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SOMMARIO

STUDI E RICERCHE

SERRAGLIO, ELEONA, AND LANGADA ARCHAEOLOGICAL PROJECT (SELAP): REPORT ON THE RESULTS OF THE 2011 TO 2015 STUDY SEASONS *

This report presents the results of the 2011 to 2015 seasons of the 'Serraglio, Eleona, and Langada Archaeological Project' (SELAP), a research endeavor carried out on Kos since 2009 under the auspices of the Italian Archaeological School at Athens in close collaboration with T. Marketou of the Ephorate of Antiquities of Dodecanese[1]. SELAP's aim is to provide new information on the social and cultural history of NE Kos from the Late/Final Neolithic (LN/FN) up to the Late Protogeometric (LPG) period. Particular attention is devoted to four subjects: occupational sequences, cultural identities, political trajectories, and funerary practices.

During the last four years, SELAP's research questions were examined using a multi-disciplinary approach that incorporated different archaeological and archaeometric methodologies. The first component of SELAP's archaeological work was focused on the analysis of space, landscape, and built environment in the NE Koan region, with a particular focus on the sites located in the wider area of the settlement of the 'Serraglio' (Fig. 1). The second archaeological component concentrated on the typological and contextual study of a diverse array of finds, including ceramics, precious and semi-precious adornments for the body and clothing, weaving equipment, weapons, bronze implements, and miscellaneous worked stones. For the archaeometric examinations, SELAP's work was directed toward geological prospections for the identification of ancient clay and stone sources, chemical and petrographic analysis of ceramic finds, paleonutritional and strontium analysis of the human bones, and microbotanical analysis of stone tools and ceramic containers for food storage, processing, and preparation. In addition, the information from Hittite and Linear B textual sources has also been considered with respect to the role of Kos and the Dodecanese in the Ahhijawa question.

This report is divided into six sections, within which the results of SELAP's work are presented by subject rather than on an individual site basis.

* SELAP's 2009 to 2015 seasons were made possible through generous grants from the Ministry of Education, Lifelong Learning and Religious Affairs of the Hellenic Republic, the Institute for Aegean Prehistory (INSTAP), The Shelby White Leon Levy Program for Archaeological Publications, the University of Calabria, and The Mediterranean Archaeological Trust. We are very grateful to the former and present Directors of the Italian Archaeological School at Athens, Emanuele Greco and Emanuele Papi, for logistical and scientific support to the project. This paper could not have been written without the assistance provided by our friends and colleagues of the Ephorate of Antiquities of Dodecanese, in particular Maria Chalkiti and Elpida Skerlou. Additional thanks go to Mario Benzi, Elisabetta Borgna, Giampaolo Graziadio, Reinhard Jung, Antonis Kotsonas, Ourania Kouka, Jana Mokrišová, Štěpán Rückl, and Jeremy B. Rutter for their constructive comments on the subjects discussed within this manuscript. A special acknowledgement is due to Joanne Cutler, who has shared some of her notes on the Koan weaving equipment, as a result of her visit during SELAP's 2015 season. Last, but not least, we are also very thankful to the staff of the British School at Athens, especially the Director John Bennet, the Assistant Director Chryssanthi Papadopoulou, and the Archivist Amalia Kakissis, for granting permissions to study and publish the Koan materials included in the BSA sherd collection.

[1] During the 2011-2015 seasons, SELAP's team was composed by 25 members from 14 institutions or universities: Eleonora Ballan (Ca' Foscari University), Carmen Basile (Alumnus, University of Milan), Federico Bianchini (University of Pisa), Caroline Belz (UCLA), Nicholas G. Blackwell (North Carolina State University), Iro Camici (University of Pisa), Anna Hager (photographer), Christopher Hale (British School at Athens), Teresa Hancock Vitale (Alumnus, University of Toronto), Amanda Iacobelli (Pennsylvania State University), Ioannis Iliopoulos (University of Patras), Marie Leduc (photographer), Cinzia Mantello (Alumnus, University of Siena), Calla McNamee (Wiener Laboratory for Archaeological Science, American School of Classical Studies at Athens), Jana Mokrišová (University of Michigan), Jerolyn E. Morrison (Institute for Aegean Prehistory, Study Center East Crete), Kalirroi Moulo (University of Patras), Ioanna Moutafi (Wiener Laboratory for Archaeological Science, American School of Classical Studies at Athens), Kalliopi-Sofia Passa (University of Patras), Salvatore Regio (illustrator), Marcella Rossin (illustrator), Tina Ross (illustrator), Arianna Trecarichi (Alumnus, University of Pisa), Efrossini Vika (University of Durham), and Salvatore Vitale (University of Pisa).

Fig. 1 - Map of NE Kos including the main sites and areas under SEALP's study
(base map from Google Earth adapted by: C. McNamee - S. Vitale - T. Marketou)

The first section includes a discussion of the character of the available dataset. The second, third, fourth, and fifth sections are focused respectively on: occupational sequences; landscape, spatial analysis, and built environment; burial practices; and the study of the finds. The sixth and final section includes a summary of the results and a discussion of the significance of our discoveries to SELAP's main research questions.

Salvatore Vitale

1 - DATASET

SELAP is primarily based on the evidence recovered on Kos between 1935 and 1946 by L. Morricone. Morricone's excavations were concentrated in three main areas, which constitute the core of SELAP's research: the Asklupis region, the 'Serraglio', and the cemeteries of Eleona and Langada (Fig. 1)[2].

Additional information on prehistoric Kos is provided by the extensive survey carried out in the 1960's by R. Hope Simpson and J.F. Lazenby and the more recent rescue excavations by the Greek Archaeological service, especially Marketou, at the 'Serraglio' and at various sites in the vicinity of the modern town of Kos[3].

While the investigations by the Greek Archaeological Service were carried out with up-to-date methodologies and provide us with exhaustive records, the resolution of the data from Morricone's excavations and Hope Simpson and Lazenby's survey is of uneven quality when compared to modern standards[4]. Morricone's materials constitute a large collection of finds, but the sample exhibits a significant bias due to the arbitrary discard strategies that were typical of Morricone's period. An additional problematic aspect is represented by the partial destruction of the original documentation, which occurred during World War II. Lost data include most of the diaries from the excavations at the 'Serraglio', those from Eleona Tombs 1-20, as well as detailed drawings of plans, archaeological sections, and architectural features. Within the rather wide region explored by Hope Simpson and Lazenby, three aspects of the available evidence are problematic: the non-systematic coverage of the area explored, the dearth of accurate information on the spatial distribution and the density of the archaeological artifacts, and the absence of refined geomorphological and environmental data.

Despite these limitations, during the last four years, SELAP has produced a significant amount of new information on Koan Bronze Age chronology, landscape, settlement patterns, architecture,

[2] MORRICONE 1950; MORRICONE 1967; MORRICONE 1975; MORRICONE 1978.

[3] HOPE SIMPSON-LAZENBY 1970, 55-66, figs. 5-7, pls. 19-20; PAPACHRISTODOULOU 1979; SAMPSON 1987; PAPAZOGLOU 1981; MARKETOU 1990a; MARKETOU 1990b; MARKETOU 2004; MARKETOU 2010a, 762-766 (all with previous bibliography). See also GEORGIADIS 2012, 5-10.

[4] For specific observations on Morricone's excavation practices, see VITALE 2016a, 76.

burial practices, subsistence strategies, and pottery technology[5]. SELAP's results show that substantial progress in our understanding of the past can be achieved by using a multidisciplinary and holistic analytical approach, even when the original dataset comes mostly from old archaeological investigations.

Salvatore Vitale

2 - Occupational Sequences

The study of Koan occupational sequences was conducted to a large extent as a collaborative work between SELAP and Marketou. The results achieved in the last four years are presented here with reference to the three main areas of SELAP's analysis.

2.1 - The Asklupis

The results of Morricone's excavations and Hope Simpson and Lazenby's survey suggest the existence of a long occupational sequence in the Asklupis region (Tabs. I-II). The finds come from the summit and the immediate surroundings of the Asklupis ridge. The earliest ceramic materials imply that human frequentation may have occurred during all of the phases between the LN/FN and the Early Bronze Age (EBA) 2 (Fig. 2:a-e)[6]. Evidence for human presence also exists during several distinct phases of the Late Bronze Age (LBA) and Early Iron Age (EIA) periods, including LBA IA Early (Fig. 2:f-g) to LBA IA Mature (Fig. 2:h), Late Helladic (LH) IIIA2 to LH IIIB[7], LH IIIC Middle (Fig. 2:i), and LPG (Fig. 2:j).

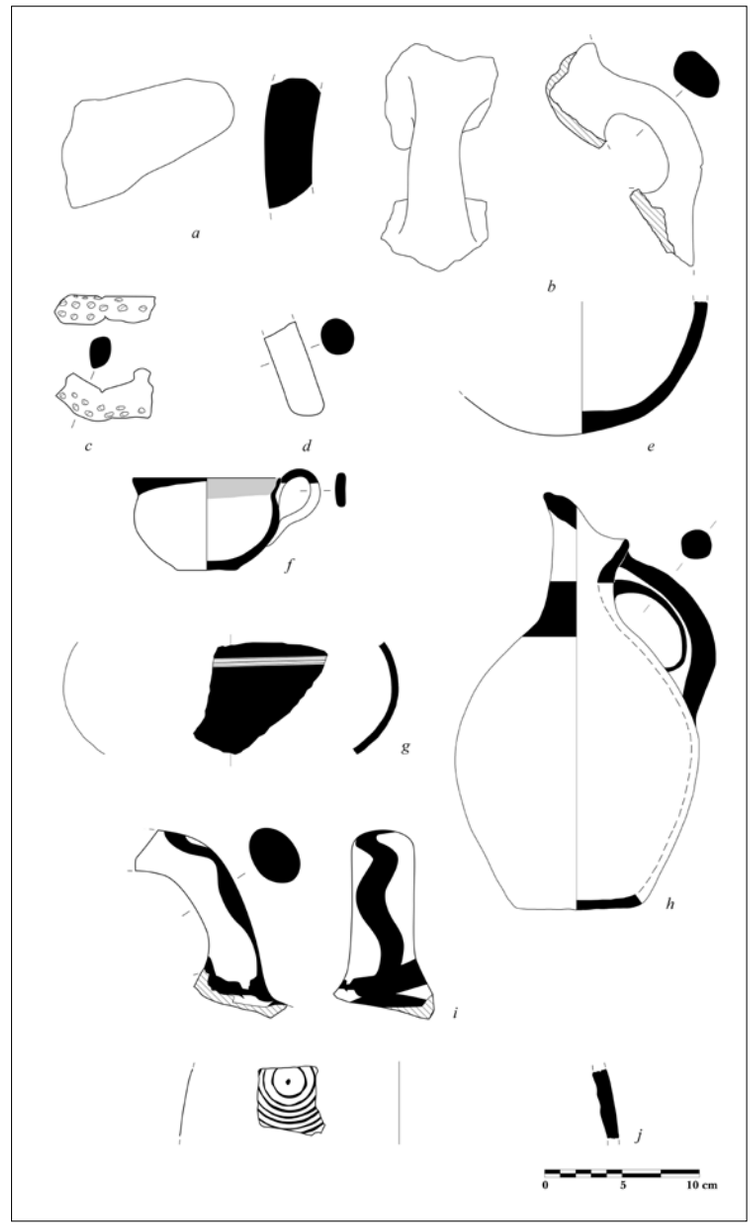

Fig. 2 - Ceramics from the Asklupis area. a: LN/FN-EBA 2; b-d: EBA 1-EBA2; e: EBA2; f-g: LBA IA Early; h: LBA IA Early-LBA IA Mature; i: LH IIIC Middle; j: LPG (a, c, d: S. Regio - T. Ross; b, f: M. Rossin - T. Ross; e: I. Camici - T. Ross; g: M. Rossin - A. Trecarichi; h: S. Regio - A. Trecarichi; i: S. Regio - M. Rossin - T. Ross; j: A. Trecarichi - T. Ross)

The occurrence of an occupational gap in the Asklupis area between the EBA 3 and the Middle Bronze Age (MBA) period seems to be confirmed by the results of landscape analysis and the observation of site distribution patterns in NE Kos during these phases (see below, section 3.2). Based on the absence of diagnostic sherds dating to LBA IB, LBA II, LBA IIIA1, LH IIIC Early and Middle Protogeometric (MPG), other occupational gaps

[5] Vitale 2012a; Vitale 2012b; Vitale 2013; Vitale 2016a; Vitale 2016b; Vitale-Hancock Vitale 2010; Vitale-Hancock Vitale 2013; Vitale-Trecarichi 2015; McNamee-Vitale 2016; Vitale-Blackwell-McNamee *forthcoming*; Vitale-Marketou-McNamee *forthcoming*; Vitale-Morrison *forthcoming a*; Vitale-Morrison *forthcoming b*; Iliopoulos *et alii forthcoming*; Vitale-Moutafi-Vika *forthcoming*. See also Vitale 2006; Vitale 2007.

[6] Hope Simpson-Lazenby 1970, 57, fig. 7:6, pl. 20:b.3-4; Morricone 1975, 264-270, figs. 213, 217, 219, 220, 223; Vitale 2013, 52-57, tab. 3, figs. 4-7.

[7] Hope Simpson-Lazenby 1970, 57.

Phases with Human Activity	Suggested Chronology	Approximate Synchronisms	
		Crete	Greek Mainland
I	LN/FN-EBA 2	LN/FN-EM IIA	LN/FN-EH IIA
GAP	EBA 3-MBA	EM IIB-MM IIIA	EH IIB-MH III Early
II:1	LBA IA Early-LBA IA Mature	MM IIIB-LM IA	MH III Late-LH I
GAP (?)	LBA IB-LBA IIIA1	LM IB-LM IIIA1	LH IIA-LH IIIA1
II:2	LH IIIA2-LH IIIB	LM IIIA2-LM IIIB	LH IIIA2-LH IIIB
GAP (?)	LH IIIC Early	LM IIIC Early	LH IIIC Early
II:3	LH IIIC Middle	LM IIIC Late-Subminoan	LH IIIC Middle-EPG
GAP (?)	MPG	Subminoan-EPG	MPG
III:1	LPG		LPG

Tab. I - Phases with Human Activity in the Asklupis Area from the LN/FN to the LPG Period

Dodecanese (MARKETOU 2010a; 2010b; VITALE 2013)	**W Coastal Anatolia (ŞAHOĞLU 2005b; KOUKA 2009; PAVÚK 2015)**	**Crete (MOMIGLIANO 2007)**
EBA 1 Asklupis, settlement; Tsilimbiri; Troulli; Ayios Fokas (?); Panayia Tsoukalaria (?); Kastro at Palaio Pyli (?)	EBA 1 Troy I Early/Middle; Liman Tepe VI	EM I
EBA 2 Present-day Hippokrateion Foundation; Tavla; Mesaria; Kastro at Palaio Pyli (?); Asklupis, settlement; Tsilimbiri; Troulli; Ayios Fokas (?); Panayia Tsoukalaria (?)	EBA 2 Early Troy I Late; Liman Tepe V:3	EM IIA Early-Late
Asomatos 2 (?); Asklupis, settlement and cemetery; Tsilimbiri; Troulli; Kastro at Palaio Pyli (?)		
?	EBA 2 Late* Troy II; Liman Tepe V:2-1	EM IIB
Asomatos 2 (?) EBA 3 Early Asomatos 3A; the 'Serraglio'; Aspri Petra (?)	EBA 3A Troy III; Liman Tepe IV:2	
EBA 3 Late Asomatos 3B; the 'Serraglio'; Aspri Petra (?); Daskalio (Kalymnos)	EBA 3B Troy IV; Liman Tepe IV:1	EM III
MBA Ialysos; the 'Serraglio'	MBA 1-early MBA 2 Troy V-early VI:a; Liman Tepe IV:1-III:3 early	MM IA-MM IIIA
* The grey background indicates the presence of diagnostic features of the Lefkandi I/Kastri phase (RUTTER 1979) and corresponds to the so-called Anatolian Trade Network period (ŞAHOĞLU 2005b).		

Tab. II - Approximate Chronological Synchronisms Between the Dodecanese, W Coastal Anatolia, and Crete During the EBA and the MBA Periods

Morricone's Excavations (MORRICONE 1975)		**Marketou's Excavations (MARKETOU 1990a; 1990b; 2009; 2010a)**	**Vitale (VITALE 2006; 2012a)**	**Vitale and Marketou (this article)**		**Approximate Synchronisms**	
Building Phases	Suggested Chronology	Suggested Chronology		Building Phases	Suggested Chronology	Crete	Greek Mainland
-	-	EBA 3 Early	-	I:1	EBA 3 Early	EM IIB-EM III	EH III
-	-	EBA 3 Late	-	1:2	EBA 3 Late		
-	-	MBA	-	II	MBA	MM IA-IIIA	MH I-III Early
Settlement Preceding City I, First Sub-Phase	MM III	LBA IA Early	LBA IA Early	III:1.a	LBA IA Early	MM IIIB or LM IA Early-Advanced**	MH III Late
Settlement Preceding City I, Second Sub-phase		LBA IA Mature	LBA IA Mature	III:1.b	LBA IA Mature	LM IA or LM IA Final**	LH I
City I	MBA III-LBA I or LBA I	LBA IB	LBA IB	III:2	LBA IB	LM IB	LH IIA
City II, First Sub-phase	LBA IIIA (= end of the period)	Disturbed LM II/LH IIB to LM/LH IIIC Late Sequence	LBA II-LBA IIIA1	III:3.a	LBA II-LBA IIIA1	LM II-LM IIIA1	LH IIB-LH IIIA1
City II, Second Sub-phase			LBA IIIA1	III:3.b	LBA IIIA1	LM IIIA1	LH IIIA1
City III, First Sub-phase	LBA IIIA-LBA IIIB		LH IIIA2-LH IIIB1	III:4.a	LH IIIA2-LH IIIB1	LM IIIA2-LM IIIB1	LH IIIA2-LH IIIB1
City III, Second Sub-phase	LBA IIIB Final (= end of the period)		LH IIIB1-LH IIIB2 Late	III:4.b	LH IIIB1-LH IIIB2 Late	LM IIIB1-LM IIIB2	LH IIIB1-LH IIB2 Late
City IV	LBA IIIC		LH IIIC Early-Middle	III:5	LH IIIC Early-Middle	LM IIIC Early-Subminoan	LH IIIC Early-Late ***

* The earliest phases of the LBA are termed LBA I, II, and IIIA1 because during these periods Koan material culture was still typified by a strong local character. From LH IIIA2 onward, the typical Mycenaean sequence and terminology can also be applied to Kos (see VITALE 2007, 44).
** See VAN DE MOORTEL 2001; RUTTER-VAN DE MOORTEL 2006.
*** LH IIIC Phases 1-5, according to RUTTER 1977; RUTTER 1978.

Tab. III - Occupational Sequence at the Settlement of the 'Serraglio' During the Bronze Age*

in the Asklupis area may have existed also during these phases (Tab. I). In any case, Morricone's excavations show that other major periods of human activity occurred during the Hellenistic and the Roman times[8], when the importance of the Asklupis region may have been emphasized by the geographical proximity to the Panhellenic sanctuary of the Asklepieion.

Salvatore Vitale

2.2 - The 'Serraglio'

Collaboration between SELAP and Marketou enabled the establishment of a comprehensive occupational sequence for the settlement of the 'Serraglio' (Fig. 3) during the entire Bronze Age (Tab. III). This sequence combines the results of Greek excavations and SELAP's study of the finds from Morricone's investigations. Three main phases

[8] MORRICONE 1975, 263.

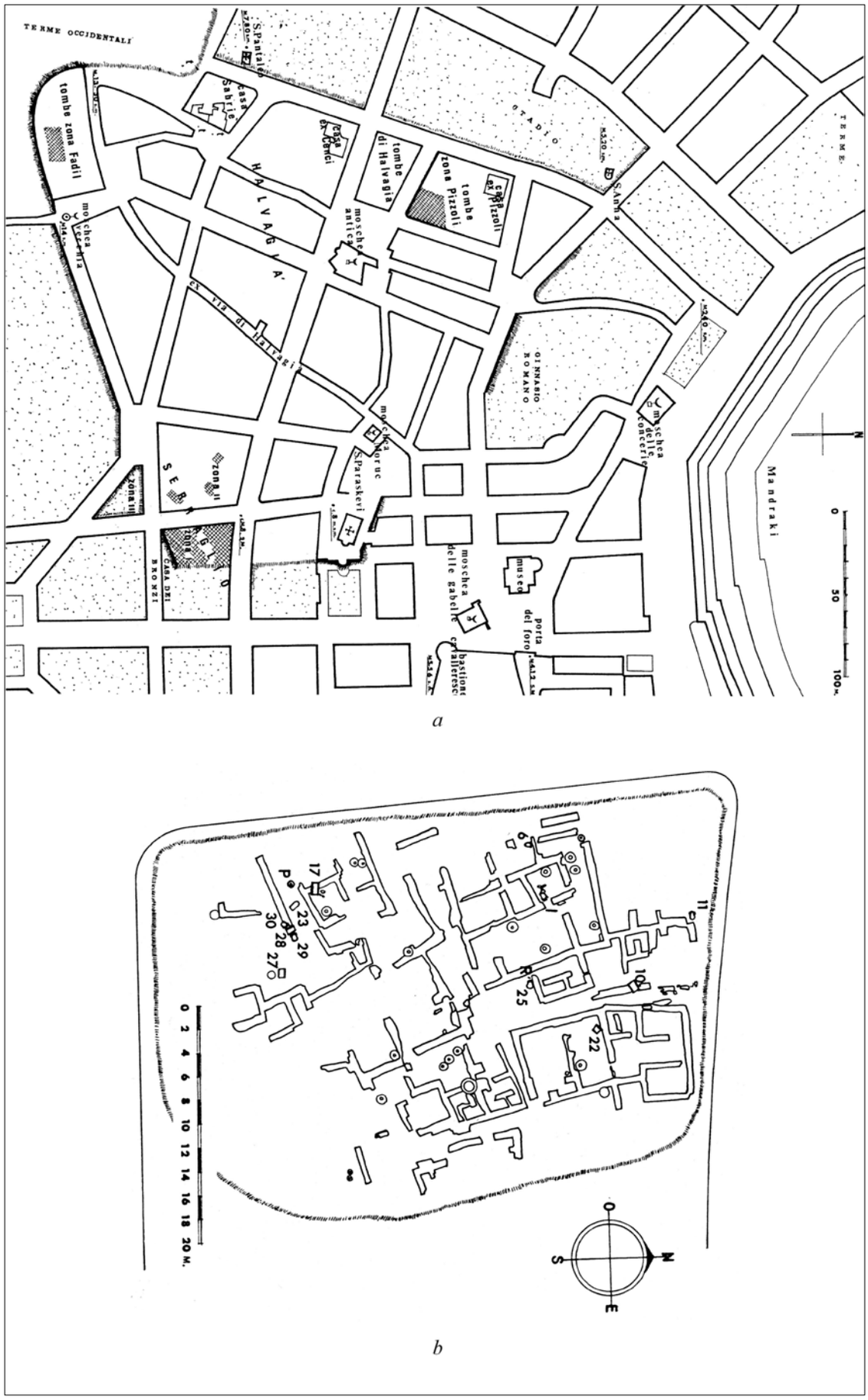

Fig. 3 - a: The LBA settlement of the 'Serraglio' with Morricone's main excavation sectors outlined in grey; b: Sketch map showing the storage vessels found *in situ* within the buildings of City III at the 'Serraglio', Zone I (after MORRICONE 1975, 152, 159, figs. 7, 21)

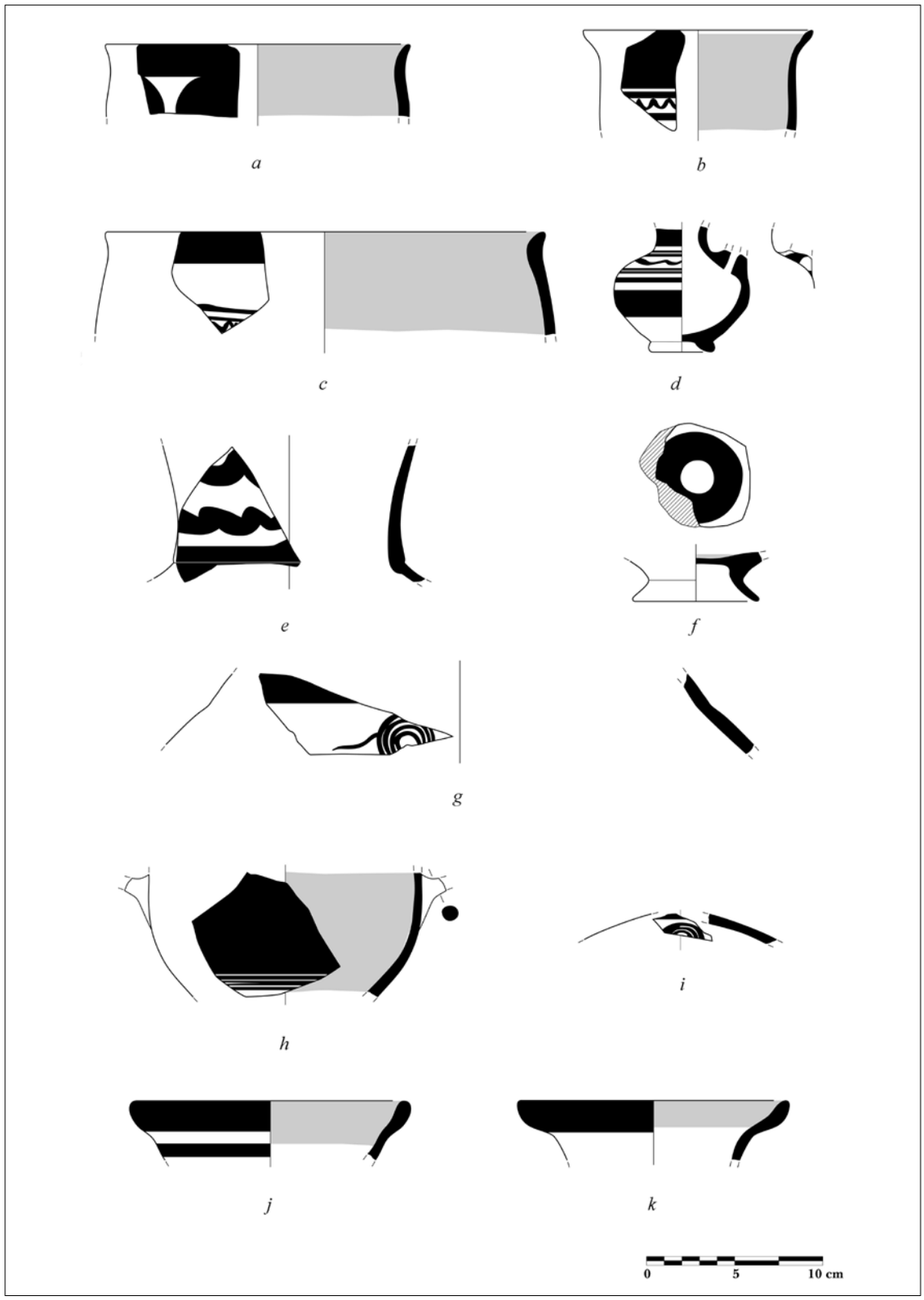

Fig. 4 - LBA and EIA Ceramics from the 'Serraglio'. a-e: LH IIIC Late-EPG; f-g: EPG; h: MPG; i: MPG-LPG; j-k: LH IIIC Middle-LPG (M. Rossin - T. Ross)

were defined, dating to the EBA, MBA, and LBA, with Phase I subdivided into two sub-phases and Phase III subdivided into eight sub-phases. Phase II, on the other hand, was left undivided. This sequence indicates that habitation at the 'Serraglio' began during the EBA 3 period and continued up until the end of the LBA.

