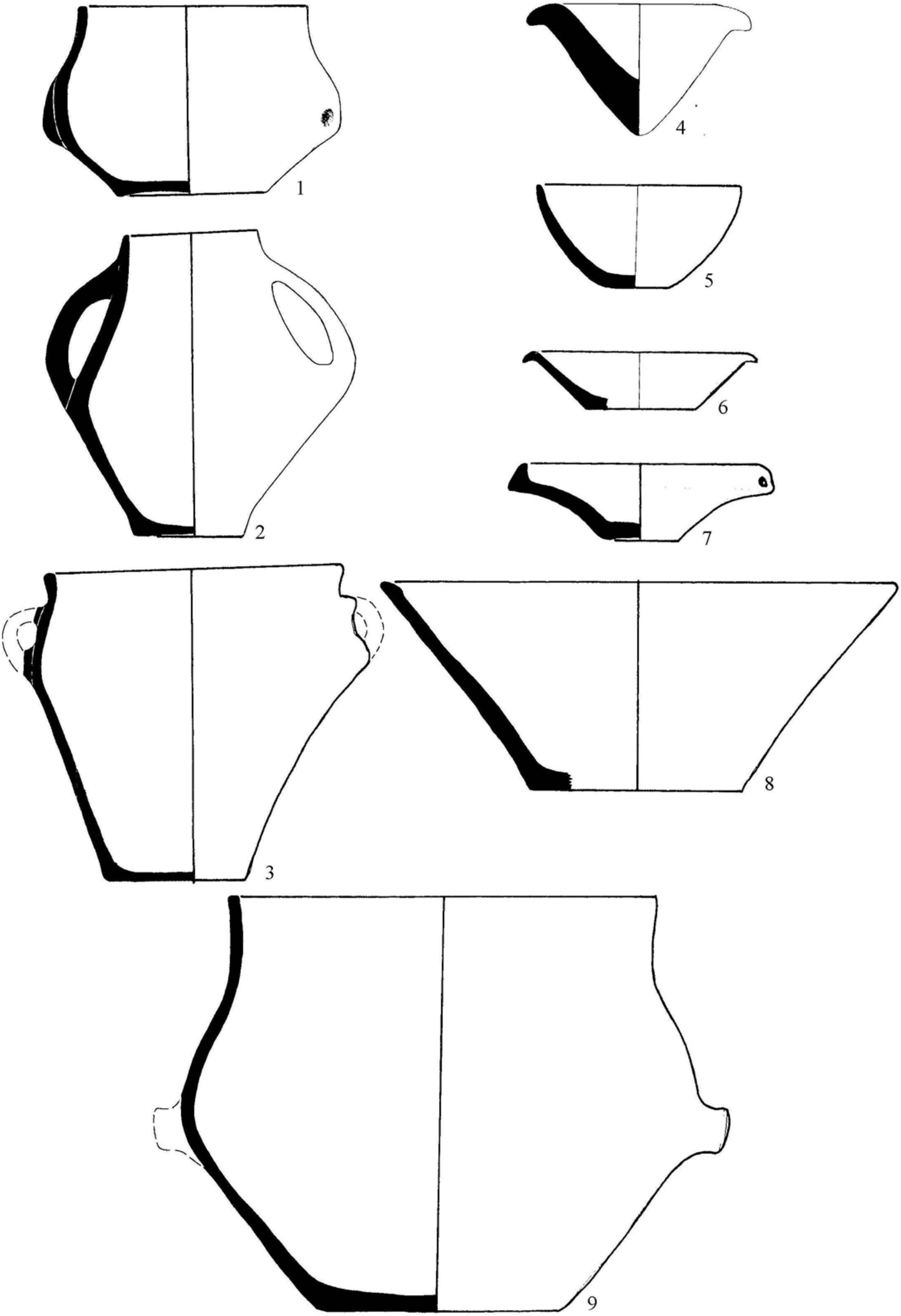
Dikili Tash: Late Neolithic Ia Cooking Vessels 1:3