Another major result of SELAP's 2011 to 2015 study seasons was the identification of a small number of fine decorated fragments stylistically assignable to the transition between LH IIIC Late and Early Protogeometric (EPG), as well as to the EPG phase (Fig. 4:a-g). These materials come either from the fills above the final floor of the House

Sites	LBA II	LBA IIIA1	LH IIIA2	LH IIIB	LH IIIC Early	LH IIIC Middle	Not Datable	Total
Eleona	4	10	1	4	1	2	-	22
Langada	-	-	10	18	14	14	5	61
Total	4 (4.8%)	10 (12.0%)	11 (13.3%)	22 (26.5%)	15 (18.1%)	16 (19.3%)	5 (6.0%)	83 (100.0%)

LBA II: E. Ts. 2, 4, 8, 18.
LBA IIIA1: E. Ts. 3, 7, 10, 11, 12, 14, 16, 17, 21, 22.
LH IIIA2: E. T. 15; L. Ts. 3, 16, 25, 29, 37, 38, 41, 51, 54, 56.
LH IIIB: E. Ts. 5, 6, 19, 20; L. Ts. 10, 15, 19, 20, 21, 28, 30, 35, 36, 40, 46, 48, 49, 52, 53, 57, 59, 60.
LH IIIC Early: E. T. 13; L. Ts. 4, 5, 6, 11, 13, 17, 22, 23, 24, 26, 31, 43, 44, 61.
LH IIIC Middle: E. Ts. 1, 23; L. Ts. 1, 2, 8, 9, 14, 18, 32, 33, 34, 39, 45, 47, 50, 55.
Not Datable: L. Ts. 7, 12, 27, 42, 58.

Tab. IV - Absolute Number of the Tombs Built at Eleona and Langada from LBA II to LH IIIC Middle

Sites	LBA II	LBA IIIA1	LH IIIA2	LH IIIB	LH IIIC Early	LH IIIC Middle	Not Datable
Eleona	4	13	5	6	4	13	-
Langada	-	-	10	19	22	27	5
Total	4	13	15	25	26	40	5

LBA II: E. Ts. 2, 4, 8, 18.
LBA IIIA1: E. Ts. 3, 4, 7, 8, 10, 11, 12, 14, 16, 17, 18, 21, 22.
LH IIIA2: E. Ts. 2, 10, 15, 16, 18; L. Ts. 3, 16, 25, 29, 37, 38, 41, 51, 54, 56.
LH IIIB: E. Ts. 4, 5, 6, 15, 19, 20; L. Ts. 10, 15, 19, 20, 21, 28, 30, 35, 36, 37, 40, 46, 48, 49, 52, 53, 57, 59, 60.
LH IIIC Early: E. Ts. 4, 11, 13, 20; L. Ts. 4, 5, 6, 10, 11, 13, 17, 19, 22, 23, 24, 25, 26, 31, 35, 43, 44, 52, 53, 57, 59, 61.
LH IIIC Middle: E. Ts. 1, 2, 4, 6, 7, 8, 11, 12, 13, 15, 20, 21, 23; L. Ts. 1, 2, 6, 8, 9, 10, 11, 14, 15, 17, 18, 19, 20, 32, 33, 34, 35, 39, 41, 44, 45, 47, 50, 52, 55, 57, 61.
Not Datable: L. Ts. 7, 12, 27, 42, 58.

* The total exceeds 83, because many tombs were utilized during more than one phase.

Tab. V - Chronological Distribution of the Tombs in Use at Eleona and Langada Between LBA II and LH IIIC Middle*

of the Figs or from mixed contexts[9]. Pottery stylistically assignable to LH IIIC Late and EPG is rarely documented on Kos and in the wider SE Aegean-SW coastal Anatolian region. Until SELAP's study, the absence of obvious ceramics attributable to these phases was taken by some scholars as evidence for a temporary abandonment of the 'Serraglio' before the establishment of a cemetery in the same area during MPG[10]. This idea, however, was rejected by Morricone on stratigraphic grounds[11]. SELAP's identification of fragments stylistically assignable to the LH IIIC Late to EPG

[9] MORRICONE 1975, 227-231, figs. 154-159. For a preliminary report on the materials from the fills above and below the final floor of the House of the Figs, see VITALE 2006, 83-85, fig. 13.

[10] LEMOS 2002, 180-182.

[11] MORRICONE 1978, 46-47.

Sites	LBA IIIA1	LH IIIA2	LH IIIB	LH IIIC Early	LH IIIC Middle	Not Datable	Total
Eleona T. Nos.	3, 14, 17, 22 (4)	-	5, 19 (2)	-	1, 23 (2)	-	8
Langada T. Nos.	-	3, 16, 25** (G. 3), 29, 38*, 51, 54, 56 (8)	21*, 28, 30, 36*, 40, 46*, 48, 49, 60 (9)	4, 5, 13, 22, 23*, 24*, 25** (Gs. 1, 2, 5), 26, 31, 43*, 57** (G. 2) (13)	1*, 2, 8, 9, 14, 18*, 32, 33, 34, 39, 45, 47, 50, 55 (14)	7*, 42*, 58* (3)	47
Total	4	8	11	13	16	3	55

Abbreviations: G.= Group; T.= Tomb.
* Single burial.
** Undisturbed ceramic assemblages assignable to specific interments.
The tombs with no asterisks include pottery dating to a single chronological period only (Furumark's homogeneous find groups; Furumark 1941, 32-33).

NB: Morricone describes the stratigraphy of Langada Tombs 25, 40, 50, 55, 57, 59, and 61 and states that he was able to recognize at least the latest interment of each tomb (MORRICONE 1967, 27–28). However, the association between the vessels from these graves and their interments is either unclear or not thoroughly explained, except in the cases of Tombs 25 and 57. For this reason, the latter are the only ones from this group that are included in the present table among closed deposits.
Langada T. 25: G. 1= no. 82; G. 2= nos. 81, 399; G. 3= nos. 80, 83, 85; G. 4= no. 273; G. 5= nos. 84, 86.
Langada T. 57: G. 1= nos. 225, 227; G. 2= nos. 230, 233, 235; G. 3= nos. 223, 226, 234.

Tab. VI - Qualified Pottery Groups from Eleona and Langada

transition and to EPG suggests that Morricone's view was correct. The limited number of these materials, however, may imply that, during the phases known as LH IIIC Late and EPG on the Greek mainland, the vast majority of the Koan vessels continued to be manufactured in the style of LH IIIC Middle (Tabs. I-III).

The LH IIIC Late-EPG and EPG fragments identified through SELAP's research are often characterized by a black lustrous or red dull paint on a yellow-slipped or brown unslipped surface. These decorative treatments continue into the later stages of the Protogeometric period both on locally produced and imported vessels (Fig. 4:h-i). Diagnostic shapes assignable to the LH IIIC Late to EPG transition include 'salami' deep bowls or skyphoi (Fig. 4:a), deep bowls or skyphoi decorated with zigzag FM 61 (Fig. 4:b-c), and closed shapes with wavy band FM 53 (Fig. 4:d-e). EPG shapes include skyphoi with low conical feet (Fig. 4:f) and closed shapes with concentric circles, one of which may belong to an amphora of R. Catling's Group I (Fig. 4:g)[12]. Throughout the time span covering the phases between LH IIIC Middle and LPG on the Greek mainland, Koan closed shapes were characterized by hollowed rims (Fig. 4:j-k).

At the current stage of research, it is unclear whether the possible amphora of Catling's Group I was locally produced or imported from central Greece. The same applies to other fragments from Morricone's excavations (Fig. 4:f, h). In any case, the occurrence of close stylistic similarities between Koan and central Greek fine decorated ceramics suggests that contacts between these two areas may have occurred during the final stages of the Bronze Age and the beginning of the EIA[13].

Salvatore Vitale - Toula Marketou

2.3 - Eleona and Langada

The cemeteries of Eleona and Langada included 83 tombs dating between LBA II and LH IIIC Middle in the case of Eleona and between LH IIIA2 and LH IIIC Middle in the case of Langada (Tabs. IV-V)[14]. In the last four years, the contextual study of the 468 vessels from these cemeteries was completed, leading to two important results. First, 55 'qualified find groups' were identified, in-

[12] CATLING 1998, 151-164.

[13] SELAP's team is grateful to Š. Rückl for pointing out some of the parallels proposed within this section between the fragments from Morricone's excavations on Kos and relevant materials from the central Greek mainland.

[14] MORRICONE 1967; MOUNTJOY 1999, 1076-1081.

Date	Eleona	Langada	Total
LBA II/LH IIB	8	-	8 (1.7%)
LBA IIIA1/LH IIIA1	27	-	27 (5.8%)
LH IIIA2	8	51	59 (12.6%)
LH IIIB	17	70	87 (18.6%)
LH IIIC Early	6	85	91 (19.4%)
LH IIIC Middle	27	101	128 (27.4%)
LBA II/LH IIB-LBA IIIA1/LH IIIA1	1	-	1 (0.2%)
LBA II/LH IIB -LH IIIA2	2	-	2 (0.4%)
LH IIIA2-LH IIIB	1	-	1 (0.2%)
LH IIIA2-LH IIIC Early	-	1	1 (0.2%)
LH IIIB-LH IIIC Early	2	3	5 (1.1%)
LH IIIB-LH IIIC Middle	-	2	2 (0.4%)
LH IIIC Early-LH IIIC Middle	3	24	27 (5.8%)
Not Datable	8	21	29 (6.2%)
Total	110 (23.5%)	358 (76.5%)	468 (100.0%)

Tab. VII - Chronological Distribution of Pottery Vessels from Eleona and Langada

cluding 15 closed groups and 40 stylistically 'homogeneous groups' (Tab. VI)[15]. Second, all of the vases from the tombs used during more than one pottery phase were dated either stylistically or by association with diagnostic specimens (Tab. VII). These results produced an extraordinarily solid chronological framework for the investigation of the wider cultural, social, and political implications of the burials at Eleona and Langada.

Salvatore Vitale

3 - LANDSCAPE, SPATIAL ANALYSIS, AND BUILT ENVIRONMENT

The study of landscape, space, and built environment in the area of the 'Serraglio' and the wider NE Koan region was also conducted as a collaborative work between SELAP and Marketou. This section of the report is subdivided into five parts: geomorphic processes and methodology; NE Kos from the LN/FN to the end of the MBA; NE Kos during the LBA; burial landscape and tomb typology at the Asklupis; and space and architecture at Eleona and Langada.

3.1 - Geomorphic Processes and Methodology

For the purpose of SELAP's research, two different definitions of the NE Koan region are adopted, based on chronological and cultural factors. During the phases between the LN/FN and the MBA periods, SELAP's study area includes the region between the Mesarias stream to the W, the island's coastline to the N, the cape of Ayios Fokas to the E, and the ridge of Mount Dikaios to the S (Fig. 5). For the LBA period, on the other hand, a wider area is considered and the W border is moved from the Mesarias river to the region surrounding the site of the Kastro at Palaio Pyli (Fig. 6).

The uplands of the Dikaios are clearly delineated by their steep slope and shallow soils. They transition sharply into an extensive alluvial plain that slopes gradually to the coast. This plain is composed of pediment toward the upland and alluvial deposits as one moves down in elevation toward the coast. Bisected plateaus are also found in this upper section of the alluvial plain, where differential bedrock weathering occurs.

[15] VITALE 2016a, 77, tab. 5:2; VITALE-TRECARICHI 2015, 315-316, tab. 2. For the definition of 'closed', 'qualified', and 'homogeneous' find groups, see FURUMARK 1941, 32-33.

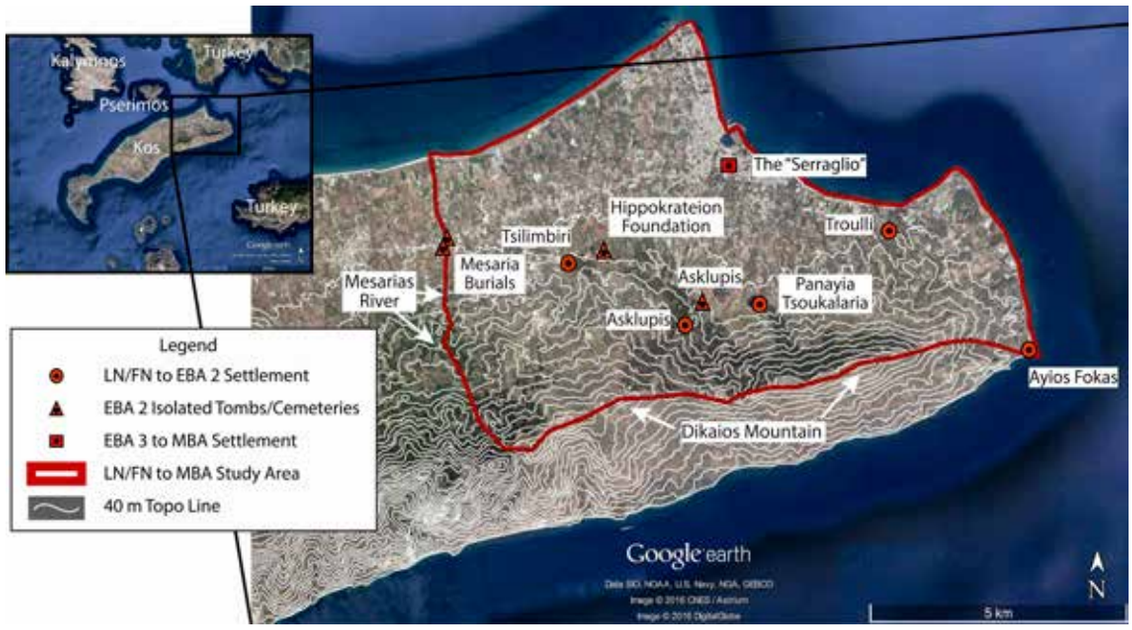

Fig. 5 - Map of NE Kos including the main study area from the LN/FN to the end of the MBA period (base map from Google Earth adapted by: C. McNamee - S. Vitale - T. Marketou)

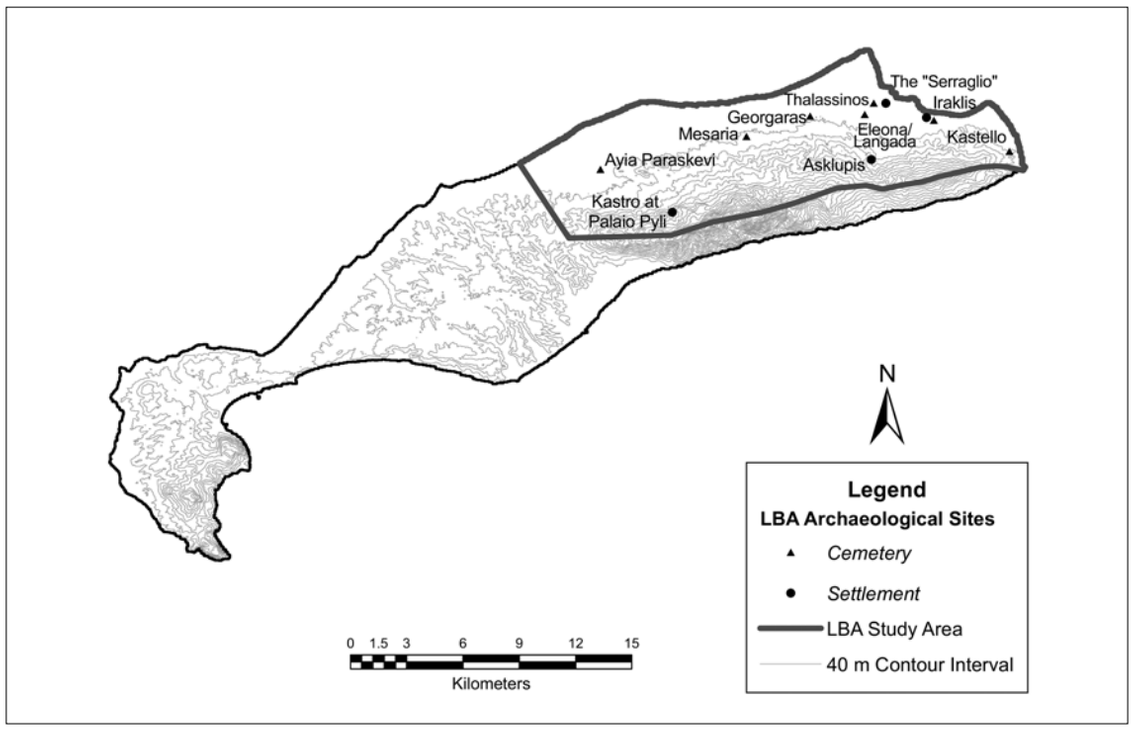

Fig. 6 - Map of NE Kos including the main study area during the LBA (C. McNamee - S. Vitale)

The alluvial plain, on the other hand, is an area where eroded material from the upland is actively deposited. Multiple processes, including sheetflow deposition, slopewash, alluvial fan activity, and alluvial terracing, are responsible for the formation of the alluvial plain. On NE Kos, alluvial fan activity has played a prominent role in forming the alluvial plain, as demonstrated by an exposure on the banks of the Platys river, whose sediments may extend well into the quaternary based on the depth of the deposits.

The differences in geomorphic processes across the NE Koan region play a key role in the identification of potential sites, especially through pedestrian survey. In the uplands, where erosion is the dominant process, the recognition of archaeological resources on the surface is possible. Moving into the basin of the alluvial plain, depositional processes begin to dominate and the potential for buried materials increases.

In order to supplement the admittedly coarse resolution of the available information and estab-

lish our own dataset, SELAP's methodology was directed towards four main goals: the relocation of all previously discovered sites in the area of interest; the identification of potential agricultural areas in the vicinity of these sites; the georeferencing of topographic maps and aerial photographs; and the establishment of a comprehensive ArcGIS incorporating the map and the site data (Figs. 5-6). In addition to a variety of aerial pictures dating between 1957 and today, three main topographic sources were used: the 1925 Italian Military Geographical Service 1:25.000 meter map, the 1972 Hellenic Military Geographical Service (HGMS) 1:50.000 meter map, and the 1977 HGMS 1:5.000 meter map.

Calla McNamee - Salvatore Vitale - Toula Marketou

3.2 - NE Kos from the LN/FN to the End of the MBA

During the phases between the LN/FN and the EBA 2, a total of five sites were identified in the NE Koan region through surface finds[16], including Tsilimbiri, the Asklupis, Troulli, Panayia Tsoukalaria, and Ayios Fokas (Fig. 5)[17]. The majority of these sites are located in naturally protected inland areas characterized by relatively flat ridges, providing suitable conditions for small size habitation (Fig. 5, 7). Besides the abovementioned five sites, isolated EBA 2 pithos burials or small cemeteries were discovered in the wider Mesaria area, the territory of the present-day Hippokrateion Foundation near the Asklepieion, and the Asklupis area (Fig. 5)[18].

Based on the geomorphology and the natural landscape, it is likely that the upland locations of the majority of the sites provided easy access to grazing lands in the surrounding hills and to isolated agricultural resources along small alluvial drainages (Fig. 7). Within this environment, wild game could also have played a role in local subsistence. It is also possible that the inhabitants of the upland sites exploited to some extent the agricultural resources of the Mesaria plain to the N. At the present stage of research, there is no evidence that this plain was settled during the phases from the LN/FN to the EBA 2 period. However, the burials in the Mesaria area may suggest the occurrence of small size habitation also in the alluvial plain, at least during the EBA 2 phase. If these sites existed, however, they may now be buried under thick alluvial layers[19].

Besides subsistence strategies, geological prospections have demonstrated that natural resources for the production of artifacts were abundantly present in the uplands, especially in the Asklupis area. These included workable rocks for the manufacture of stone tools, as well as raw clays, river sands, and suitable rock tempering materials for the production of ceramic vessels (see below, sections 5.4, 5.5)[20].

The EBA 3 and MBA periods were characterized by four significant elements of change from the previous phases. First, all of the five sites discussed above seem to no longer be utilized. Second, there is a noticeable decrease in the total number of attested sites, which now include exclusively the 'Serraglio' (Fig. 5). Third, this new site is located within the large and fertile NE Koan alluvial plain and alongside the coastline. Fourth, isolated burials or cemeteries dating to the phases between the EBA 3 and the end of the MBA are not represented in the archaeological record[21].

The settlement of the 'Serraglio' was built on a low hill in close vicinity to a naturally protected harbor and had a total estimated size of circa 1.1 hectares. It contained elongated structures and an impressive fortification wall, which was roughly one meter and a half thick and presumably encircled the entire settlement. These features characterize the 'Serraglio' as a proto-urban regional center within the wider NE Koan region[22].

The changes in settlement distribution patterns, which occurred in the NE Koan region during the EBA 3 period, suggest significant social transformations and the implementation of different socio-economic strategies from the previous phases. These may include changes in agricultural practices, such as the transition from the cultivation of small household plots to larger scale production, and herding practices, with grazing in the

[16] SAMPSON 1987, 109; HOPE SIMPSON-LAZENBY 1970; GEORGIADIS 2012, 5-10.

[17] For a more comprehensive analysis of the evidence from these sites, see VITALE-MARKETOU-MCNAMEE *forthcoming*.

[18] MORRICONE 1975, 261-271, figs. 210-224; MARKETOU 2004, 20-23; CHRISTOPOULOU 2008; VITALE 2013.

[19] The settlement distribution characterizing the NE Koan region between the LN/FN and the EBA 2 periods has significant similarities with the so-called Halasarna area, located in the SW sector of the island of Kos (GEORGIADIS 2012, especially 205-208). For a comparison between SE Aegean and Cretan settlement patterns and material evidence, see NOWICKI 2014, especially 302-379.

[20] VITALE 2012a, 1244-1245, fig. 9.

[21] HOPE SIMPSON-LAZENBY 1970, 55-66; MARKETOU 1990a, 101-102; MARKETOU 1990b, 41, 43-44; MARKETOU 2004; MARKETOU 2010a, 762-763; VITALE 2013, 57.

[22] MARKETOU 2004, 25-27, figs. 6-7.

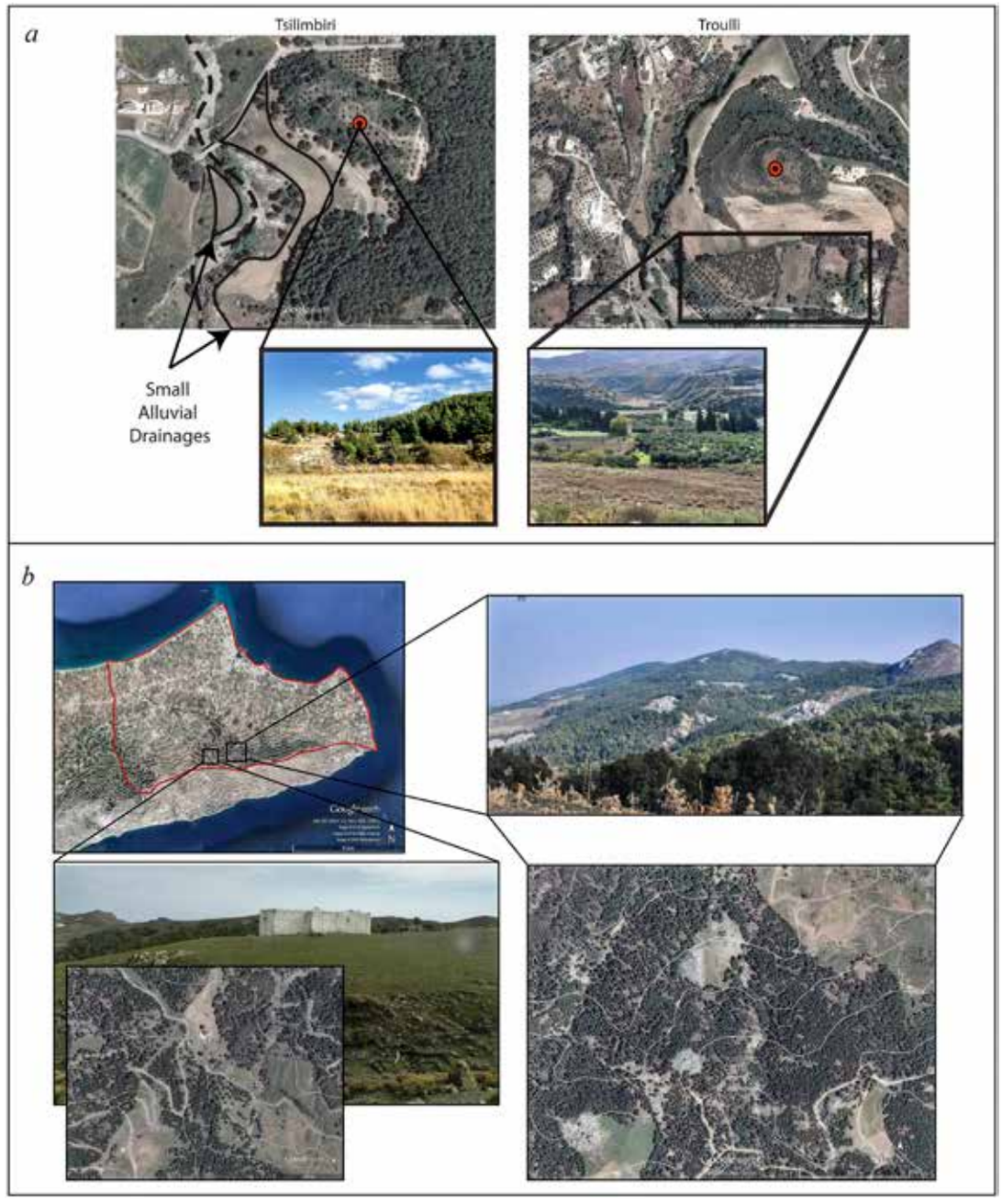

Fig. 7 - a: Small alluvial drainages located adjacent to NE Koan archaeological sites; b: NE Koan grazing locations (base map and aerial views from Google Earth adapted by: C. McNamee - S. Vitale - T. Marketou; additional photos: A. Iacobelli - S. Vitale - C. McNamee)

uplands replaced by grazing on the agricultural lands of the alluvial plains[23]. Socially, gradual discrepancies in household wealth may have arisen due to differential access to resources and the ability to accumulate storage. The nucleation in the coastal settlement of the 'Serraglio' in EBA 3 suggests that an emerging elite had an active interest in engaging in broader maritime trade networks.

The appearance of a proto-urban regional center at the 'Serraglio' is part of a wider and well known phenomenon characterizing settlement patterns and cultural choices in the E Aegean-W coastal Anatolian region during the final stages of the EBA 2 and the first half of the EBA 3: the so-called Anatolian Trade Network period[24]. The material culture revealed at the 'Serraglio' has signif-

[23] For studies on the relationships between landscape, land use, diet, and subsistence in prehistoric Greece, see, among others: HALSTEAD 2000; HALSTEAD 2011; HALSTEAD 2014; WHITELAW 2000; VALAMOTI 2004, especially 127-133; PAPATHANASIOU-THEODOROPOULOU-VALAMOTI 2013; PAPPA *et alii* 2013; PEARSON *et alii* 2015.

[24] ŞAHOĞLU 2005a; ŞAHOĞLU 2005b (both with previous bibliography).

Fig. 8 -Landscape reconstruction of the W boundaries of the LBA settlement of the 'Serraglio' (base map and aerial views from Google Earth adapted by: C. McNamee - S. Vitale - T. Marketou; additional photos: S. Vitale - C. McNamee)

icant parallels with Asomatos on Rhodes, the Heraion on Samos, Liman Tepe in the Urla Peninsula, Poliochni on Lemnos, and Troy on the NW coast of the Anatolian mainland. Shared features, which may include monumental fortification systems, the spread of pottery wheel technology, and the presence of a distinctive set of eating and drinking vessels, demonstrate the existence of significant cultural interconnections in the wider E Aegean and W coastal Anatolian region during this phase[25]. It is important to observe, however, that the NE Koan region seems to have joined the Anatolian Trade Network system not from the beginning, but only during EBA 3 and thus later than all the other sites mentioned previously.

Toula Marketou - Salvatore Vitale - Calla McNamee

3.3 - NE Kos during the LBA

Three main conclusions were drawn through SELAP's on-going study of the NE Koan region during the LBA. The first is the determination that the Fadil area likely marks the western border of the LBA settlement of the 'Serraglio' (Fig. 3:a). This conclusion stems from two factors. The first is the presence of a natural drainage down slope W of the Fadil area that would have functioned as a divide between the 'Serraglio' and the region to the W (Fig. 8). The occurrence of a Roman aqueduct up drainage from the Fadil also confirms the presence of this topographic feature. The second factor is the proximity of the Fadil area to the tholos tomb discovered in the Thalassinos property and the chamber tombs at Eleona and Langada, located circa 250 meters to the W and 750 meters to the SW (Figs. 1, 6, 8)[26].

The second conclusion from SELAP's work is the recognition of a shift in settlement patterns between the Palatial (LH IIIA2 to LH IIIB) and Postpalatial (LH IIIC) phases of the Mycenaean civilization. During the Palatial period, four settlement and eight cemetery sites show traces of occupation in the wider NE Koan region (Fig. 6). The settlements include the 'Serraglio', the Asklupis, Iraklis in the Paradeisi area at Psalidi, and the Kastro at

[25] ŞAHOĞLU 2005b, 340 (with previous bibliography).
[26] MORRICONE 1967; SKERLOU 1997.

Palaio Pyli[27]. The cemetery sites include the necropoleis of Eleona and Langada, the isolated chamber tombs found at Kastello, Iraklis, Mesaria, and Ayia Paraskevi, and the tholos tombs discovered in the properties of Georgaras and Thalassinos[28]. All of these settlement and funerary sites were used during both LH IIIA2 and LH IIIB, with the following exceptions: (a) The tholos in the Georgaras property (LH IIIA2 only); and (b) The Kastro at Palaio Pyli, Kastello, and the tholos in the Thalassinos property (LH IIIB only). This evidence suggests that, in the Palatial period, the NE part of Kos was densely occupied. Two prominent sites existed during LH IIIB at the E and W borders of the Mesaria plain: the 'Serraglio' and the Kastro at Palaio Pyli. The occurrence of an impressive defense wall at the latter site most likely implies a fortified stronghold on top of the Kastro hill, which is otherwise naturally protected by steep limestone outcrops[29]. With its commanding view over the fertile Mesaria plain, the islands of Kalymnos and Pserimos, and the W coast of Anatolia, the Kastro at Palaio Pyli may have had the key function of overlooking the rich Mesaria agricultural supplies, as well as the important sea trade routes to the N[30].

In contrast with the Palatial period, only two settlement sites, the 'Serraglio' and the Asklupis, and three cemetery sites, Eleona, Langada, and the tholos in the Georgaras property, show evidence of use during the Postpalatial period. Of these, only the 'Serraglio', Eleona, and Langada were in use throughout LH IIIC. In fact, as stated previously, the Postpalatial occupation at the Asklupis seems to have been scanty and was limited to LH IIIC Middle. Similarly, the tholos in the Georgaras property, which was built in LH IIIA2, was re-used only during LH IIIC Middle. These data suggest that, during the 12th and 11th centuries B.C., the Koan population may have largely abandoned minor settlements and concentrated at the 'Serraglio'.

The third conclusion from SELAP's analysis of NE Kos during the LBA concerns the built environment at the 'Serraglio' during the Palatial and Postpalatial phases of the Mycenaean civilization. In the 'Serraglio' sequence, LH IIIA2 and LH IIIB encompassed Morricone's City III (Tab. III). The estimated size of the settlement during this period

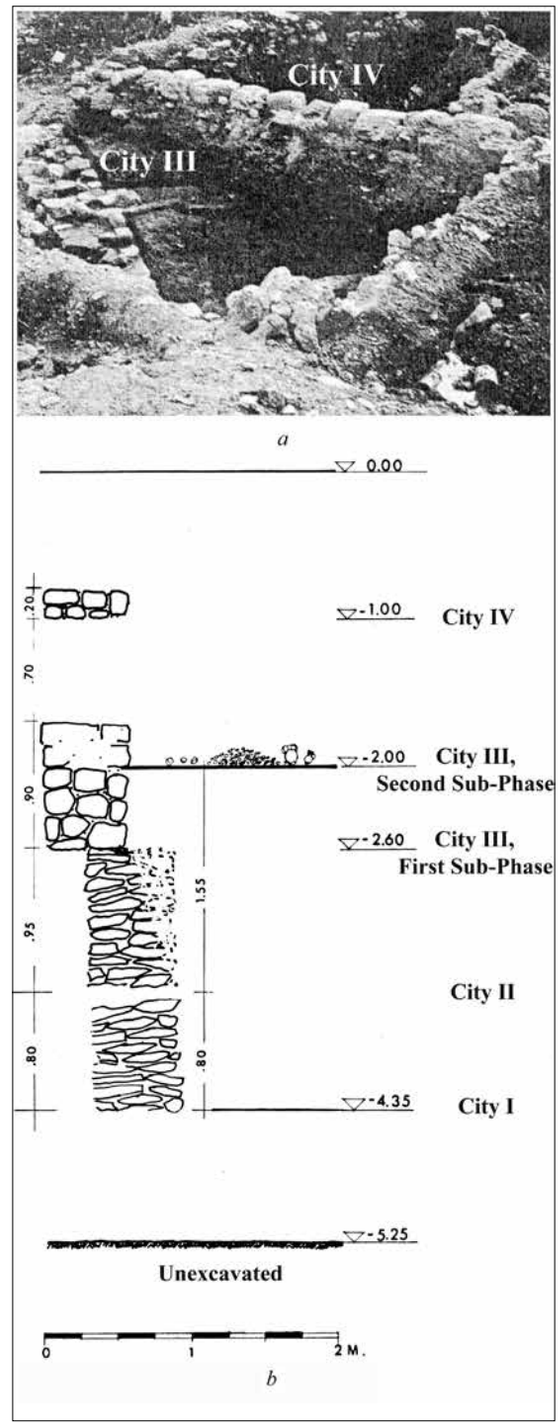

Fig. 9 - a: The 'Serraglio', Zone II, NW corner, view of the walls of Cities III and IV; b: The 'Serraglio', Zone II, NW corner, reconstructed stratigraphic section (readapted by S. Vitale, after Morricone 1975, 227, 230, figs. 154, 158)

[27] Hope Simpson-Lazenby 1970, 55-60, fig. 5; Morricone 1975, 392-393; Skerlou 1996, 690; Vitale 2006, 83-87; Vitale 2012a, 1238; Georgiadis 2012, 5-10; Marketou 2010a, 763, 765. Some of the sherds recovered at Misonisi, near Zia, are described as LBA in date and similar in fabric to those from the Asklupis and the Kastro at Palaio Pyli (Hope Simpson-Lazenby 1970, 58-59). However, it is impossible to establish the exact chronological placement of these fragments within the wider LBA period based on Hope Simpson and Lazenby's original report.

[28] Morricone 1967; Hope Simpson-Lazenby 1970, 55, 60, fig. 5; Papazoglou 1981; Gregoriadou 1996; Skerlou 1993, 553; Skerlou 1997; Benzi 2005; Vitale 2012a, 1237-1238, tab. 2; Vitale-Trecarichi 2015, 315-316, tab. 2; Georgiadis 2012, 5-10; Marketou 2010a, 765; McNamee-Vitale 2016.

[29] Hope Simpson-Lazenby 1970, 59-60, fig. 6, pl. 21.

[30] Vitale-Blackwell-McNamee *forthcoming*.

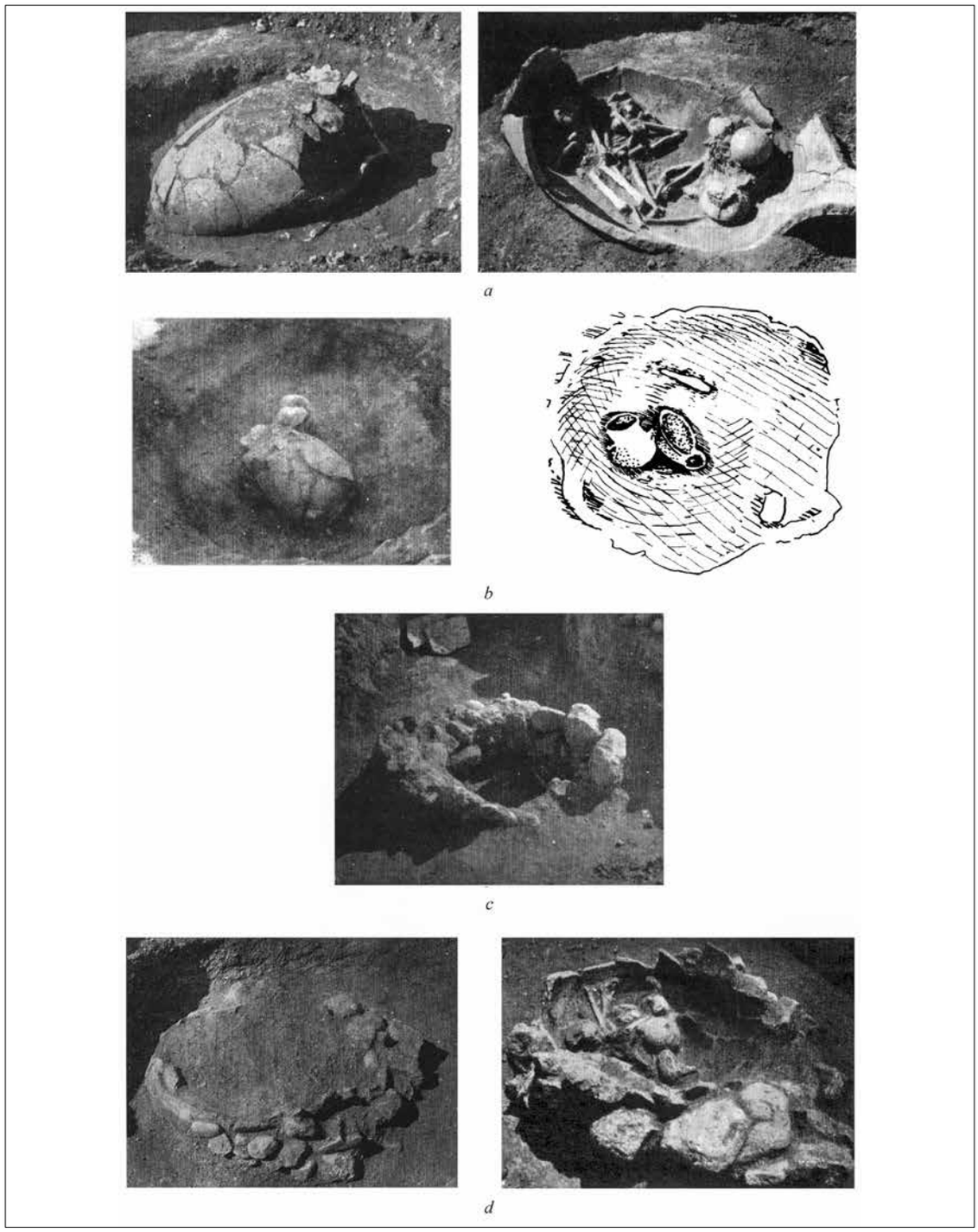

Fig. 10 - a: Asklupis Tomb 1; b: Asklupis Tomb 2; c: Asklupis Tomb 3; d: Asklupis Tomb 4 (after MORRICONE 1975, 263-266, 269, figs. 211-212, 214-215, 218, 221-222)

was large, measuring circa 6 hectares (Fig. 3:a)[31]. According to Morricone, City III yielded the most impressive remains within the LBA settlement. During City III, structures were aligned in a N-NW to S-SE direction (Fig. 3:b). Walls were built carefully with regularly cut slabs and stones and were preserved up to a height of 1.0 meter (Fig. 9)[32].

All of LH IIIC falls within Morricone's City IV (Tab. III)[33]. Unfortunately, the architectural remains from this phase were heavily disturbed by later building activities and thus the size of City IV cannot be securely determined. However, based on

[31] MORRICONE 1975, 388; VITALE 2006, 83-87, figs. 13-14; VITALE 2012a, 1238, tab. 1, fig. 7.
[32] MORRICONE 1975, 178-179, 206, 227-231, 245, 392-393, figs. 21, 64-66, 111-113, 154, 158-159, 188, 190, plan B.
[33] MORRICONE 1975, 227, 249-250, 393-394, figs. 154, 158-159, 190, plan B.

Tomb Nos.	Excavation and Tomb Characteristics			Human Remains						Finds		
	Excavation Date	Tomb Type	Tomb Orientation	Presence of Bones	Burial Position	Total MNI (According to Morricone and SELAP)	Sub-Total of MNI (According to SELAP)			Ceramics	Small Finds (Terracotta and metal)	Miscellaneous Finds not Published by Morricone
							M	F	?			
Tomb 1	May 8-11, 1943	Pithos	E-W Facing: East	YES (3 Crania + humeri, femora, tibiae, radii, ulnae, fibulae, pelvis)	Contracted	3	2	1	-	2 (Nos. 1268, 1269*)	1 Spindle whorl	4 1 - Closed ceramic shape 1- Copper Ring 1 - Incised terracotta spindle whorl 1 - Stone tool
Tomb 2	May 8-11, 1943	Pithos	? Facing: ?	NO	-	-	-	-	-	2 (Nos. 1270, 1271)	1 Dagger	-
Tomb 3	May 10, 1943	Stone-lined pit	E-W Facing: East	YES (Pair of femora)	Contracted ?	1	-	1	-	3 (Nos. 1272, 1273, 1274)	-	3 3 - Miscellaneous stone tools
Tomb 4	May 11-12, 1943	Pithos	E-W Facing: East	YES (3 Crania + humeri, clavicle, pelvis, femora, tibiae, rib)	Contracted ?	3	1	1	1	3 (Nos. 1275, 1276, 1277)	-	1 1 - Copper arrowhead
Stray Finds	N/A			YES	N/A	?**	?	?	?	-	-	-
Totals						7	3	3	1	10	2	8

* The small tankard no. 1269 was not placed within, but just outside of the burial pithos of Tomb 1.
** The stray human bones found during the excavations of Tombs 1-4 at the Asklupis have not been studied in detail yet.

Tab. VIII - Main Features of the Asklupis Tombs and Burials

the spread of LH IIIC stray finds, it seems that no change in dimensions occurred from City III[34]. City IV structures were aligned in a NW to SE direction with a slight change from City III (Fig. 9). Walls were less carefully built than those of City III with irregularly cut stones preserved for a single course only up to a height of 20 cm[35].

These data suggest the occurrence of a shift in architectural and construction practices at the 'Serraglio' between the Mycenaean Palatial and Postpalatial periods. In particular, the less impressive quality of City IV structures may indicate a decrease in the importance for the local community of a carefully built environment and a less organized use of the habitation space.

Salvatore Vitale - Calla McNamee - Toula Marketou

3.4 - Burial Landscape and Tomb Types at the Asklupis

In total, only four graves were exposed by Morricone at the Asklupis (Fig. 10), all dating to EBA 2 (Tab. II)[36]. Tombs 1, 2, and 4 were pithos burials, while Tomb 3 consisted of an irregular circle of stones, which may have represented a stone-lined pit (Tab. VIII). As Morricone's excavations were limited to four days between May 8th and 12th, 1943, it cannot be excluded that the original cemetery included more tombs. Considering the EBA settlement pattern in the area, however, it is also possible that the cemetery only served a small community for a short time.

The general features of the natural environment surrounding the Asklupis region have been

[34] MOUNTJOY 1999, 1097-1105, figs. 448-451; VITALE 2006, 87; VITALE 2012a, 1237, tab. 1.
[35] MORRICONE 1975, 393-394, fig. 154.
[36] MORRICONE 1950, 324-325, figs. 98, 101-102; MORRICONE 1975, 261-271, figs. 210-225; VITALE 2013.