Figure 103



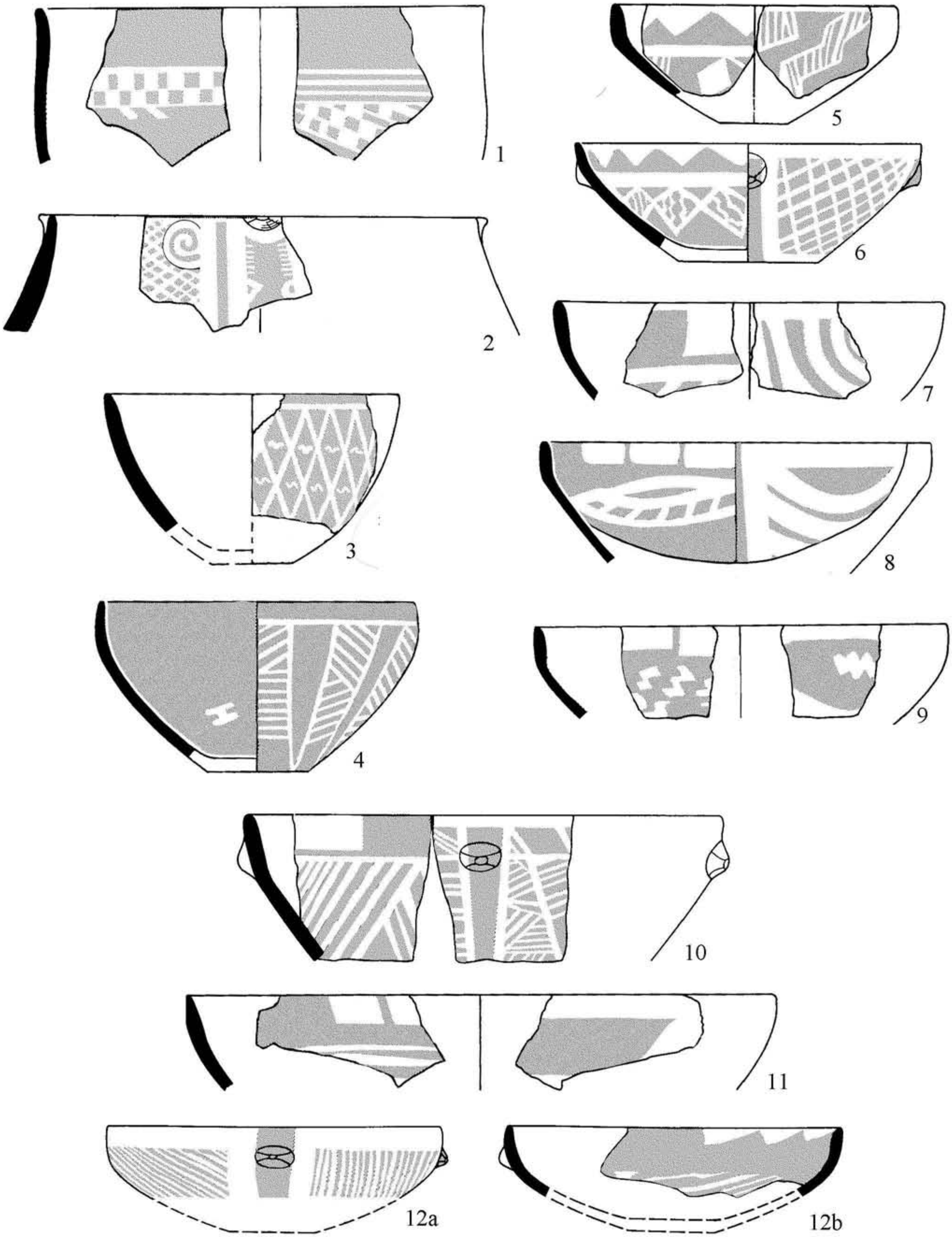
Sitagroi (Phase I-II): Late Neolithic Ia Undecorated Vessels 1:3