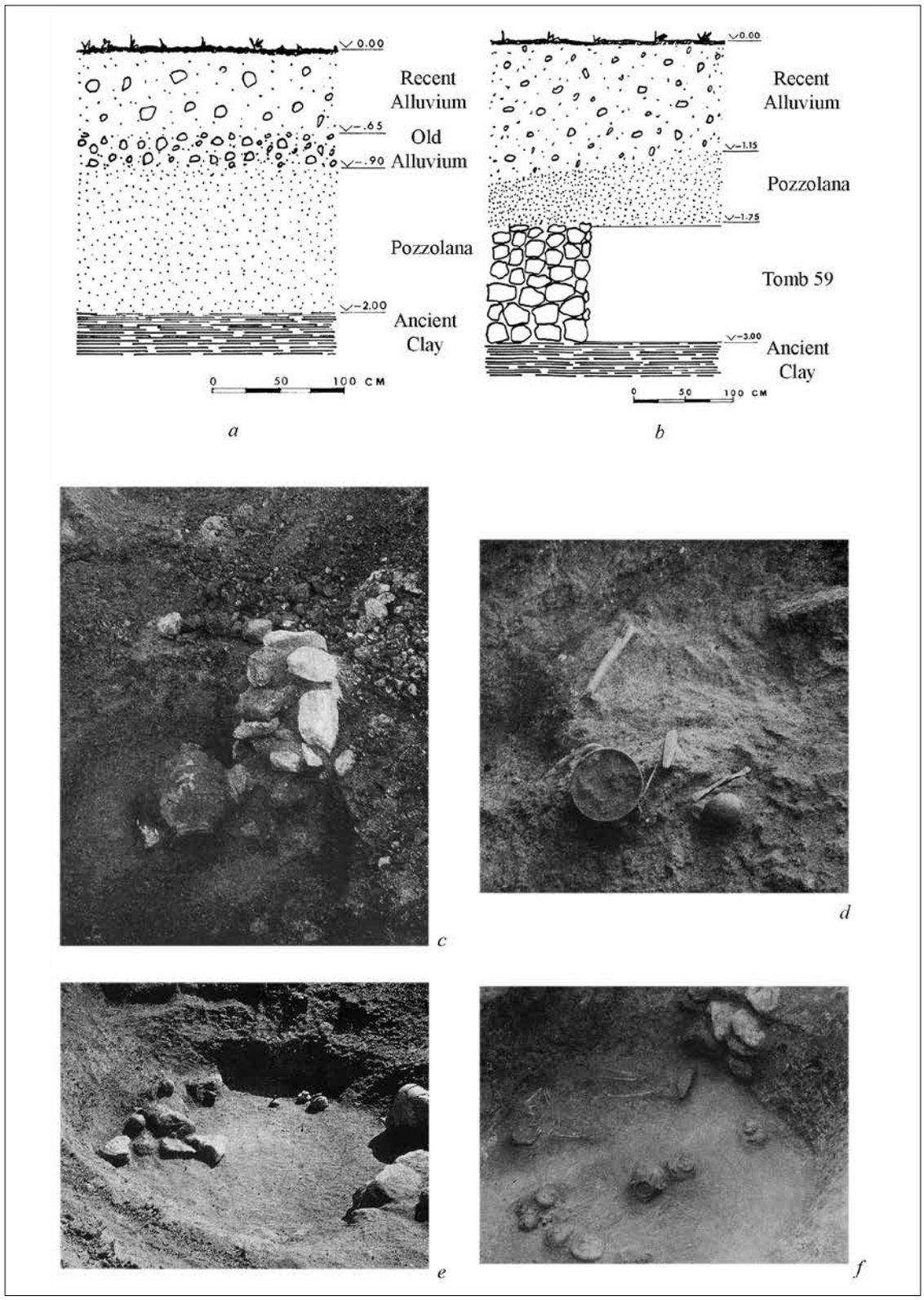

Fig. 11 - a-b: Reconstructed stratigraphic sections from Langada Tombs 45 and 59; c-f: Langada Tombs 58, 43, 38, and 59 (readapted by S. Vitale, after MORRICONE 1967, 178, 200, 208, 253, 255-256, figs. 188, 210, 219, 278, 281-282)

described above in section 3.2. In this context, it is important to stress that the EBA 2 cemetery was situated in close vicinity to numerous seasonal streams and drainages, such as the Platys, the Glykoperama, and the Anavolia (Fig. 5)[37]. The presence of watercourses is a recurrent element in

[37] VITALE 2013, 49-51, fig. 2.

the Koan EBA 2 burial landscape. In fact, in addition to the Asklupis, the burials discovered in the Mesaria area and in the territory of the present-day Hippokrateion Foundation, E of the Asklepieion, were also located near streams[38]. The presence of water may have served practical purposes, such as the accomplishment of burial operations, as well as the performance of ritual practices[39].

Asklupis Tombs 1, 2, and 4 had an E-W orientation with the pithos mouths facing W. The orientation of Tomb 3 remains unclear (Tab. VIII). The burial pithos of Tomb 4 was surrounded on three sides by a semi-circle of stones (Fig. 10:d). Stones and pebbles were also used to support the shoulder and neck of the burial pithos of Tomb 1 and possibly as capstones in the case of Tomb 4 (Fig. 10:a, d)[40].

During the EBA, both pithos graves and stone-lined pits have their closest parallels in W coastal Anatolia, as well as in inland W Anatolia[41], where the pithos grave was the most common form of interment, especially in the second half of the period[42].

Salvatore Vitale

3.5 - Space and Architecture at Eleona and Langada

During the last four years, SELAP has undertaken a comprehensive restudy of the natural stratigraphy, burial landscape, space, and architecture at the cemeteries of Eleona and Langada. Here, only a brief summary of SELAP's results is provided, with specific emphasis on architecture, tomb typology, and spatial analysis. A more in-depth report, including a reconstruction of natural stratigraphy and ancient landscape, will be published elsewhere.

Eleona and Langada were located on the opposite sides of an alluvial drainage (Figs. 1, 6, 11-12). Most of the tombs were set into pozzolana layers, a relatively soft material for the construction of chamber tombs. Other graves were set into both alluvium and pozzolana or, to a lesser extent, into a deeper and harder clay stratum (Fig. 11:a-b)[43]. The geological characteristics of the Eleona and Langada area are thus not ideal for a chamber tomb cemetery. This fact implies that the location must have been selected based on other criteria. More specifically, the choice may have been dictated by the distance from the 'Serraglio' and the presence of a watercourse, two features that fall within the typical range of Mycenaean burial behavior[44].

The exact position of the Eleona tombs is uncertain, due to the loss of the excavation diaries. Morricone states that they were all built in a single row on the slope of a low hill facing N. More precise information is available for Langada, where the resolution of the data, although coarse when compared to modern standards, permits a fuller reconsideration of the evidence[45].

In 1936, the Ephor L. Laurenzi reported for the first time on the discovery of the cemeteries and stated that the graves were Mycenaean simple pits[46]. By contrast, in his first discussion of his excavations at Eleona and Langada, Morricone claimed that the graves were all collapsed chamber tombs, each accessible through an identified *dromos*[47]. Finally, in 1967, Morricone confirmed that the graves were all collapsed chamber tombs, but stated that the original cuts for *dromoi* and chambers were difficult to recognize, because of the crumbly consistence of the alluvial and pozzolana sediments into which most of the tombs were dug[48]. More specifically, Morricone mentioned only five instances where he could tentatively identify the traces of a *dromos*, including Langada Tombs 35, 40, 48, 58 (Fig. 11:c), and 60[49].

SELAP's recent restudy of the evidence seriously questioned Morricone's final attribution and suggested that 17 of the 61 graves from Langada may have been simple pits (Fig. 11:d) rather than chamber tombs (Tab. IX). This reconstruction is based on the fact that these 17 graves do not exhibit any of the diagnostic features that characterize Mycenaean chamber tombs, including the occurrence of multiple interments, *dromoi*, and/or built architectural features, such as closure walls, benches, and platforms[50].

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[38] Marketou 2004, 20-23; Christopoulou 2008.

[39] Georgiadis 2003, 34, 47-48.

[40] Morricone 1975, 263-266, 268-269, figs. 211-212, 214-215, 218, 221-222; Vitale 2013, 51-52, fig. 3.

[41] Özgüç 1948; Stech Wheeler 1974; Pecorella 1984; Massa-Şahoğlu 2011, 167; Vitale 2013, 52.

[42] Massa 2014, 78-81; Massa-Şahoğlu 2011, 167.

[43] Morricone 1967, 13-17; McNamee-Vitale 2016.

[44] See Mee-Cavanagh 1990, 225, 229-230; Gallou 2005, 61-62 (both with previous bibliography).

[45] Morricone 1967, 22-25.

[46] Laurenzi 1936, 141.

[47] Morricone 1950, 323-324.

[48] Morricone 1967, 13-25.

[49] Morricone 1967, 11, 22, 169, 195, 229, 253, 260.

[50] McNamee-Vitale 2016. If the same criteria were applied to Eleona, the minimum number of chamber tombs from this cemetery would be 14.

Type	LH IIIA2	LH IIIB	LH IIIC Early	LH IIIC Middle	Not Datable	Total
Pits	3, 16 (2; 11.8%)	36, 46 (2; 11.8%)	22, 23, 24, 26, 43 (5; 29.4%)	1, 2, 8, 18, 32, 33, 47 (7; 41.1%)	42 (1; 5.9%)	17 (100.0%)
Chamber Tombs	25, 29, 37, 38, 41, 51, 54, 56 (8; 18.2%)	10, 15, 19, 20, 21, 28, 30, 35, 40, 48, 49, 52, 53, 57, 59, 60 (16; 36.4%)	4, 5, 6, 11, 13, 17, 31, 44, 61 (9; 20.4%)	9, 14, 34, 39, 45, 50, 55 (7; 15.9%)	7, 12, 27, 58 (4; 9.1%)	44 (100.0%)
Total	10 (16.4%)	18 (29.6%)	14 (22.9%)	14 (22.9%)	5 (8.2%)	61 (100.0%)

Tab. IX - Chronological Distribution of Tomb Types at Langada according to their Construction Date

Cultural Phases	Chamber Tombs	Pits	Total
Palatial Period	24 (85.7%)	4 (14.3%)	28 (100.0%)
Postpalatial Period	16 (57.1%)	12 (42.9%)	28 (100.0%)
Not Datable	4 (80.0%)	1 (20.0%)	5 (100.0%)
Total	44 (72.1%)	17 (27.9%)	61 (100.0%)

Tab. X - Distribution of Tomb Types at Langada by Broad Cultural Phases according to their Construction Date

The chronological distribution of the 44 indisputable chamber tombs identified at Langada reveals the existence of interesting trends (Fig. 11:c, e-f). First, LH IIIB is the most impressive building phase, followed by LH IIIC Early, LH IIIA2, and LH IIIC Middle (Tab. IX). This trend is confirmed, when all the graves from Langada or the combined graves from Eleona and Langada are considered together, regardless of their type, with LH IIIB being the most prominent building phase with 18 out of 61 tombs at Langada and 22 out of 83 tombs at Eleona and Langada (Tab. IV). Second, there is a striking contrast between the construction of indisputable chamber tombs during the Palatial and the Postpalatial phases of the Mycenaean civilization (Tab. X). In fact, chamber tombs built during the former period account for 24 out of 28 cases (85.7%), while during the latter they make up only 16 out of 28 cases (57.1%).

A difference between the Palatial and Postpalatial phases of Mycenaean burial practices on Kos is also observable when the shape of the chambers and the use of space are considered. At Langada, during LH IIIA2 and LH IIIB there was a clear preference for roughly circular chambers, which accounted for 9 out of the 24 total chamber tombs, and represented 37.6% (Tab. XI). Other types included two roughly rectangular and two

Approximate Shape of Chambers	Palatial Period			Postpalatial Period			Not Datable	Total
	LH IIIA2	LH IIIB	Sub-Total	LH IIIC Early	LH IIIC Middle	Sub-Total		
Circular	4	5	9 (37.6%)	1	3	4 (25.0%)	- (0.0%)	13 (29.6%)
Rectangular	-	2	2 (8.3%)	3	2	5 (31.3%)	- (0.0%)	7 (15.9%)
Square	-	2	2 (8.3%)	1	-	1 (6.2%)	- (0.0%)	3 (6.8%)
Uncertain	4	7	11 (45.8%)	4	2	6 (37.5%)	4 (100.0%)	21 (47.7%)
Total	8	16	24 (54.5%)	9	7	16 (36.4%)	4 (9.1%)	44 (100.0%)
Average Area (m^2)	3.55	4.89	4.48	4.00	4.13	4.06	N/A	4.29

Circular: L. Ts. 25, 29, 37, 38 (LH IIIA2), 35, 40, 52, 53, 57 (LH IIIB), 61 (LH IIIC Early), 39, 45, 50 (LH IIIC Middle).
Rectangular: L. Ts. 21, 60 (LH IIIB), 4, 6, 13 (LH IIIC Early), 9, 14 (LH IIIC Middle).
Square: L. Ts. 10, 59 (LH IIIB), 17 (LH IIIC Early).
Uncertain: L. Ts. 41, 51, 54, 56 (LH IIIA2), 15, 19, 20, 28, 30, 48, 49 (LH IIIB), 5, 11, 31, 44 (LH IIIC Early), 34, 55 (LH IIIC Middle), 7, 12, 27, 58 (not datable).

Tab. XI - Chronological Distribution of Tomb Chamber Shapes at Langada

roughly square forms (individually accounting for 8.3%), while the shape of 11 chamber tombs (45.8%) could not be identified. During LH IIIC Early and Middle, on the other hand, of the 16 indisputable chamber tombs, four had a roughly circular chamber (25.0%), five had a roughly rectangular chamber (31.3%), and one had a roughly square chamber (6.2%), while the shape of six chambers (37.5%) could not be determined (Tab. XI).

Turning to spatial analysis, the distribution of LH IIIA2 and LH IIIB tombs reflects an organized use of the area, with the tombs being roughly linearly aligned and widely spaced across the whole field (Fig. 12:a-b). By contrast, the distribution of the burials during LH IIIC Early and Middle implies a more casual use of space, with the occurrence of tombs clustered in close proximity to one another (Fig. 12:c-d).

The chamber tomb is the Mycenaean grave type *par excellence* and definitely requires more building efforts than digging simple pit graves. The higher incidence of chamber tombs built during LH IIIA2 and LH IIIB (Tabs. IX-X) suggests a strong emphasis on the Mycenaean cultural component of the Koan funerary landscape in the Palatial period. The more pronounced construction efforts required to build chamber tombs, the preference for a specific chamber shape, as well as the occurrence of a well-planned use of the space during LH IIIA2 and LH IIIB are indicative of a clearly defined and organized social structure. By contrast, during LH IIIC Early and Middle, the more frequent occurrence of a less formalized burial type, such as pit graves, together with the increased variability in chamber tomb shape and the less organized use of space, implies the existence of a more fluid social structure. At the same time, despite the increased incidence of pit graves, when the total number of tombs in use is considered, it is clear that chamber tombs were still largely predominant during the Postpalatial period, account-

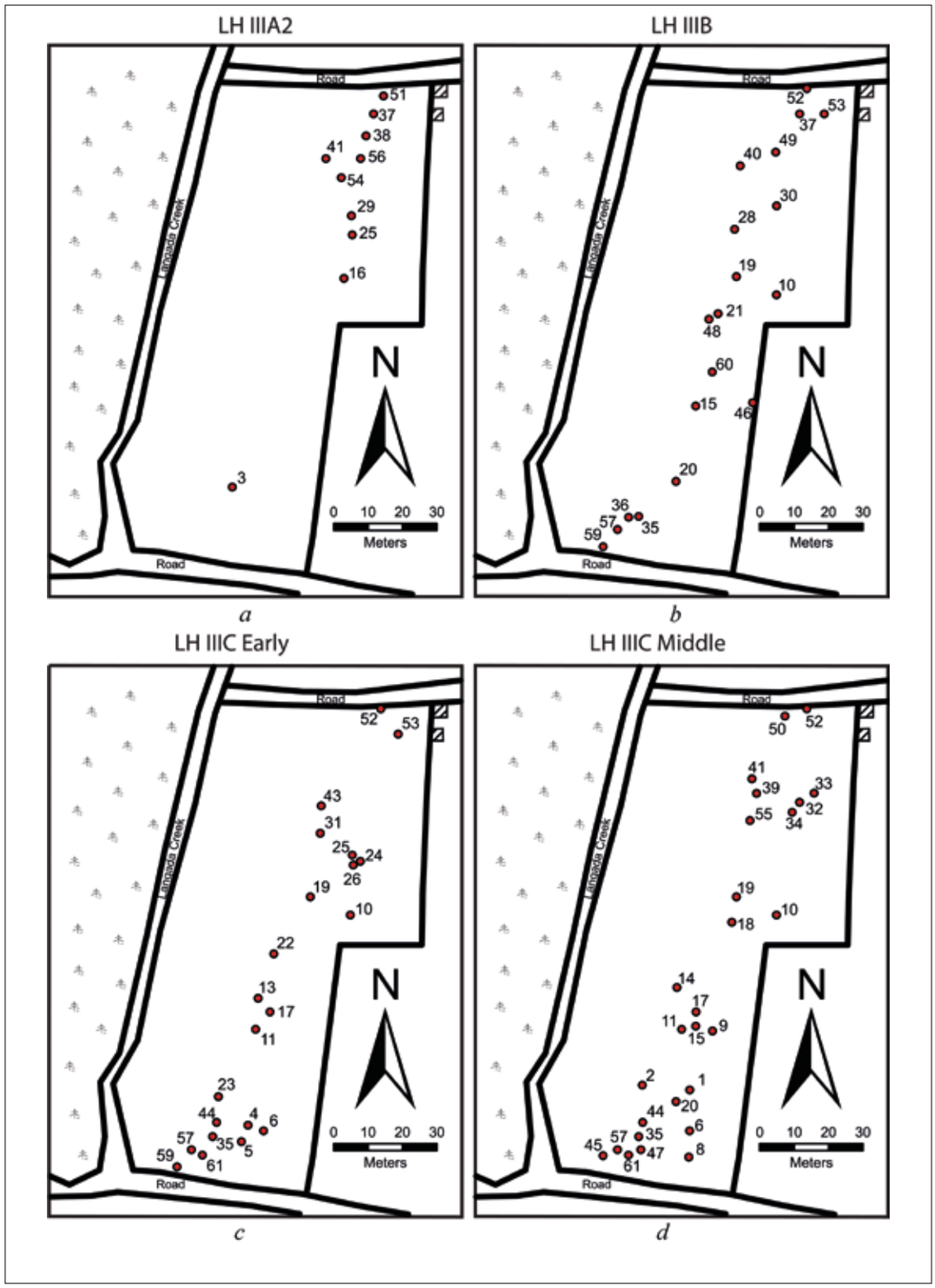


Fig. 12 -Spatial distribution of the tombs used at Langada during LH IIIA2, LH IIIB, LH IIIC Early, and LH IIIC Middle. The exact position of the tombs from the Eleona cemetery, located in the field immediately W of Langada creek, is unknown (C. McNamee - S. Vitale)

ing for 77.3% in LH IIIC Early and 74.1% in LH IIIC Middle (Tab. XII). These data demonstrate that Mycenaean architecture remained the prominent component of the Koan funerary landscape also after the end of the Palatial period.

Calla McNamee - Salvatore Vitale

4 - OSTEOLOGICAL REMAINS AND BURIAL PRACTICES

The initial analysis of the human bones from the cemeteries of the Asklupis, Eleona, and Langada was completed in 2012 by C. Mantello, provid-

ing information on the paleodemographic and paleopathological profile of the individuals, as well as data on ergonomic factors. During 2015, a new aspect of SELAP's study of these materials has been undertaken by the coauthors of this section, aiming to reconstruct in greater details burial practices, ancient diet, subsistence patterns, and mobility. This in-depth and more recent analysis of Koan human bones has resulted in the re-evaluation and partial revision of the data obtained until 2012. Within the following paragraphs, in addition to a brief summary of the results accomplished thus far, our questions and plans for future research are also presented.

4.1 - The Asklupis

Human bones were discovered in all Asklupis graves except for Tomb 2 (Fig. 13:a-b; Tab. VIII). The minimum number of individuals is seven, as Tombs 1 and 4 were used for more than one interment. The remains belonged to three males and three females, while in one case the sex could not be determined[51]. The even occurrence of male and female individuals conforms to the norm of contemporaneous cemeteries in W Anatolia, where both sexes are usually represented in fairly equal numbers[52]. All skeletons belonged to adults. The complete absence of children may be considered unusual. While this feature is worth noting, it should be stressed that all of the potential peculiarities represented in the Asklupis burials may depend on the small sample size and the possibility that only part of the cemetery was identified and excavated.

The analysis of ergonomic factors suggests that the Asklupis individuals were involved in repeated physical activities. This is indicated by the frequent occurrence of musculoskeletal indicators of stress, such as areas of pronounced muscle insertions on the bones[53]. The preliminary results of SELAP's analysis of funerary treatments indicates that one of the three burial pithoi did not preserve any bones, while two contained a minimum of three individuals each (Tab. VIII). The stone-lined pit, on the other hand, preserved only a few fragments of the femora of a single female individual. None of the skeletons was found undisturbed in a correct anatomical position. Morricone recognized some partial articulation of hyperflexed lower limb bones in Tomb 1 and assumed that they should belong to the last interment (Fig. 10:a). This indicates that this individual must have been placed in a contracted position in a E-W orientation with the head to the E, towards the mouth of the pithos (Tab. VIII). This placement follows exactly contemporaneous W Anatolian customs[54].

The data presented above demonstrate that the Asklupis tombs were re-used for multiple burials and thus indicate some form of secondary treatment of the earlier interments. In contemporary western Anatolian cemeteries, variable secondary treatment practices have been observed. These include pushing the whole skeleton of the previous burial to the side for the new interment, retaining only selected bones, and/or clearing out almost completely the remains of the previous skeletons[55]. In the case of the Asklupis, the identification of extra-numerous skulls and long bones may indicate that some bones from earlier interments were retained. However, additional analysis is necessary to reveal specific details of this practice and to investigate its potential social meanings. In particular, an in-depth taphonomic study of the osteological remains is crucial to assess factors that may have impacted the preservation of the current sample. In addition to excavation biases, the Asklupis burials, which were located along a drainage, may have been impacted by soil moisture and/or water exposure[56]. These factors are certainly evident not only on the osteological remains, but also on the surface of some of the ceramic vessels from the tombs[57]. The absence of intact interments, the dearth of individuals preserving small and fragile skeletal elements, the lack of human remains from Tomb 2, and the occurrence in Tomb 3 of only two poorly preserved femoral fragments could all also be partially due to poor preservation[58]. The taphonomic study of the osteological remains from the Asklupis burials is currently on-going and the final results will be presented elsewhere.

Salvatore Vitale - Ioanna Moutafi - Efrossini Vika

[51] On the human remains from the Asklupis, see also Morricone 1975, 263-270; Vitale 2013, 52, tab. 2.
[52] Massa 2014; Massa-Şahoğlu 2011.
[53] Vitale 2013, 52.
[54] Vitale 2013, 52, tab. 2 (with previous bibliography).
[55] Massa 2014, 78-82; Massa-Şahoğlu 2011, 167.
[56] Morricone 1975, 261-263.
[57] See Vitale 2013, 53, 56, 60, figs. 4-7.
[58] Morricone 1975, 263-270; Vitale 2013, 52, tab. 2.

a

b

c

d

Fig. 13 - a-b: Human osteological remains from Asklupis Tomb 1; c-d: Human osteological remains from Langada Tombs 15 and 36 (C. Mantello)

Type	Chamber Tombs			Pits	Total
	Built	Re-used	Sub-Total by Phase		
LH IIIA2	25, 29, 37, 38, 41, 51, 54, 56 (8)	-	8 (80.0%)	3, 16 (2; 20.0%)	10 (100.0%)
LH IIIB	10, 15, 19, 20, 21, 28, 30, 35, 40, 48, 49, 52, 53, 57, 59, 60 (16)	37 (1)	17 (89.5%)	36, 46 (2; 10.5%)	19 (100.0%)
Sub-Total Palatial Period	25 (86.2%)			4 (13.8%)	29 (100%)
LH IIIC Early	4, 5, 6, 11, 13, 17, 31, 44, 61 (9)	10, 19, 25, 35, 52, 53, 57, 59 (8)	17 (77.3%)	22, 23, 24, 26, 43 (5; 22.7%)	22 (100.0%)
LH IIIC Middle	9, 14, 34, 39, 45, 50, 55 (7)	6, 10, 11, 15, 17, 19, 20, 35, 41, 44, 52, 57, 61 (13)	20 (74.1%)	1, 2, 8, 18, 32, 33, 47 (7; 25.9%)	27 (100.0%)
Sub-Total Postpalatial Period	37 (75.5%)			12 (24.5%)	49 (100%)
Not datable	7, 27, 58 (3; 60.0%)	12 (1; 20.0%)	4 (80.0%)	42 (1; 20.0%)	5 (100%)

Tab. XII - Chronological Distribution of Tomb Types at Langada by Periods of Use and Re-Use

Total No. of Tombs	Tombs with Bones in Morricone's Sample	Tombs with Bones in SELAP's Sample	Minimum Number of Individuals	
			Morricone	SELAP (According to Mantello)
83	46* (55.4% of total number of tombs)	22** (48.9% of tombs with bones)	82	29
* E. T. 21; L. Ts. 1, 4, 5, 6, 7, 9, 10, 11, 12, 14, 15, 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 29, 30, 34, 35, 36, 38, 40, 42, 43, 44, 45, 46, 47, 48, 49, 50, 52, 53, 55, 57, 58, 59, 60, 61. ** E. Ts. 20, 22; L. Ts. 15, 17, 19, 24, 25, 26, 27, 30, 34, 35, 36, 37, 40, 42, 44, 45, 53, 57, 58, 59.				

Tab. XIII - Tombs with Human Bones and Minimum Number of Individuals at Eleona and Langada

4.2 - Eleona and Langada

According to Morricone's original report, human bones were found within 46 of the 83 tombs excavated at Eleona and Langada (Fig. 13:c-d, Fig. 14; Tab. XIII). This low number may be due to three elements: the inadequate quality of the excavation procedures, the bad degree of preservation of the bones within the pozzolana layers, and the extensive use of secondary treatments. Of these, the latter would have been a factor impacting the bones represented in the sample from antiquity.

The loss of some of the finds from Morricone's excavations during World War II, on the other hand, is responsible for the reduced assemblage available today, which includes osteological remains from only 22 tombs (Tab. XIII). It should also be noted that, in the case of some of these tombs, the osteological remains under SELAP's study consist only of a few bones (Fig. 13:c) and/or teeth and do not include all of the materials originally recovered by Morricone. For these reasons, the minimum number of 29 individuals calculated according to SELAP's information cannot be used for in-depth demographic analysis (Tab. XIII). In the following paragraphs, some highlights of the study of ergonomic factors, paleopathology, and burial rites are provided, while detailed information on the sex and age of the deceased will be published elsewhere[59].

[59] On the osteological remains from Eleona and Langada, see also MORRICONE 1967; VITALE 2012a, 1243-1244.

According to the results of osteological analysis, femora and humeri from male individuals buried at Eleona and Langada exhibit various indicators of physical stress, which seem to be attributable to more than the simple aging process and may reflect a lifestyle that involved habitual physical activity. Several males also show evidence of irregular dental wear. In addition, three male individuals from Tombs 17, 24, and 40 at Langada show unusual depressed lesions potentially caused by blunt force. The location of the lesions on the arm in the case of the individual from Tomb 24 (Fig. 14:a) and on the skull in the case of the individuals from Tombs 17 and 40 (Fig. 14:b-c) might be an indication of involvement in physical conflict[60].

Robust muscle insertions in male individuals may suggest occupation in heavy activities, such as agriculture[61], while the deceased exhibiting irregular dental wear may have been involved in fishing. In this case, the irregular dental wear would have been caused by continuous work with fishnets. The importance of fishing is also indirectly suggested by the discovery, among the unpublished stray finds, of 18 lead rectangular or square fishing weights at Eleona and Langada (Fig. 15:a-d).

The funerary treatments documented at Eleona and Langada show that the Koan community living at the nearby settlement of the 'Serraglio' was utilizing the defining characteristics of Mycenaean burial practices[62]. In addition to the ideological implications connected to the widespread use of the chamber tomb type (Fig. 11:c, e-f), Mycenaean features include the prevalent use of inhumation, the occurrence of multiple burials and secondary treatments of the bones, the performance of drinking rituals in the *dromoi* (Fig. 15:e-f)[63] and burning rituals within the chambers[64], the ritual killing of weapons[65], and the repertoire of the objects buried with the deceased[66]. As far as the latter is concerned, the occurrence of specific ritual/cultic vases, such as rhyta FS 201 (Fig. 15:g), strainer jugs FS 155, 157 (Fig. 15:h-i), askoi FS 194 (Fig. 16:a), and ring vases FS 196, the presence of terracotta figurines (Fig. 16:b), and the use of the typical Mycenaean range of jewelry (Fig. 16:c-g), weapons (Fig. 17:a-b), and bronze implements (Fig. 17:c -e) are particularly impressive.

a

b

c

Fig. 14 - Human osteological remains from Langada Tombs 24, 17, and 40 (C. Mantello)

The adoption of Greek mainland funerary treatments, however, does not imply the absence of idiosyncrasies. In this respect, one of the most important results of SELAP's study concerns the incidence of cremation (Tab. XIV). Morricone recognized only one case from Langada Tomb 44 assignable to LH IIIC Early or Middle SELAP's analysis identified three additional secure cases from Eleona Tomb 20 (LH IIIB or LH IIIC Early) and Langada Tombs 15 (LH IIIB or LH IIIC Middle; Fig. 13:c) and 34 (LH IIIC Middle). Small fragments of human remains that show burnt-like traces also come from Langada Tombs 37 (LH IIIA2 or LH IIIB) and 53 (LH IIIB, LH IIIC Early,

[60] VITALE 2012a, 1244.

[61] VITALE 2012a, 1243.

[62] VOUTSAKI 2001, 209-211; GEORGIADIS 2003, 106-110.

[63] See MORRICONE 1967, 195-196, no no. and nos. 154, 1338, figs. 201-202 (Langada Tomb 40), 260, 262-264, nos. 247, 249, figs. 289, 291 (Langada Tomb 60).

[64] MORRICONE 1967, 25, 136 (Langada Tomb 21), 148 (Langada Tomb 25), 247 (Langada Tomb 57), 265 (Langada Tomb 61).

[65] MORRICONE 1967, 137-138, fig. 122 (Tomb 21).

[66] For a general discussion of the offerings from Eleona and Langada in their wider SE Aegean context, see GEORGIADIS 2003, 82-83, 103-105.

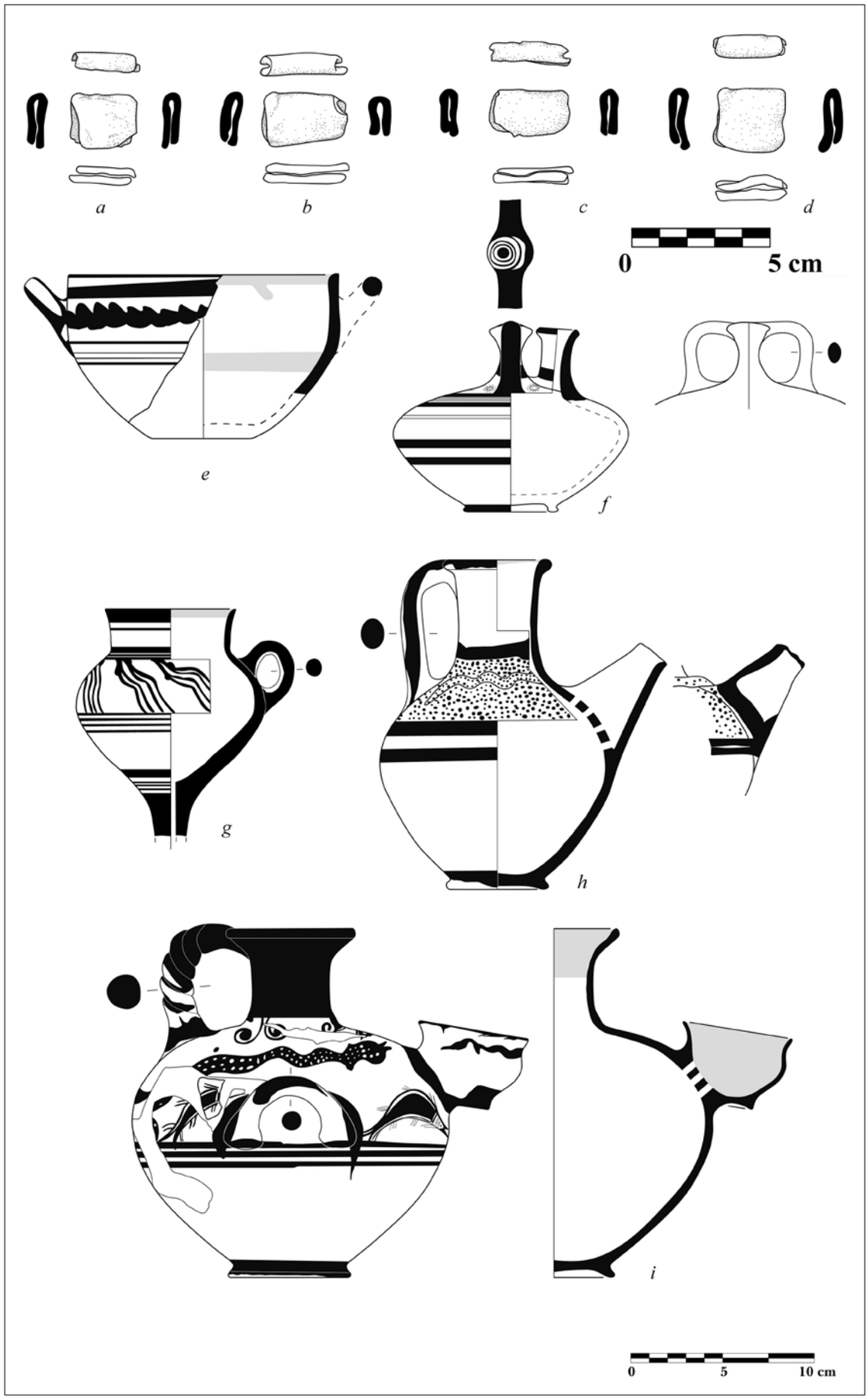


Fig. 15 - a-d: Stray lead fishing weights from Langada; e-f: Vessels from the *dromos* of Langada Tomb 40, nos. 154, 1338; g-i: Mycenaean ritual vessels from Langada Tombs 51, 52, and 39, nos. 202, 205, 151 (a-e, g-h: M. Rossin - T. Ross; f, i: S. Regio - M. Rossin - T. Ross)

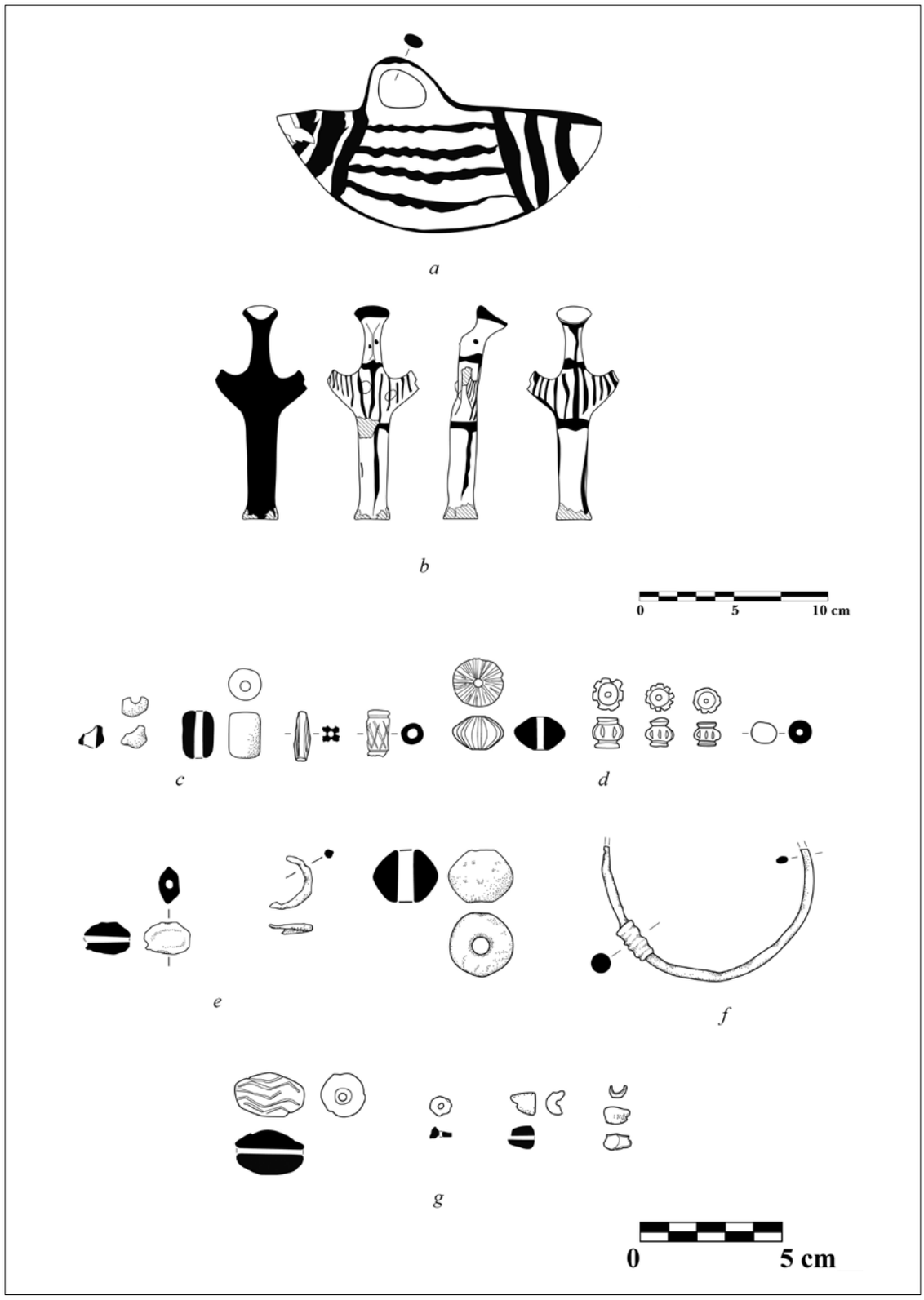


Fig. 16 - a: Askos FS 194 from Langada Tomb 17, no. 57; b: Psi figurine from Langada Tomb 57, no. 224; c-g: Adornments from Elena Tomb 22 and Langada Tombs 38, 21, 24, and 57 (a: S. Regio - M. Rossin - T. Ross; b-e, g: M. Rossin - T. Ross; f: S. Regio - T. Ross)

or LH IIIC Middle). The evidence for these last two cases is at the moment controversial and even if more in-depth analysis should demonstrate that these fragments were in fact burnt, this may not necessarily prove the occurrence of cremation. In any case, considering the small dimensions of SE-LAP's sample, which represents less than half of the original assemblage (Tab. XIII), these data suggest that the incidence of cremation at Eleona and Langada was more significant than previously

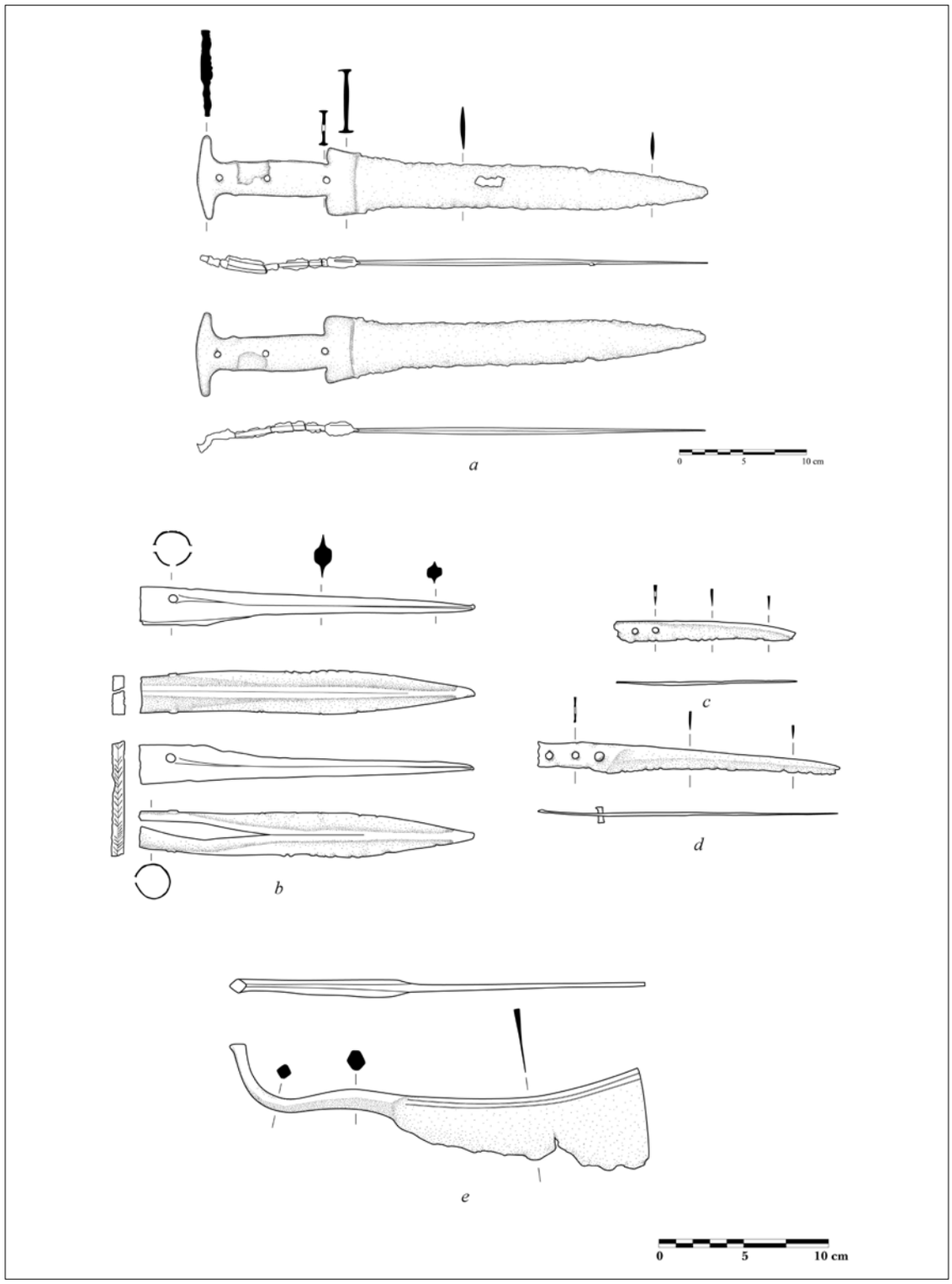


Fig. 17 - LH IIIB2 Late bronze weapons and implements from Langada Tomb 46
(a-d: S. Regio - T. Ross; e: M. Rossin - T. Ross)

known based on Morricone's published evidence. It is worth noting that some of the Koan cremations may reach back to the Mycenaean Palatial period, being only slightly later than the earliest cases from Müsgebi and Rhodes (Tab. XIV)[67]. Other significant Koan preferences in terms of funerary practices may have included the exclusive use of the contracted position for the deposition of the bodies (Fig. 11:f), the burial of a child in a pithos placed within the *dromos* of Langada Tomb 58

[67] Boysal 1967, 37-39; Benzi 1992, 230-231, 268.

Sites	LH IIIA2 or LH IIIB	LH IIIB or LH IIIC Early	LH IIIB or LH IIIC Early or LH IIIC Middle	LH IIIB or LH IIIC Middle	LH IIIC Early or LH IIIC Middle	LH IIIC Middle	Total
Eleona T. Nos.	-	-	T. 20* (1)	-	-	-	1*
Langada T. Nos.	T. 37 (?) (1)	T. 53 (?) (1)	-	T. 15* (1)	T. 44* (1)	T. 34* (1)	3* + 2 (?)

Tab. XIV - Tombs including Secure (*) and Possible (?) Burnt Human Remains in SELAP's Sample

(Fig. 11:c)[68], and the relatively widespread occurrence of Local Tradition ceramic vessels[69] and large-sized Mycenaean type piriform jars among the pottery accompanying the deceased[70].

These idiosyncrasies suggest that, while adopting Greek mainland funerary practices and beliefs, the Koan community may have also combined these features with the island's local traditions, thus creating a distinctive Koan repertoire of Mycenaean burial practices[71]. In order to establish more thoroughly the character of Koan Mycenaean burial practices, additional research is essential, particularly in terms of body treatment.

Salvatore Vitale - Efrossini Vika - Ioanna Moutafi - Cinzia Mantello

4.3 - Isotope Analysis

The diverse geological setting of the NE Koan region (Figs. 1, 5-6), including hilly areas and at the same time proximity to both the sea and freshwater sources, sets an ideal background to study how the natural environment could have been exploited for subsistence purposes. To initiate the study of these aspects through isotope analysis, a detailed assessment of the osteological remains from the Asklupis, Eleona, and Langada was accomplished during SELAP's 2015 study season. Isotope analysis involves extracting the organic or mineral part of the bone, depending on the isotope to be measured. The bone isotope values are then compared against the faunal and environmental values, on the premises that humans are not only what they eat, but also where they eat. Because isotopes are determined by local geologies, plant photosynthesis, and the food chain, they are used to reconstruct the direct link between the consumer and the product of consumption.

Specific projected gains of isotope analysis of the Koan materials include: reconstructing EBA and LBA local dietary patterns, assessing reliance on fishing and hunting, and investigating locality of arable lands and pastures. This information will be particularly valuable for understanding the relationship between human activities and landscape resources and will help clarify the character of the occupation in the Asklupis area.

In addition to paleodietary reconstructions, SELAP's research team will measure strontium isotopes from human teeth to investigate mobility patterns in the wider NE Koan region. Strontium analysis will establish whether the deceased from the Asklupis, Eleona, and Langada were locals or not and whether their geographic origin can be used to interpret parallels with other contemporary cultural assemblages in neighboring areas. This analysis may also revel if any links of common geographic descent existed among the individuals buried together in the Koan cemeteries at the Asklupis, Eleona, and Langada[72].

Efrossini Vika - Salvatore Vitale

[68] For the exclusive use of the contracted position, see Morricone 1967, 28-29. The pithos burial in the *dromos* of Langada Tomb 58 may reflect Koan local traditions reaching back to the EBA period, as in the case of the Asklupis cemetery (VITALE 2013).

[69] VITALE-TRECARICHI 2015, 332, note 36.

[70] As far as the widespread presence of large-sized piriform jars is concerned, Eleona and Langada may have followed similar patterns to those documented in contemporary cemeteries on Mycenaean Rhodes (see EERBEEK 2012).

[71] See GEORGIADIS 2003, 106-110. For a different opinion, see VOUTSAKI 2001, 209-211.

[72] On isotope analysis and paleodiet, see SCHOENINGER-DE NIRO 1986. On strontium isotope analysis, see BENTLEY 2006.

5 - Finds

Between 2011 and 2015, SELAP's study of the Koan finds was focused mainly on ceramics, miscellaneous stone tools, weapons, bronze implements, jewelry, and loomweights. In the following sections of this report, some highlights of the results are provided together with plans for future research.

5.1 - Ceramic Classification

During the last four years, the study of the local pottery assemblage led to the definition of the Koan Ceramic Classification System (KCCS), a comprehensive analytical tool organized according to four hierarchically applied criteria (Tab. XV)[73]: (a) Pottery tradition (Local *vs.* Entangled *vs.* Minoan *vs.* Mycenaean); (b) Decorative treatment (Painted *vs.* Unpainted); (c) Color (Pale *vs.* Grey *vs.* Red *vs.* Dark *vs.* Black); and (d) Size of non-plastic inclusions ('Fine' *vs.* 'Medium-Coarse' *vs.* 'Coarse').

The surfaces of vessels from monochrome classes are coated with a dark-firing slip or wash. According to their firing conditions, the color of unpainted classes may be pale or grey. Unpainted pale ceramics can be 'Fine', when the largest inclusions do not exceed 2 mm, 'Medium-Coarse', when the largest inclusions are between 2 and 4 mm, or 'Coarse', when the largest inclusions exceed 4 mm.

The KCCS is designed as a flexible and open scheme, which can be easily expanded whenever a new class is recognized. Its main advantages are to be readily applicable and to offer a useful framework for the interpretation of broad diachronic developments within the local pottery assemblage. Thus far, 22 classes were recognized within this system.

Local Tradition ceramics are dated between the LN/FN and the end of the LBA period. They are characterized by a preference for biconical profiles, slit handles, handle attachments on the neck rather than on the rim of closed shapes, burnished or wiped surfaces, monochrome decorative schemes on painted pottery, and plastic bands to decorate extensive parts of the vessel body and/or to emphasize critical structural transitions[74]. Most of these defining features of Local Tradition ceramics were elaborated between the EBA 2 and the MBA, when Kos belonged to a cultural assemblage including the Dodecanese, the Aegean islands located in the vicinity of the Anatolian coast, and the W Anatolian coast. Five of the Local Tradition classes, including 'Monochrome Red', 'Monochrome Dark', 'Unpainted Pale Fine', 'Unpainted Pale Medium-Coarse', and 'Unpainted Pale Coarse' pottery were produced from the EBA 2 to end of the LBA period, representing an impressive element of continuity of the Koan local tradition[75].