Figure 104

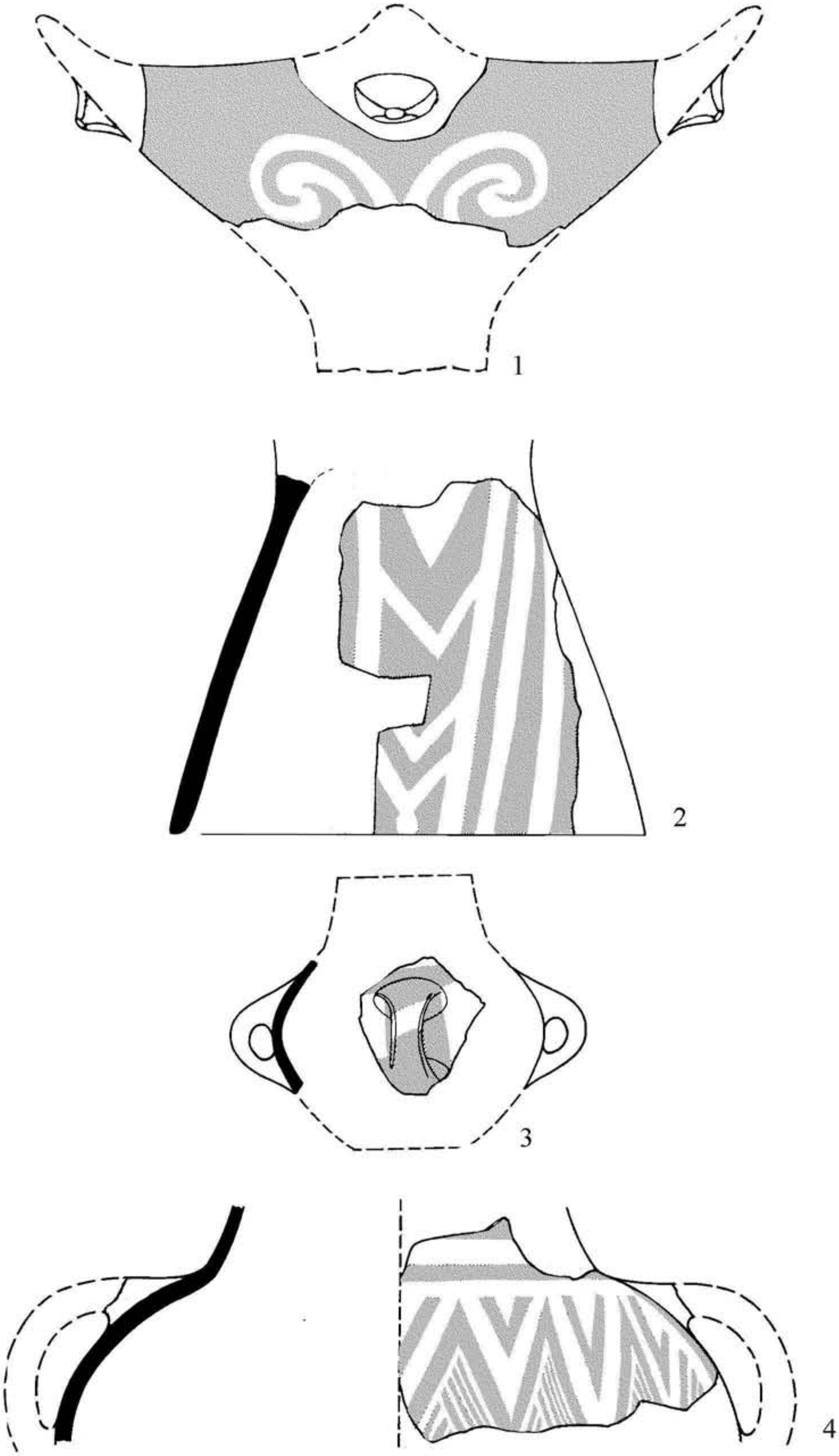


Sitagroi (Phase III): Late Neolithic Ib Undecorated Vessels 1:3

Figure 105

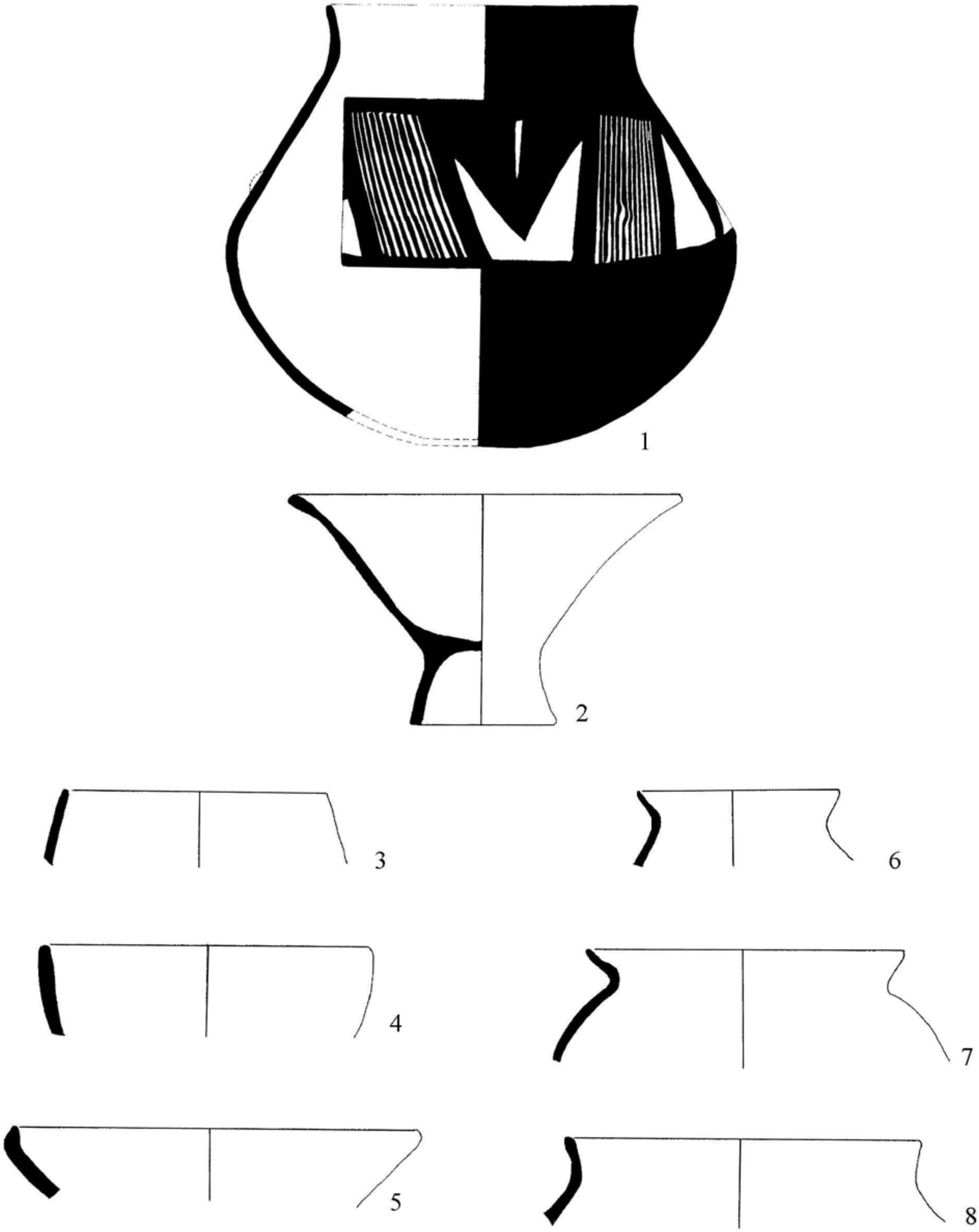


Thessaly: LN Ib White-on-red (B3α) Bowls 1:3
Figure 106



Thessaly: LN Ib White-on-red (B3α) Jars and Fruit-stands 1:3

Figure 107



Central and Southern Greece: LN Ia Urfirnis
Figure 108