Minoan and Mycenaean tradition classes include locally produced vessels characterized by shapes and/or decorative treatments of Cretan and Greek mainland origin. A wide range of painted and unpainted vessel types were produced within the Mycenaean tradition classes from LBA IB/LH IIA to LH IIIC Middle. Minoan tradition classes, on the other hand, included a limited repertoire of unpainted shapes, mostly assignable to the phases between LBA IA Early/Late Minoan (LM) IA Early-Advanced and LBA IB/LM IB (Tab. XV).

'Entangled' classes date between LBA IA Early and LBA IIIA1 and merged Local Tradition and Minoan features in a new stylistic language[76]. This is a unique Koan phenomenon and represents the intriguing response of the local community of potters to the impact of Minoan cultural influence on the island.

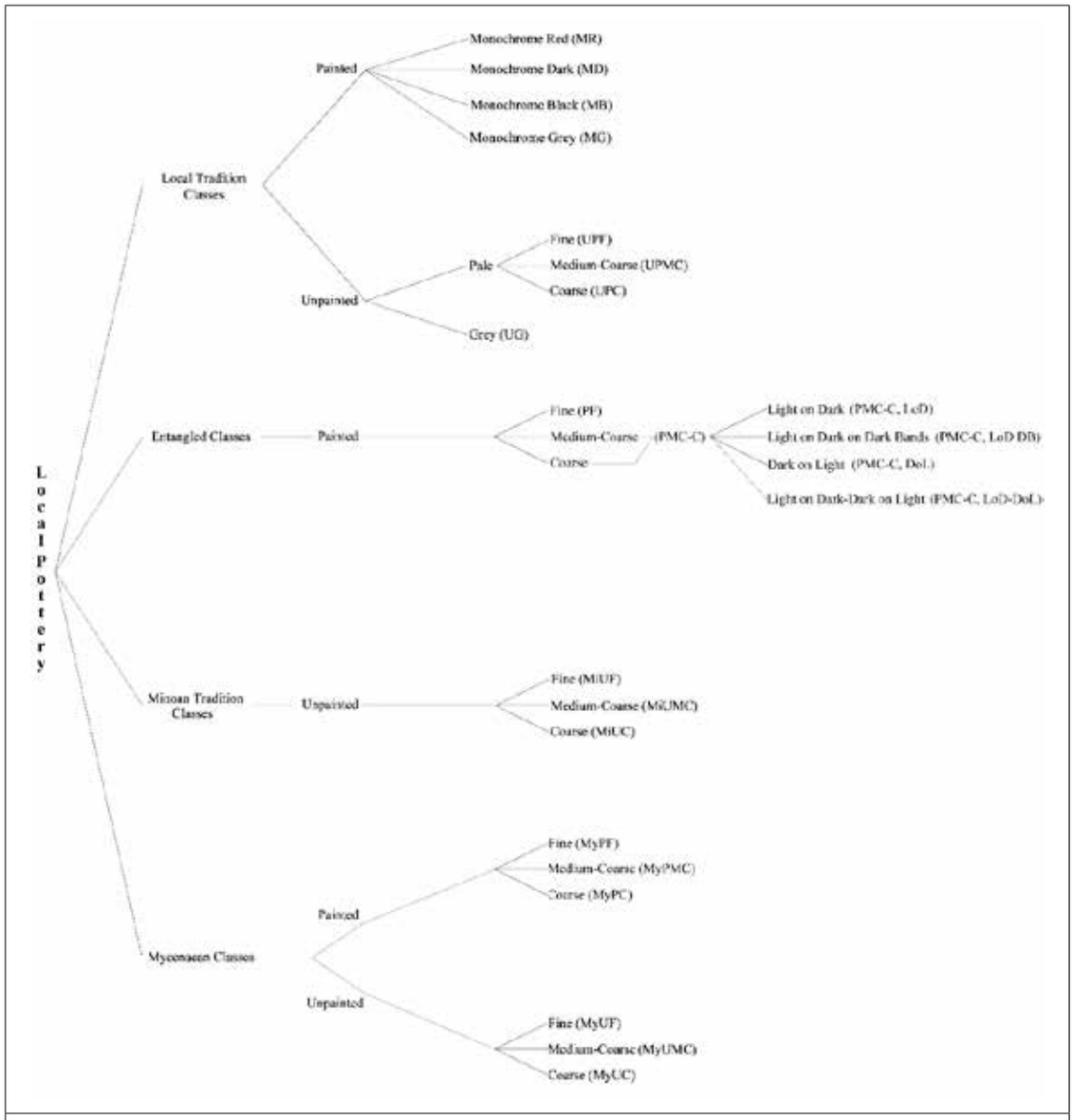
Salvatore Vitale

5.2 - Ceramic Macroscopic Fabric Analysis

The aim of this component of SELAP's study is to define local and imported fabric mixes, to record surface irregularities that could be marks of vessel production, and to investigate the interplay between fabrics, technology, and identity on Kos from the LN/FN to the end of the LPG period.

Following a similar methodology to that established by J. Moody[77], SELAP's macroscopic fabric groups were defined according to paste characteristics, density and types of non-plastic and soft inclusions, hardness, and voids within the paste (Tab. XVI)[78]. The density of non-plastic inclusions to the paste ranges from a 'fine' to a 'very coarse clay body'. The use of these terms for macroscopic fabric analysis, however, does not correspond to the use of the terms 'fine', 'medium-coarse', and 'coarse' in the context of the KCCS, as the latter considers exclusively the grain

[73] A theoretical background for these classification criteria may be found in Rutter 1995, 13-14 (with bibliography).
[74] Vitale 2013, 55; Vitale-Trecarichi 2015, 328.
[75] Vitale 2013, 55, tabs. 2-3; Vitale-Trecarichi 2015, 320, tab. 3; Vitale 2016a, 77, tab. 5:3.
[76] For the term 'Entangled classes', see Vitale 2016a, 77, note 3 (with previous bibliography).
[77] Moody *et alii* 2003.
[78] Vitale-Morrison *forthcoming* a; Vitale-Morrison *forthcoming* b.



Lifespan of Koan ceramic classes:

Local Tradition Classes: LN/FN to LH IIIC Middle;
Entangled Tradition Classes: LBA IA Early to LBA IIIA1;
Minoan Tradition Classes: LBA IA Early to LBA IB (except for conical cups that continue until LH IIIC Middle);
Mycenaean Tradition Classes: LBA IB to LH IIIC Middle.

Tab. XV - The Koan Ceramic Classification System (KCCS)

size of the inclusions, regardless of the density to paste factor.

While the KCCS is conceived for an initial and broad assessment of pottery assemblages, macroscopic fabric analysis aims to highlight subtle differences that potentially indicate material processing by the ancient potters to create clay bodies. For this reason, macroscopic fabric analysis is also an extremely useful tool for providing a deeper understanding of ceramics groups before and in preparation for petrographic study.

To date, approximately 1000 Koan fragments have been examined within SELAP using macroscopic methods. Within this sample, 262 specimens were assigned an individual macroscopic fabric analysis catalogue number and received a detailed description. The entire Koan local assemblage from the LN/FN to the LPG period is divided into four main macroscopic fabric groups, each indicated by a letter from A to D, ranging from the finest to the coarsest (Tab. XVII). As far as the density of inclusions to paste is concerned, these fab-

Inclusions (listed from hardest to softest)						
No.	Color	Shape	Hardness	Size	Frequency and Other Features	Identification
1	White to grey	Sub-round	Mohs 7 (hard)	<3 mm (occasionally 4 mm)	Very few to rare in coarse and very coarse fabrics; Possible conchoidal fracturing	Possible quartzite
2	Brown to purple-red	Sub-round	Mohs 7 (hard)	<3 mm (occasionally 4 mm)	Very few to rare in coarse and very coarse fabrics; Possible conchoidal fracturing	Possible chert
3	Grey to white (with fine-grained texture)	Sub-angular and sub-round	Mohs 4-7 (hard)	<3 mm (occasionally 3-4 mm)	Rare in coarse and very coarse fabrics	Possible limestone or quartzite
4	Shiny, black (possibly dark green)	Elongated, sub-angular to angular	Mohs 5-6 (hard)	1-3 mm	Common in coarse and very coarse fabrics	Possible accessory mineral, e.g. hornblende
5	Shiny, clear to opaque with striated or "fractured" texture	Sub-angular to angular	Mohs 5-6 (hard)	1-2 mm (occasionally 3 mm)	Common in coarse and very coarse fabrics; Independent or multi-clustered grains	Possible feldspar
6	White to grey with foliate texture	Somewhat elongated, sub-round	Mohs 2-3 (soft)	<2 mm (occasionally 4 mm)	Very few to rare in coarse and very coarse fabrics	Possible metamorphic rock, e.g. phyllite
7	Brown to purple with fine-grained texture	Sub-angular	Mohs 2-3 (soft)	1-2 mm (occasionally 5-6 mm)	Rare to very rare in coarse and very coarse fabrics	Possible low-grade metamorphic or sedimentary rocks
8	White to cream	Sub-round to round	Mohs 2-3 (soft)	1-3 mm (occasionally 4-6 mm)	Few to rare in coarse and very coarse fabrics	Possible calc bits that are naturally in the clay and cause spalling
9	Cream to white/grey with striated and/or "pumiced" texture with darker specks within the matrix	Sub-round to round	Mohs 2-3 (soft)	1-2 mm (occasionally 3-4 mm)	Common to very few in coarse and very coarse fabrics	Possible tuff or pumice
10	Shiny orange-tan with fine grain texture	Flat, sub-round	Mohs 2-3 (soft)	<3 mm (occasionally 4-5 mm)	Rare in coarse and very coarse fabrics	Possible low-grade metamorphic rock, e.g. phyllite
11	Purple to red	Sub-round	Mohs 2-3 (soft)	<2 mm (occasionally 3-4 mm)	Rare in coarse and very coarse fabrics	Possible low-grade metamorphic or sedimentary rock, e.g. phyllite or mudstone
12	Orange to red	Round	Mohs 2 (soft)	1 mm (occasionally 3-4 mm)	Very few in coarse and very coarse fabrics	Possible very soft sedimentary inclusion or "clay stone"
13	Black to brown	Sub-round to round	Mohs 2 (soft)	<2 mm (occasionally 3-4 mm)	Very few to rare in coarse and very coarse fabrics	Possible very soft sedimentary inclusion or "clay stone"
14	Shiny, clear with faceted surface	Angular	Too small for Mohs test (possibly hard)	1-2 mm	Few to rare in coarse and very coarse fabrics	Possible quartz, crystal, and/or feldspar
15	Gold ("gold mica" flakes)	Sub-round to round	Too small for Mohs test	<1 mm (occasionally 2 m)	Few to rare in coarse and very coarse fabrics	Possible biotite

Voids				
No.	Shape	Size	Frequency and Other Features	Identification
1	Sub-round to round	2-4 mm (occasionally 6-8 mm)	Variable between fabric groups	Possibly due to calc or other soft inclusions that eroded out of the paste
2	Elongated	2-4 mm (occasionally 6-8 mm)	Variable between fabric groups	Possibly from grass/chaff tempering
3	Round	1-2 mm	Variable between fabric groups, but often leaves a porous texture	Possibly from the end of grass/chaff or inclusions that have dissolved or fallen out of paste (especially on the surface)

Tab. XVI - Macroscopic Inclusions and Voids Within SELAP's Fabrics Groups

Tab. XVII - SELAP's Macroscopic Fabric Groups and Sub-Groups

Macroscopic Fabric Sub-Groups	Overall Texture	Paste				General Description
		Density of Inclusions	Sand size	Type	Hardness	
Group A Fabrics						
A-I	well	fine	coarse	non-micaceous	medium, hard	<1 mm non-plastic or "soft" inclusions
A-II	well	fine	coarse	micaceous	medium, hard	<1 mm non-plastic or "soft" inclusions
A-III	well-moderate	fine-medium	coarse	non-micaceous	medium, hard	<1–2 mm possible meta-igneous sand; white/cream soft inclusions
A-IV	poor	fine-medium	coarse, very coarse	non-micaceous	medium, hard	<1–2 mm possible meta-igneous sand; possible chaff voids
A-V	poor	fine-medium	coarse, very coarse	non-micaceous	hard	<1–2 mm possible meta-igneous sand; white/cream soft inclusions; calc spalling (+); voids (irregular NOT chaff); mica laths (-)
A-VI	poor-moderate	fine-medium	coarse, very coarse	non-micaceous	hard	<1–2 mm possible meta-igneous sand; mica laths (-); calc spalling (-)
A-VII	poor-moderate	fine-medium	coarse, very coarse	micaceous	hard	<1–2 mm possible meta-igneous sand; mica laths (+)?; calc spalling (-)
A-VIII	well	fine	coarse	micaceous	medium, hard	<1 mm dark red-brown inclusions (fired in a reduced atmosphere)
Group B Fabrics						
B-I	poor	medium	coarse, very coarse	non-micaceous	medium	<2 mm possible meta-igneous sand; <2 mm cream soft inclusions; chaff voids
B-II	poor	medium	coarse, very coarse	silver micaceous	medium	<2 mm possible meta-igneous sand; <8 mm cream soft inclusions; sub-round & chaff voids
B-III	poor	medium	coarse, very coarse	non-micaceous	medium	<2 mm possible meta-igneous sand; 2–6 mm chaff voids
B-IV	poor	medium	coarse, very coarse	non-micaceous	hard	<2 mm possible meta-igneous sand; cream/white soft inclusions (-); chaff voids (-)
B-V	poor	medium	coarse, very coarse	non-micaceous	hard	<2 mm possible meta-igneous sand; cream/white soft inclusions (-)
B-VI	poor	medium	coarse, very coarse	non-micaceous	hard	<2 mm meta-igneous sand; cream/white soft inclusions (+)
B-VII	poor	medium-coarse to coarse	coarse, very coarse	non-micaceous	hard	<2 mm meta-igneous sand; mica laths (-); cream/white soft inclusions (-) (can be shiny with the igneous sand)
B-VIII	poor	medium-coarse to coarse	coarse, very coarse	non-micaceous	hard	<2 mm meta-igneous sand; cream/white soft inclusions (-); chaff voids (-)
B-IX	well-moderate	medium-coarse to coarse	coarse, very coarse	non-micaceous (sometimes micaceous)	hard	<1–3 mm meta-igneous sands; clear shiny inclusions; black shiny inclusions; gold or silver shiny inclusions (+); cream/white soft inclusions (-)
B-X	well, poor	medium-coarse to coarse	coarse, very coarse	non-micaceous	hard	<1–3 mm possible meta-igneous sands (+); cream/white soft inclusions (-)
B-XI	poor	medium-coarse to coarse	coarse, very coarse	non-micaceous	hard	<1–3 mm possible meta-igneous sands (+); cream/white soft inclusions (+); coarser size of gold mica laths
Group C Fabrics						
C-I	poor	coarse	very coarse, pebble	non-micaceous	hard	<5 mm possible meta-igneous sand; 2–6 mm chaff voids
C-II	poor	very coarse	very coarse, pebble	non-micaceous	hard	<5 mm possible meta-igneous sand; 2–6 mm chaff voids
C-III	poor	very coarse	coarse, very coarse	non-micaceous	hard	<2 mm possible meta-igneous sand; <2 mm mix of white/grey "pumice"; 2–6 mm chaff voids
C-IV	moderate	coarse	coarse, very coarse	non-micaceous	hard	<2 mm possible meta-igneous sand; gold mica laths; <2 mm shiny clear inclusions (possible quartz or feldspar); <1 mm black shiny (possible hornblende); 2–6 mm chaff voids
Group D Fabrics						
D-I	poor	coarse	coarse, very coarse	non-micaceous	soft	<2 mm possible meta-igneous sand; <6 mm cream soft inclusions; <2 mm orange, brown soft inclusions; 2–4 mm chaff voids
D-II	poor	coarse	coarse, very coarse	non-micaceous	soft	<2 mm possible meta-igneous sand; <2 mm white, orange, brown soft inclusions; chaff voids
D-III	moderate	very coarse	coarse, very coarse	non-micaceous	soft	<2 mm possible meta-igneous sand; <2 mm white, orange, brown soft inclusions; chaff voids

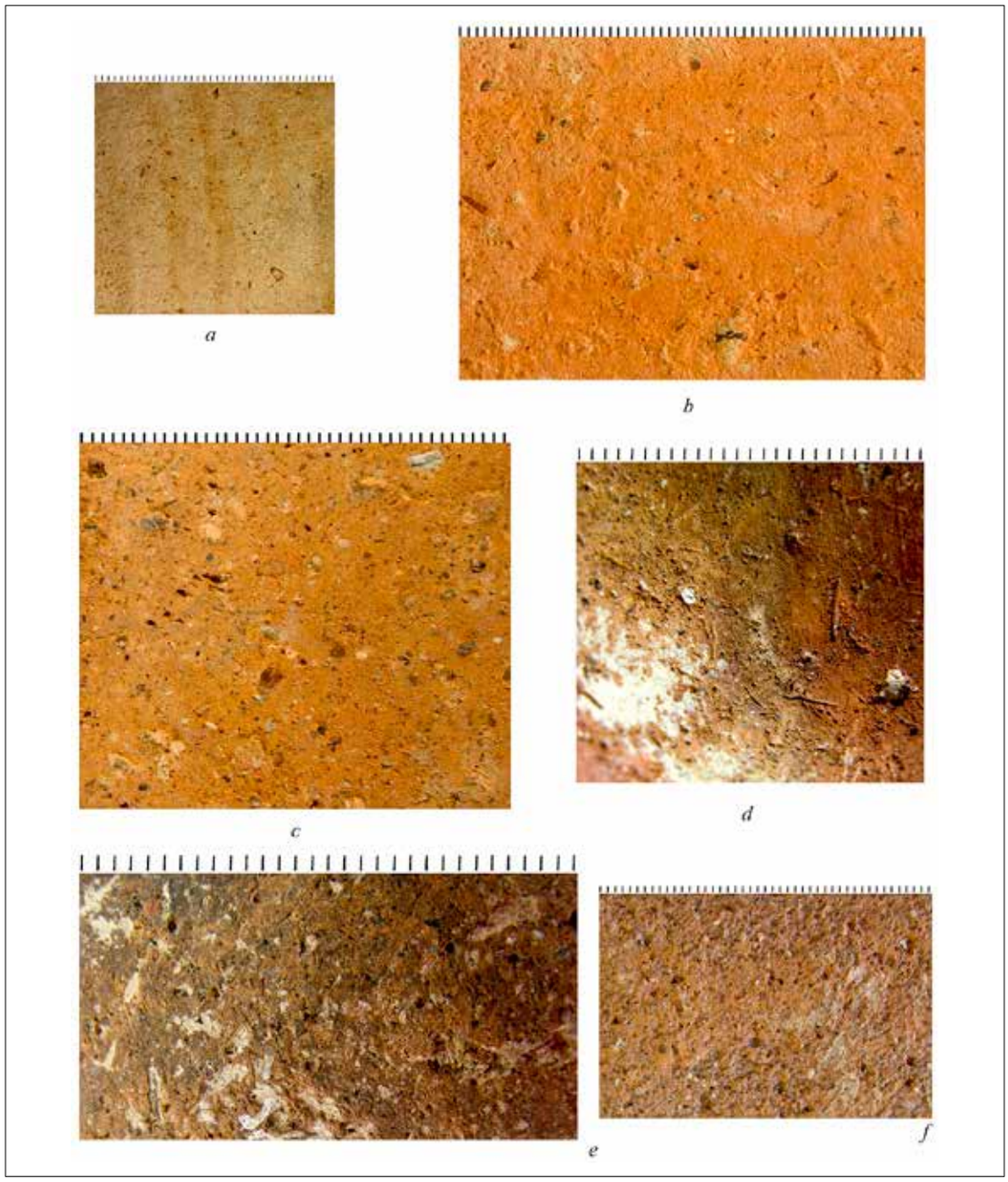


Fig. 18 - SELAP's macroscopic fabric Sub-Groups A-VI, B-IX, B-XI, C-IV, C-III, D-III
(a-c: S. Vitale; d-f: J.E. Morrison)

ric groups are classified as fine and fine-medium (Group A; Fig. 18:a), medium (Group B; Fig. 18:b-c), coarse (Group C; Fig. 18:d-e), and very coarse (Group D; Fig. 18:f). Typically, they are non-micaceous and even though mica laths can be identified, they are not necessarily distributed evenly throughout the paste. SELAP macroscopic groups are tan-to-orange-to-pink fabrics that are comprised of metamorphic-igneous sand, presumably from riverbeds, weathered tuff, and/or pumice collected from exposures. The non-plastic inclusions usually measure <2 mm, but occasionally measure <5 mm, while the elongated voids measure 2-6 mm. Soft white-cream and orange-red inclusions are also present within many of the samples and range from <2 mm to <6 mm.

All groups have internal subdivisions based on the paste granularity of the dominant inclusions and the arrangement of non-plastic inclusions within the paste. More specifically, Group A has eight sub-groups, Group B has 11 sub-groups, Group C has four sub-groups, and Group D has three sub-groups, thus leading to a total of 26 sub-groups. Many of the local fabric groups have components, such as non-plastic inclusions, soft inclusions, and voids, that suggest that the ancient Koan potters practiced material manipulation, such as clay mixing and tempering with

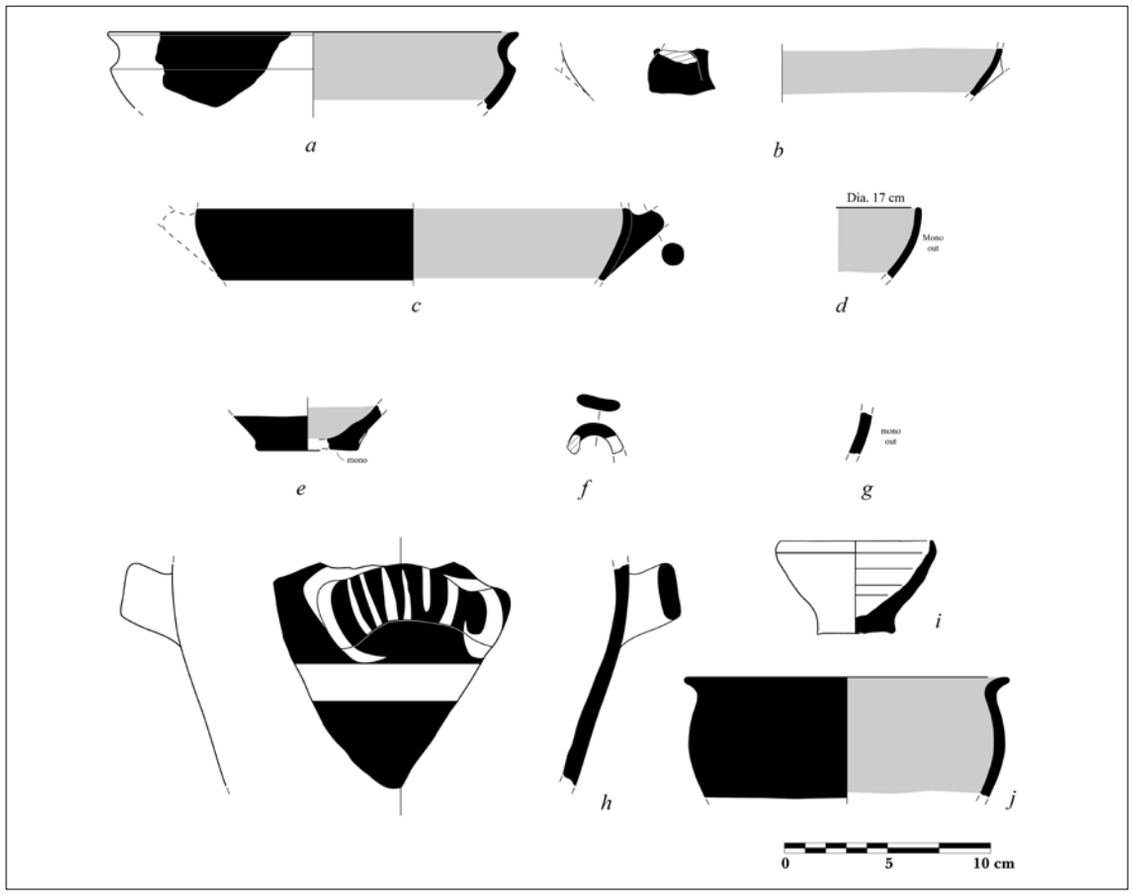


Fig. 19 - a-d: EBA 3-MBA vessels from the 'Serraglio', BSA collection; e-g MBA vessels from the 'Serraglio', BSA collection; h-j: LBA IA to LH IIIA2 Early vessels from the 'Serraglio' (a-g: T. Ross; h: A. Caputo; i: S. Regio - A. Caputo; j: S. Regio - T. Ross). Vessels a-g were reproduced with the permission of the British School at Athens

inorganic and organic materials[79].

An important chronological feature distinguishing earlier from later Koan local fabric mixes is the presence or absence of chaff tempering and the occurrence of shifts in the density of inclusions to paste. The sub-groups dating from the LN/FN to the EBA 2 period have chaff voids and tend to have a higher density of inclusions within the paste that creates a coarser fabric. On the other hand, the sub-groups dating from the EBA 3 to the LPG period usually do not have chaff voids and are comparatively less coarse[80].

Overall, however, SELAP's macroscopic fabric groups and sub-groups are characterized by significant elements of continuity throughout the periods of interest, with many overlapping features between different phases and functions. For instance, Sub-Group A-VI was used for the manufacture of EBA 3 to MBA carinated and shallow bowls (Fig. 19:a-d), as well as for MBA cups and miscellaneous closed shapes (Fig. 19:e-g). Successively, manufacture with this fabric sub-group remained common through the LBA, when it was used for LBA IA Light-on-Dark vessels (Fig. 19:h), LBA IA Minoan-type conical cups (Fig. 19:i), LBA IIIA1 to LH IIIA2 Early Mycenaean goblets FS 263 (Fig. 19:j), as well as LH IIIC closed shapes (Fig. 2:i). At the same time, while Sub-Group A-VI is not attested before the EBA 3 period, its macroscopic features show many elements of similarity with earlier fabrics, especially Sub-Groups B-I and B-II that date to the EBA 2.

Jerolyn E. Morrison - Salvatore Vitale

5.3 - Medium-Coarse to Coarse Pottery and Identity

SELAP's study of domestic pottery vessels suggests an important continuity in food storage practices throughout the Bronze Age, during which Koan pithoi and pithoid jars were embedded in the Local Tradition repertoire, especially in

[79] VITALE-MORRISON *forthcoming* a; VITALE-MORRISON *forthcoming* b.

[80] The use of chaff tempers still occurs on Kos during the LBA, but is much less common than in the EBA 2. The only two LBA fabric Sub-Groups with evidence for chaff tempers are B-IV and B-VIII.

Shapes	Local tradition					Sub-Total
	B-V	B-VI	B-VII	B-IX	B-XI	
Pithoi	0	0	0	3	0	3
Cooking jars	0	0	1	2	0	3
Cooking pot lid	0	0	0	1	0	1
Cooking jug (with Mycenaean traits)	0	0	0	1	0	1
Cooking tripod (with Mycenaean traits)	0	1	0	0	0	1
Jar (utilitarian, related to cooking)	0	0	0	1	0	1
Sub-Total	0	1	1	8	0	10
	Entangled tradition					Sub-Total
	B-V	B-VI	B-VII	B-IX	B-XI	
Pithoid jars	3	0	0	1	1	5
Sub-Total	3	0	0	1	1	5
	Minoan tradition					Sub-Total
	B-V	B-VI	B-VII	B-IX	B-XI	
Tripod cooking pot	0	0	0	2	0	2
Braziers (utilitarian, related to cooking)	0	0	1	2	0	3
Sub-Total	0	0	1	4	0	5
	Mycenaean tradition					Sub-Total
	B-V	B-VI	B-VII	B-IX	B-XI	
Cooking jug/amphora FS 65/66	0	0	1	3	0	4
Tripod cooking pot FS 320	0	1	1	9	1	12
Sub-Total	0	1	2	12	1	16
Total	3	2	4	25	2	36

Tab. XVIII - Correlation Between LBA Shapes, Fabrics, and Potting Traditions in SELAP's Koan sample

terms of shape morphology and fabric mixes (Fig. 20:a-b)[81]. The local tradition also played an enduring role in food preparation practices (Fig. 20:c-d). However, from the beginning of the LBA, the appearance of Minoan (Fig. 20:e) and Mycenaean (Fig. 20:f-g) cooking pottery implied the coexistence on Kos of a range of culturally diverse culinary traditions (Tab. XVIII). SELAP's research, has indicated that the character of Minoan and Mycenaean influence on Koan cooking pottery was different in terms of duration, quality, and quantity. Minoan influence was brief (LBA IA Mature), did not cause a drastic change to the local assemblage, and had no obvious impact on ceramic technology. Mycenaean influence was a longer process (LBA II to LH IIIC Middle) and produced major changes in cooking pottery typology, as well as in the pottery manufacturing process with the introduction of wheel-thrown specimens (Fig. 20:g)[82].

The study of utilitarian vessels was particularly concentrated on fireboxes. SELAP's collection consists of 16 vases, including 13 specimens of H. Georgiou's Type 1 (Fig. 20:h), one tripod specimen of Georgiou's Type 2, and two additional specimens that do not conform to any of the types identified by Georgiou[83]. Attention was devoted to those features considered important for understanding the possible use and function of these vessels of Minoan origin on Kos. All of the hypotheses proposed by previous scholars were examined[84], based on four main questions: (a) Was the larger hole plugged?; (b) How homogeneously spread were the burning marks within the interior and exterior of the chamber?; (c) How intense were burning marks on the vessels' rim?; and (d) Which areas were more intensely exposed to the heat? SELAP's current results suggest that the chambers of Type 1 specimens were filled in with some kind of organic burning substance and, as proposed by

[81] VITALE-MORRISON *forthcoming* a; VITALE-MORRISON *forthcoming* b. See also HOPE SIMPSON-LAZENBY 1970, 55, fig. 7:1, pl. 20:1.

[82] VITALE-MORRISON *forthcoming* a. For the definition of the term 'wheel-thrown', see CHOLEVA 2012.

[83] MORRICONE 1975, 283-285, figs. 248-249; GEORGIOU 1980, 124-125, pls. I-IV.

[84] GEORGIOU 1980, 153-158, 169-173 (with previous bibliography).

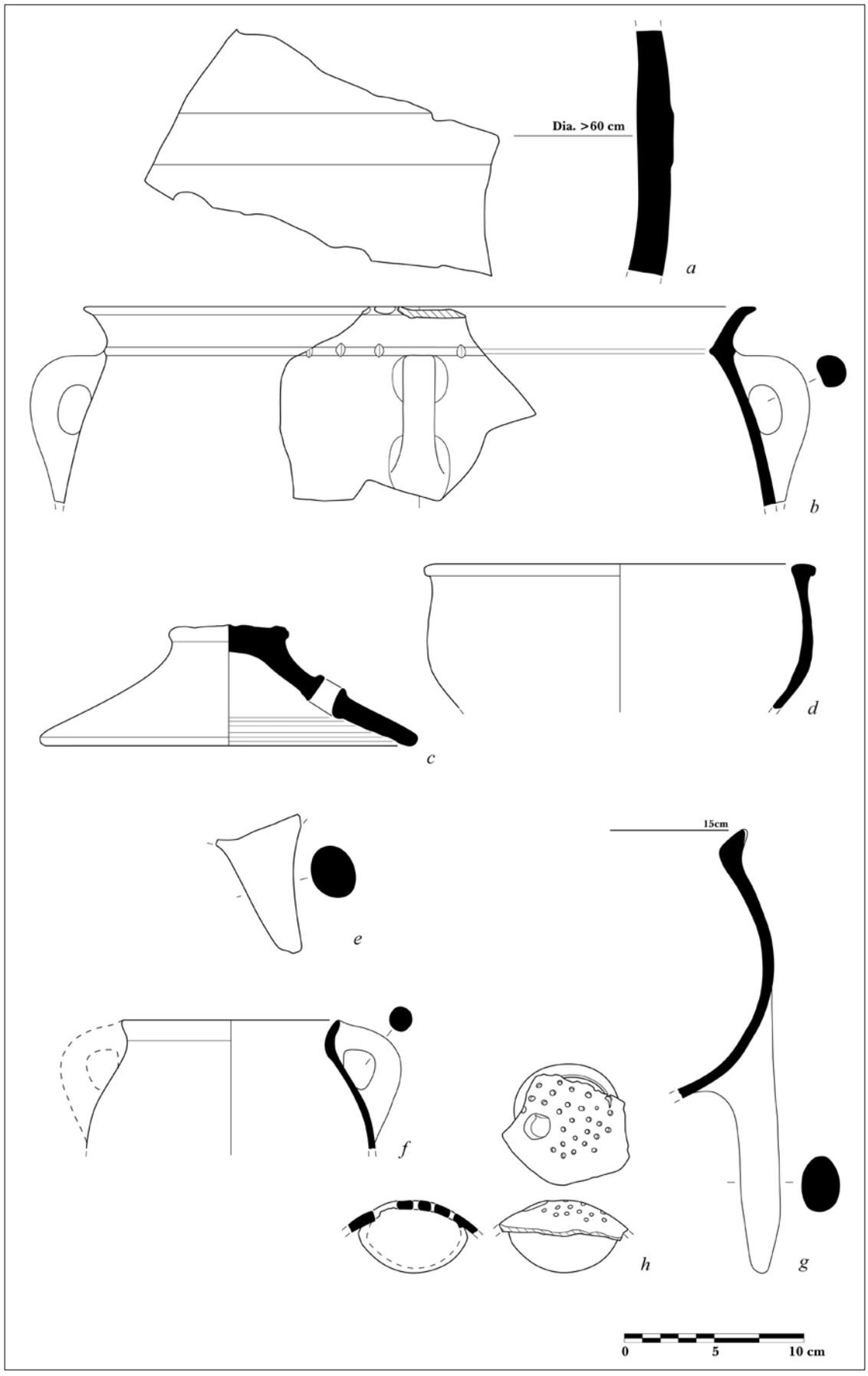


Fig. 20 - a-b: LBA IA and LH IIIA2-LH IIIB1 Koan Local Tradition pithoi; c-d: LBA IA and LH IIIA2-LH IIIB1 Koan Local Tradition cooking lid and jar; e: LBA IA Mature Minoan tradition tripod cooking pot locally produced on Kos; f-g: LH IIIA2-LH IIIC Mycenaean tradition cooking pots locally produced on Kos; (h) LBA IA Mature Minoan tradition Type 1 brazier locally produced on Kos (a-b: S. Regio - T. Ross; c-h: M. Rossin - T. Ross)

P.M. Warren[85], were used with the holes facing upwards (Fig. 20:h). This is demonstrated by the abundant and homogeneous burning marks concentrated at the bottom of the chambers' interiors. The single Type 2 specimen, on the other hand, did not show any traces of burning within the chamber. Instead, burning marks were concentrated along the rim interior, suggesting that organic matter was burned within the bowl. No wear indicating that the larger hole could have been plugged was detected. In the future, experimental work will be conducted on replicas to verify these conclusions. As to the possible function of fireboxes, iconographic evidence may indicate that these vessels were used to burn aromatic substances and that coals may have been utilized for this aim[86]. Additional data may be provided in the near future by the results of SELAP's microbotanical residue analysis (see below, section 5.6).

Salvatore Vitale - Jerolyn E. Morrison - Calla McNamee

5.4 - Geological Prospections and Natural Potting Resources

The aims of this part of SELAP's research were to define the compositional variability of raw clayey materials and sands in the area of NE Kos, to test their technological properties, and to establish their potential suitability for potting purposes. While no final association between the Koan raw clay samples and Koan prehistoric ceramics can be securely established without petrographic and chemical analyses of the ancient artifacts, our current data allow us to formulate some preliminary hypotheses on the prehistoric and EIA exploitation of natural potting resources.

SELAP's geological prospection targeted clay deposits, river sands, and rock tempers in an area of circa 5 km around the site of the 'Serraglio' (Fig. 21:a). The geological formations cropping out in the study area include mainly Plio-Pleistocenic sedimentary deposits[87]. The Pl.m formation (Pliocene) encompasses lacustrine and marine deposits of white and grey loose to cohesive marls; light yellow, red, and black clays; yellow-red sands; coarse-medium-fine sandstones; and loose to cohesive conglomerates with clayey-marly cementing matrix and sporadic lignite occurrences. The Pt.l,c formation (Upper Pleistocene) is characterized by brown to yellow clayey materials with unconsolidated volcanic, phyllitic, pelitic, and chert rubbles of various sizes and marly cementing material. Other formations such as the Pt.s (Lower Pleistocene), Ms.m,k (Upper Miocene), and Mz.ph,st (Mesozoic) were also considered because of their potential of containing small occurrences of clayey deposits.

Five main sampling locations were selected for this study based on their abundant clay deposits (Fig. 21:a): (a) The Asklepieion area, where marly grey clays are predominant; (b) The Platys river area, near the Asklupis, where various types of clayey deposits were encountered, including grey clays, greenish-yellow clays, and brown-red clays; (c) The Paradeisi area at Psalidi, where fossiliferous clays and marly grey clays are common; (d) The Ayios Fokas area, where whitish clays occur; and (e) The Therma area, where the main formations include grey-black clays. In total, 23 clay samples were collected from these locations. In addition, ten recently deposited sand samples were collected from the Myloi river in the Asklepieion area, the Platys river in the Asklupis area, where small volcanic outcrops also occur, and the Iraklis river in the Paradeisi area.

All clay and sand samples were separated in two different fractions using a d=2mm sieve. Clay samples were treated with water to facilitate their passing through the sieve and the fine fraction (<2mm) was left to dry in open air conditions for use in further analysis. The >2mm fraction was stored for future reference.

Clay briquettes were prepared from the fine (<2 mm) sample fraction at the Laboratory of Mineral and Rock Research of the Department of Geology at the University of Patras (Fig. 21:b-e). The briquettes were air dried and were subsequently fired to a maximum temperature of 750° C in a Vulcan 3-550 box furnace with programmable controls under oxidizing conditions. The maximum temperature was achieved using a heating rate of 8°C/min and a soaking time of six hours at maximum temperature. The fired clay briquettes were let to cool overnight in the furnace with the door closed.

The color of the wet, air-dried, and fired clay briquettes was recorded according to the Munsell Soil Color Charts[88]. Other significant macroscopic features, such as shrinkage and fissures, were also recorded for comparison with Koan prehistoric ceramics. The characteristics of the briquettes were re-examined one month after firing.

The Atterberg limits of all of the samples that survived intact after this period are currently being determined and recorded. These properties, which include the plastic limit, liquid limit, and plastic

[85] WARREN 1972, 122-123; GEORGIOU 1980, 170-171.
[86] See MARINATOS 1972, 43, pls. 100-101.
[87] TRIANTAFYLLIS-MAVRIDES 1998.
[88] MUNSELL COLOR COMPANY 1992.

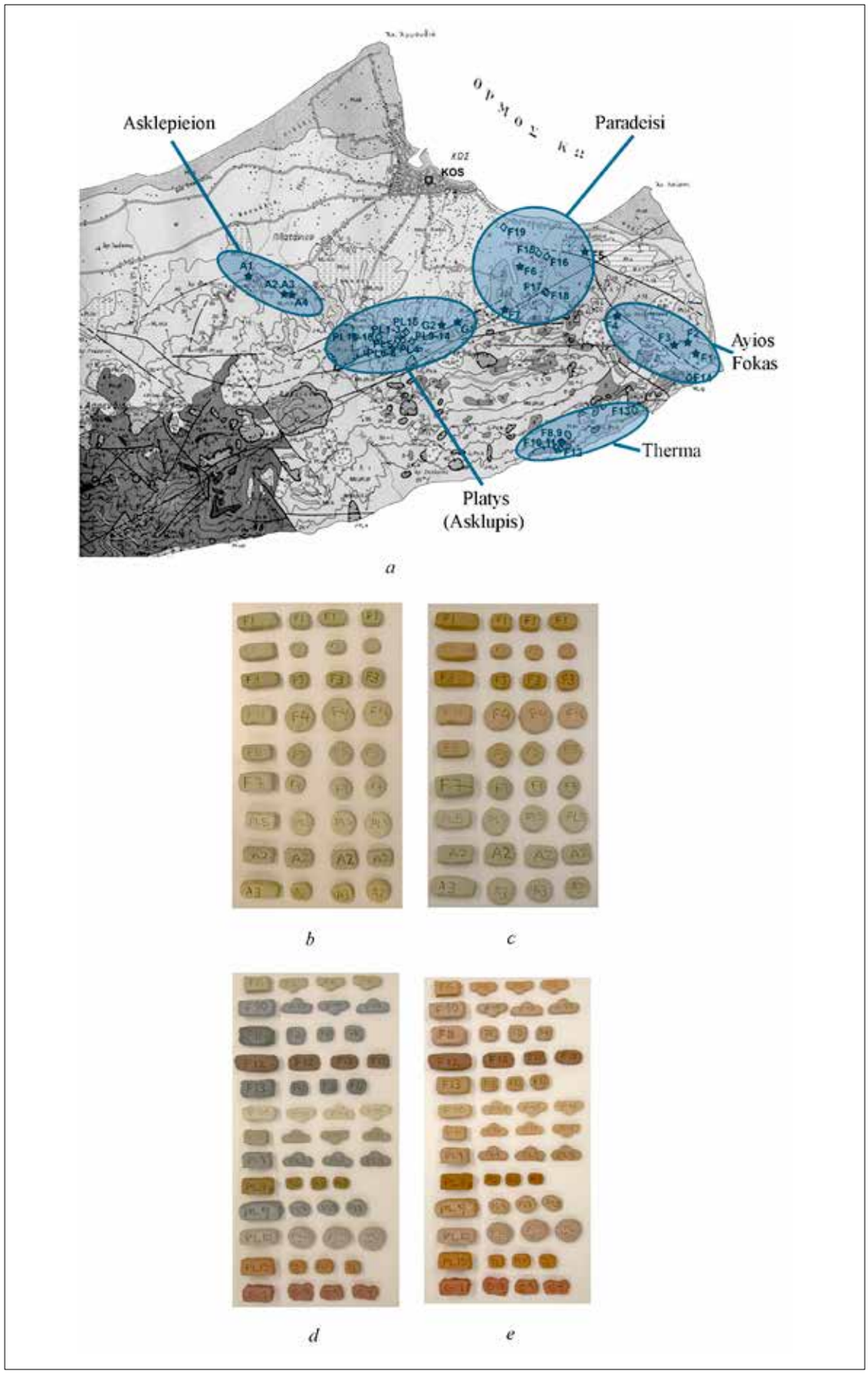


Fig. 21 - a: Geological map of NE Kos with the sampling locations considered in the present study; b-c: Calcareous clay briquettes at air dried stage and after having being fired at 750° C; d-e: Non-calcareous clay briquettes at air dried stage and after having being fired at 750° C (a: readapted by I. Iliopoulos and K.-S. Passa, after TRIANTAFYLLIS-MAVRIDES 1998; b-e: I. Iliopoulos - K.-S. Passa)

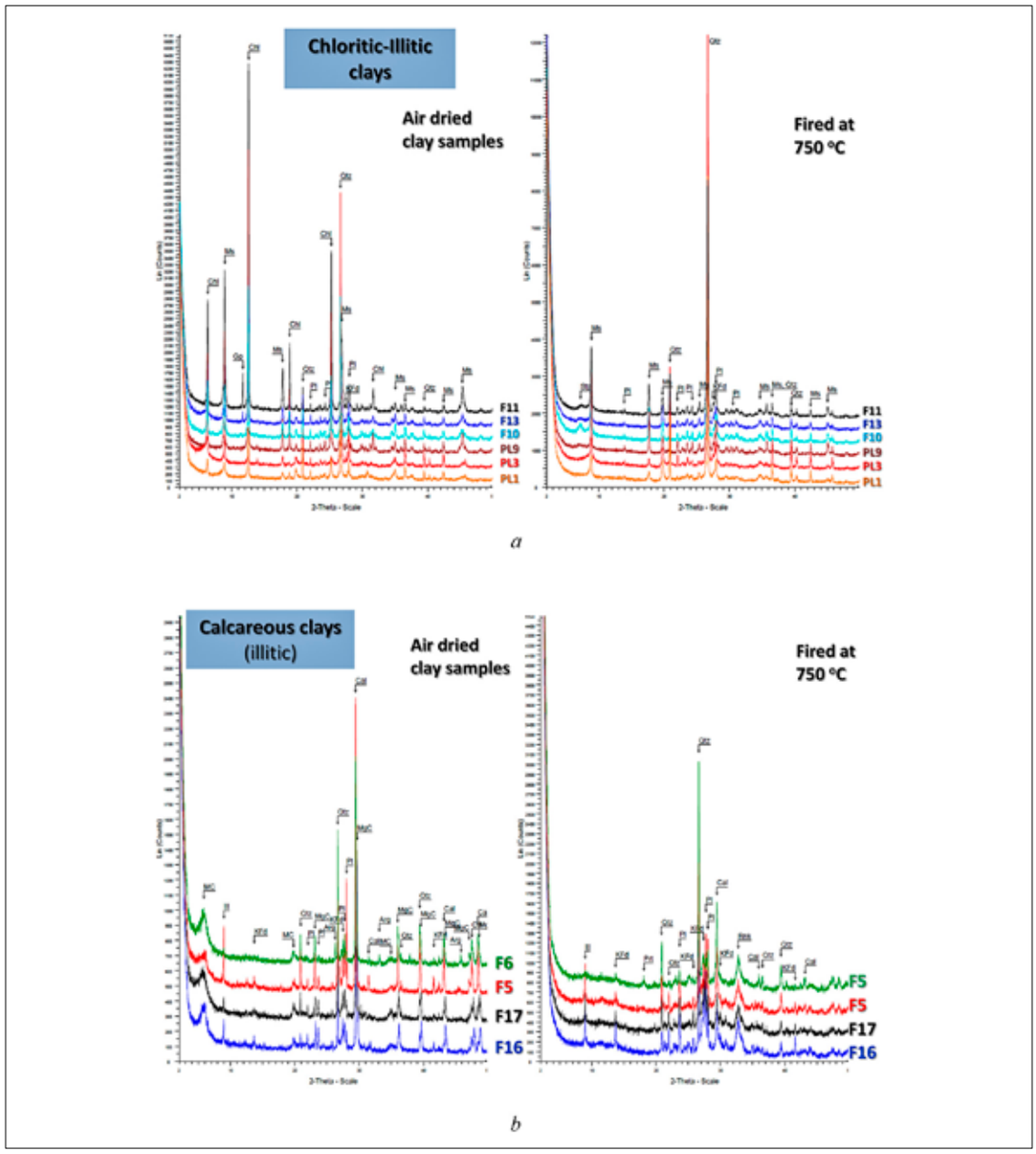


Fig. 22 - a: XRPD patterns of the chloritic-illitic clays from the area of the Platys river, near the Asklupis (PL1, PL3, PL9), and from Therma (F10, F11, F13); b: XRPD patterns of the calcareous-illitic clays from the Paradeisi area (I. Iliopoulos - K.-S. Passa; mineral abbreviations after KRETZ 1983)

index, are particularly important for defining the behavior of the raw clayey materials during the manufacture of clay products.

The mineralogical composition of all <2mm fractions of the clay samples, as well as of the fired clay briquettes, was obtained by X-ray powder diffraction analysis (XRPD) using a Bruker D8 Advance X-Ray diffractometer with Ni filtered CuKα radiation operating at 40kV/40mA and equipped with a LynxEye ultrafast detector (Fig. 22). The scanning area covered the interval 2-70° 2θ, with a scanning angle step of 0.015° and a time step of 0.1s. Qualitative analysis was performed using the DIFFRACplus EVA software (Bruker-AXS, USA), based on the ICDD Powder Diffraction File (2006 version).

The fired clay briquettes were also thin-sectioned and studied under a Zeiss AxioScope.A1 polarizing microscope, equipped with a Jena ProgRes C3 digital camera, in order to identify their petrographic characteristics (Fig. 23). The petrographic assessment followed the basic system of description proposed by I. Whitbread, which facilitates the detailed characterization of microstruc-

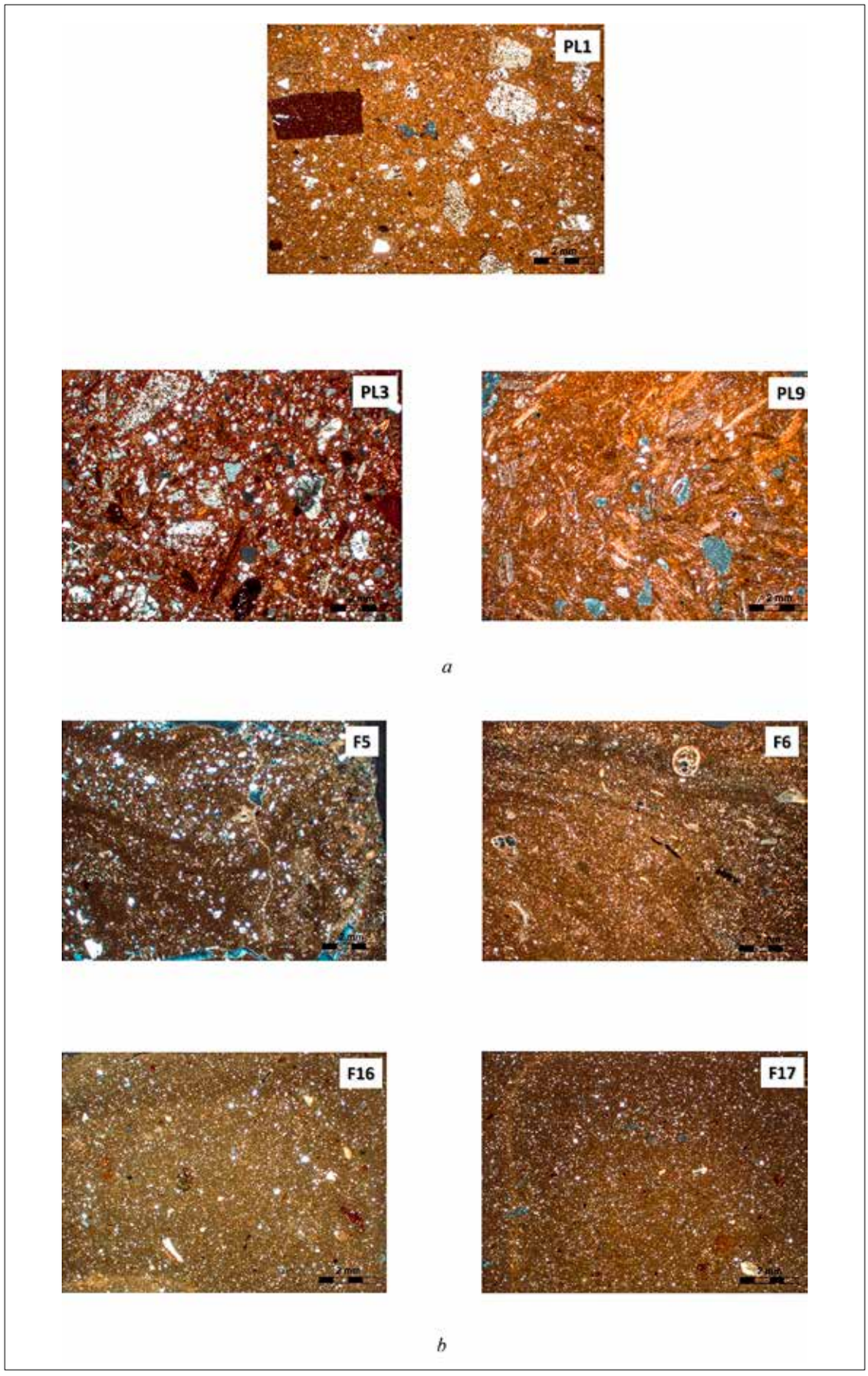


Fig. 23 - a: Representative photomicrographs under cross-polarized light of some of the fired briquettes prepared with the clayey materials from the area of the Platys river, near the Asklupis; b: Representative photomicrographs under cross-polarized light of some of the fired briquettes prepared with the clayey materials from the Paradeisi area (I. Iliopoulos - K.-S. Passa)

ture, groundmass, and inclusions present in the ceramic artifacts[89].

In the following paragraphs, some highlights of SELAP's current results are provided. The study of the mineralogical and petrographic composition of the raw clayey materials sampled in the NE Koan region has revealed the inter-site compositional variability of the main clay sources identified. The Paradeisi and Asklepieion areas comprise calcareous clays. In the Paradeisi area some of the calcareous clays examined contained significant amounts of illite (Fig. 22:b; Fig. 23:b). In the area of the Platys river, near the Asklupis, a more pronounced compositional variability is observable. Chloritic-illitic clays are the most common types (Fig. 22:a; Fig. 23:a), but some occurrences of clays formed as alteration products of the volcanic rocks out cropping along the banks of the Platys river have also been identified. The clays from Therma show a remarkable compositional and textural similarity with the chloritic-illitic clays recognized in the area of the Platys river. Finally, the clays from the area of Ayios Fokas exhibit a rather peculiar composition, as they are rich in dolomite and serpentine minerals.

The compositional differences of the NE Koan clay sources are mirrored in the experimental briquettes fired at 750° C, both in terms of color and neo-formed minerals. In particular, the formation of rankinite and portlandite in the case of the calcareous-illitic clays is likely responsible for the superior performance characteristics observed in the fired briquettes from the Paradeisi samples. In fact, these two mineral phases are well known components that form during cement production and increase cement strength.

Color comparison between fired briquettes and Koan prehistoric ceramics has suggested some initial hypotheses on the potential association between clay sources and archaeological artifacts. The calcareous-illitic clays from the Paradeisi area exhibit significant similarities with SELAP's macroscopic Group A (Fig. 18:a). On the other hand, the chloritic-illitic clays from the area of the Platys river, near the Asklupis, are particularly similar to macroscopic Groups B, C, and D (Fig. 18:b-f). The preliminary results obtained for Atterberg limits offer further proof to the ceramic suitability of the Paradeisi calcareous-chloritic clays and the Platys chloritic-illitic clays, indicating that these two areas may have been the main sources exploited during Koan prehistory and EIA. The validity of such a hypothesis remains to be verified through the results of mineralogical, petrographic, and chemical analyses of the ancient artifacts. SELAP's final list includes 173 specimens selected for petrography and 142 for chemical (NAA) analysis, with a total of 51 specimens having being selected for both techniques. The results of this comprehensive analytical program will be discussed in details elsewhere[90].

Ioannis Iliopoulos - Salvatore Vitale - Jerolyn E. Morrison - Toula Marketou - Kalliopi-Sofia Passa - Kalirroi Moulo

5.5 - Stone Tools

A preliminary assessment of the Koan stone tools included within SELAP's collection was accomplished between 2014 and 2015. After typological analysis, circa 30 worked stone tools could be assigned to the phases between the EBA and the LPG periods. These artifacts come mostly from the 'Serraglio' (Fig. 24:a-c) and, to a lesser extent, from the area of the Asklepieion and the cemeteries of the Asklupis, Eleona, and Langada (Fig. 24:d)[91]. The stone tools represented in SELAP's collection include pounders, axes, grinding tools, such as mortars and slabs (Fig. 24:a-b), lamps (Fig. 24:c), whetstones (Fig. 24:d), and one fragmentary mold. Since most of these objects were directly or indirectly connected to domestic activities, such as food processing and preparation, the on-going analysis of these materials may be particularly informative to further explore issues of cultural practices and identity on Kos.

The typological analysis of SELAP's worked stones was combined with a macroscopic evaluation of the objects' construction materials and an assessment of Koan raw stone resources in order to determine which of the archaeological artifacts may have been potentially manufactured with local materials. This part of the research was conducted together with SELAP's geologists I. Iliopoulos and K.-S. Passa, assisted by Ms. K. Moulo.

To identify their approximate petrographic and mineralogical composition and classify them into the main rock types, macroscopic examination of the archaeological artifacts was undertaken first by naked eye and then with a 10x magnifying loop. This characterization was followed by detailed macro- and micro-photography, using a Proscope Mobile (BODELIN Technologies) wireless digital microscope paired with an iPad 2 tablet. This device allowed microscopic observation of the surface of the stone tools at magnifications up to 50x.

[89] Whitbread 1995.

[90] For the sampling strategy and projected gains of SELAP's program of ceramic petrographic and chemical analysis, see Vitale 2012a, 1236, 1244-1245.

[91] See Morricone 1967, 112, 176, 199, figs. 93:b, 183:f, 207:k; Morricone 1975, 255, 272-275, figs. 200:b, 227-229.

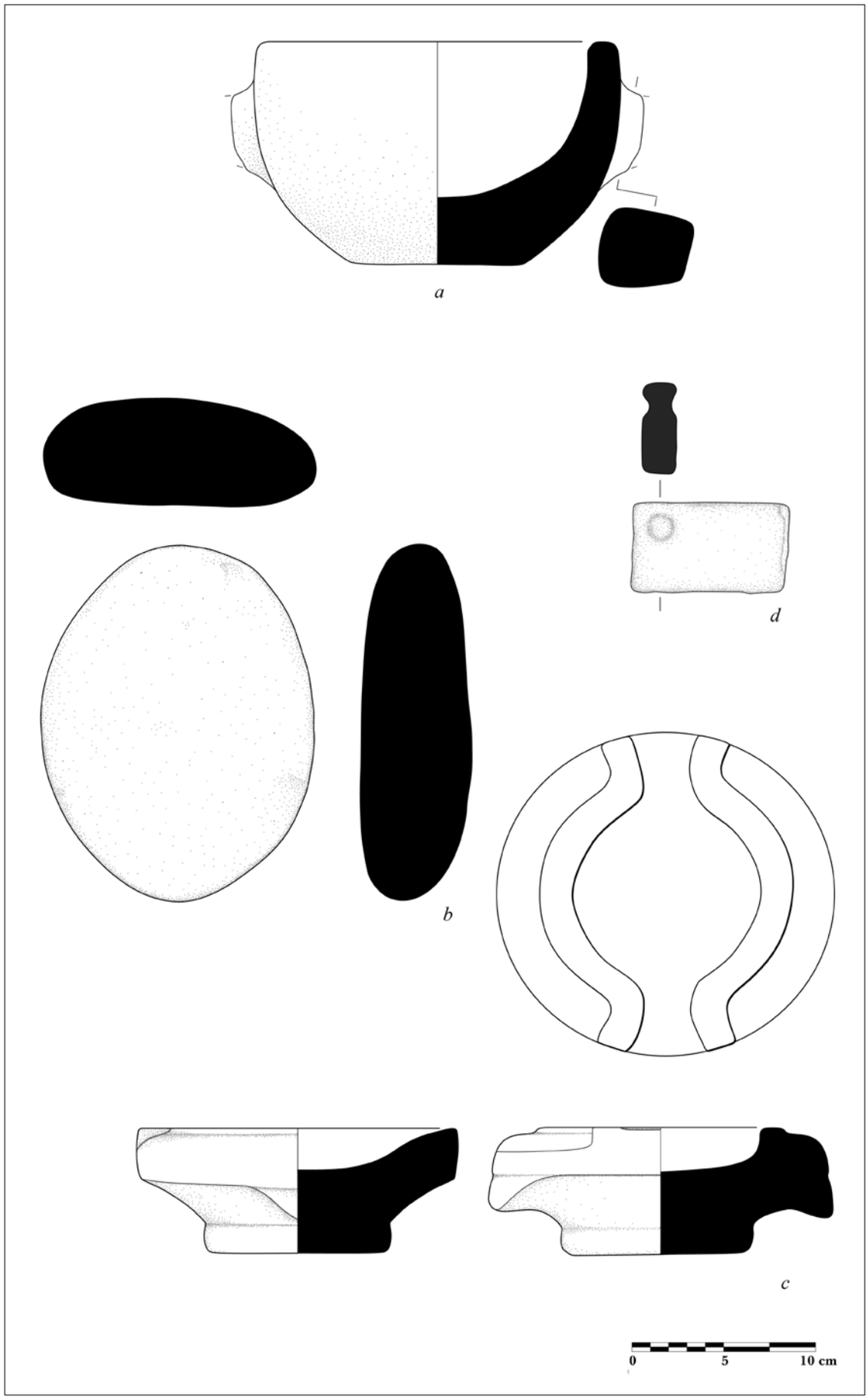


Fig. 24 - a-c: LBA IB worked stone tools from the sounding underneath *Vano A*, in Zone II of the 'Serraglio'; d: Whetstone from Langada Tomb 11 (a, c-d: M. Rossin - T. Ross; b: A. Trecarichi - T. Ross)

The results of this preliminary analysis led to the identification of various raw materials that were used for the construction of the archaeological items. The main rock types recognized are rhyolitoids, trachytoids, dacitoids, volcanic bombs and pyroclastic materials, dolomites, limestones (occasionally fossiliferous), siltstones, sandstones, phyllites, hornfelses, and other metamorphic rocks.

At this stage of research, no secure inferences can be raised on the provenance of the raw materials used to manufacture the stone tools recovered on Kos. The combined use of local and imported tools and/or raw materials appears possible. The analysis of a LBA IB domestic context from Zone I at the 'Serraglio', for example, shows the simultaneous occurrence of two probably imported tools, a Minoan-type lamp (Fig. 24:c) and a white marble deep bowl mortar with lug handles (Fig. 24:a), together with a likely local oval slab grinding stone (Fig. 24:b).

Salvatore Vitale - Ioannis Iliopoulos - Kalliopi-Sofia Passa - Kalirroi Moulo

5.6 - Microbotanical Analysis of Domestic Pottery and Stone Tools

Our understanding of food processing and preparation practices on Kos will be supplemented and enriched through microbotanical (starch grain and phytolith) analysis of worked stone tools (Fig. 24) and domestic ceramics, such as storage, cooking, and miscellaneous utilitarian vessels (Fig. 20). This methodology is based on two distinct stages of sampling. The first one involves the collection of dirt and other residue from the used surface of the artifact through an initial wash. The second implies placing the artifacts in an ultrasonic bath to loosen any adhering microbotanical remains. The effluent from both washes is stored in test tubes and taken back to a lab for additional processing.

During SELAP's 2015 season, a small list of artifacts was selected for future analysis, including 22 ceramic samples (two conical cups, two braziers, two fireboxes, two pithoi, three pithoid jars, two miscellaneous closed shapes, five cooking pots, two basins, one dipper, and one bridge-spouted jar) and two grinding stone tools (one legged and one deep bowl mortar). The limited number of samples selected for this study is due to the fact that SELAP's materials were washed immediately after excavations and successively may have been contaminated during the long period of storage in the Archaeological Museum of Kos. The results of this small pilot study will indicate whether microbotanical starch grain and phytolith analysis can be successfully applied in the case of SELAP's ceramics and stone tools.

Calla McNamee - Salvatore Vitale

5.7 - Bronze Implements and Weapons

SELAP's materials offer significant insights about bronze consumption and production at the 'Serraglio', Eleona, and Langada during the LBA[92]. The Koan assemblage is subdivided into two broad functional categories: weapons and bronze implements. The first group includes items designed primarily for fighting, such as swords, spearheads, and arrowheads. The second category consists of a diverse array of work tools, though certain implements like axes and knives could also function as a weapon[93].

Koan bronzes are unevenly distributed between the settlement and the cemeteries. The 'Serraglio' has a diverse assemblage of 23 implements and two weapons (Tab. XIX), while Eleona and Langada collectively contained 26 implements and 49 weapons (Tab. XX). All bronzes from the 'Serraglio' come from unstratified contexts, except for an axe and a razor that were recovered *in situ* on a LH IIIB occupational surface (Fig. 25:a-b). The materials from Eleona and Langada, on the other hand, can be dated with a much greater degree of precision (Tabs. IV-VII).

The larger implements from the 'Serraglio' are intended primarily for carpentry/masonry (Fig. 25:a-g), metallurgical (Fig. 25:h-i), and utilitarian work (Fig. 25:j), while the smaller objects are meant for small craft or detail work (Fig. 25:k-o; Tab. XIX)[94]. The site's tool variability is highlighted by the occurrence of three different types of axes: one single/flat axe (Fig. 25:a), two double axes (Fig. 25:c-d), and one lugged or trunnion axe (Fig. 25:e). This tool diversity is often found in LBA metal hoards throughout the Aegean[95].

The majority of the 'Serraglio' tools, including at least two knives (Fig. 25:j), one chisel (Fig. 25:f), two double axes with oval shaft holes (Fig.

[92] The materials from the Asklepieion area are not discussed in this report. The term 'bronze' is used loosely since neither chemical nor metallographic analyses, to date, were performed on any of the Koan LBA metal finds. Thus, the precise copper-alloy makeup of these objects is uncertain. Yet, given the prominence of tin-bronze in the Aegean during the second half of the 2nd millennium B.C., it is not misleading to refer to the SELAP metal tools as bronze (see PARE 2000, 9-12, 26, fig. 1:14).

[93] See BLACKWELL 2011, 21, 35-38.

[94] See MORRICONE 1975, 169, 275-279, figs. 47, 230-239.

[95] CATLING 1964, 294-298; KNAPP-MUHLY-MUHLY 1988.

Type	Absolute No.	Function
Implements		
Axes	4 (3 types)	Carpentry/Masonry (6)
Chisels	1	
Saws	1	
Tongs	2	Metallurgical (2)
Knives/Blade Fragments	8	Utilitarian (9)
Razors	1	
Awls and/or Needles	3	Small Craft or Detail Work (6)
Nails/Tacks	2	
Ear Scoops	1	
Sub-Total	23	
Weapons		
Spearheads	1	Offensive Weapons (2)
Dagger Blades	1	
Sub-Total	2	
Total of Implements and Weapons	25	

Tab. XIX - Bronze Implements and Weapons from the 'Serraglio'

Sites	Bronze			Other Materials			Total
	Weapons	Implements	Sub-Total	Weapons	Implements	Sub-Total	
Eleona	4 Spearheads; 1 Sword	1 Blade fragment; 1 Knife; 2 Razors/ Cleavers; 1 Casting waste	10 (13.3%)	-	1 Obsidian blade	1 (4.5%)	11 (11.3%)
Langada	37 Arrowheads; 4 Spearheads; 3 Swords	4 Awls; 2 Chisels; 3 Cleavers; 1 Conical cap; 7 Knives; 2 Razors/Cleavers; 1 Set of tongs; 1 pair of Tweezers	65 (86.7%)	-	3 Whetstones; 18 Lead fishing weights	21 (95.5%)	86 (88.7%)
Total	49	26	75 (100.0%; 95.1%)	-	22	22 (100.0%; 4.9%)	97
Weapons: E. Ts. 4 or 5, 6 or 7; L. Ts. 15, 16, 21, 34, 37, 46, 53, stray finds. Implements: E. Ts. 15, 17, 20, 21; L. Ts. 11, 15, 25, 34, 37, 38, 42, 43, 45, 46, 52, 58, stray finds (two of the three stray finds are currently unpublished).							

Tab. XX - Distribution of Weapons and Miscellaneous Implements from Eleona and Langada by Type and Material

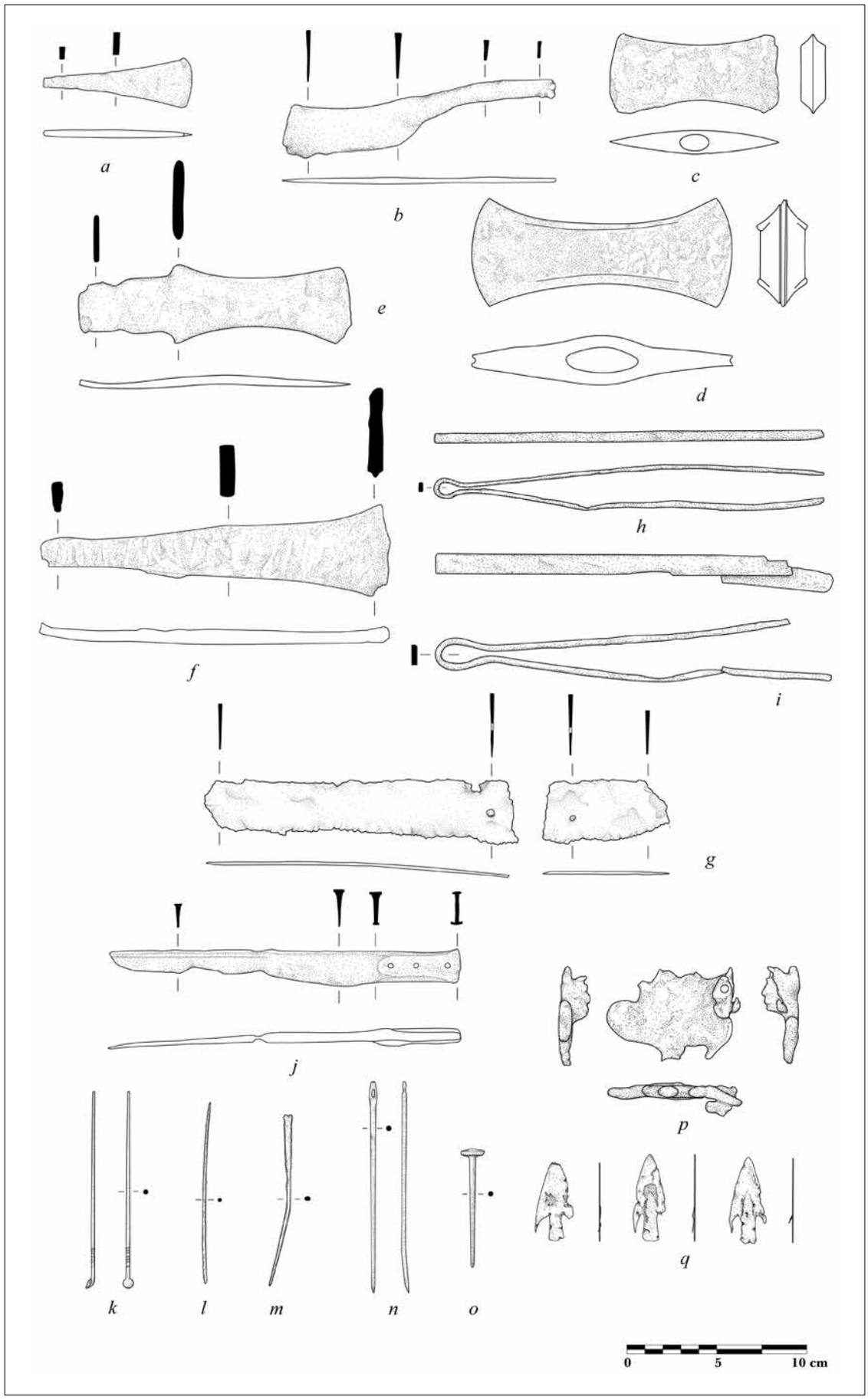


Fig. 25 - a-o: Bronze implements from the 'Serraglio'; p: Bronze casting waste or spillage from Eleona Tomb 20; q: Stray bronze arrowheads from Langada (a-b, e-j, p: S. Regio - T. Ross; c-d, k-o, q: M. Rossin - T. Ross)

25:c-d), one razor (Fig. 25:b), and one ear-scoop (Fig. 25:k), fit best within Greek mainland traditions. Due to the ambiguity of several tool types, Crete cannot be eliminated completely as an influential source on the Koan material. Unquestionable Minoan types, however, are absent[96]. Easily identifiable Cretan implements would have included: long chisels between 27 and 35 cm in length; double axes that are shorter and wider than Mycenaean versions and that have a circular shaft hole; other double-ended implements like axe-adzes and double adzes; and finally saws that are longer and taller than mainland types[97]. These observations are useful for our cultural understanding of the 'Serraglio' assemblage, especially if one considers the dearth of contextual information for the vast majority of the tools from this settlement.

One cannot exclude, however, the possibility of non-Greek mainland influences on the tool assemblage. The trunnion or lugged axe, for instance, represents an implement of Anatolian origin (Fig. 25:e)[98]. One of the knives, characterized by an incised decoration along its top (non-cutting) edge, belongs to the so-called *Scoglio del Tonno* type and has close Italian parallels[99]. The recently identified 'Serraglio' saw (Fig. 25:g) is distinctive from Minoan types. It may be a local type/product, although its basic shape is reminiscent of band saws from the Greek mainland[100]. Indeed, local metallurgical activity is attested by two pairs of tongs from the 'Serraglio' (Fig. 25:h-i) and a piece of casting waste from Eleona Tomb 20 (Fig. 25:p). Thus, the production of Koan metal tools and weapons is a possibility, yet the dearth of molds limits our ability to know what products the island manufactured[101].

The weapons from the 'Serraglio' include a spearhead and a dagger blade[102]. The former is characterized by a fully cast socket and may have had an Italian/European origin (Tab. XIX). The dagger reflects more canonical Aegean types.

As in the case of the 'Serraglio', the typological and functional range of the bronzes from Eleona and Langada is rich and diverse (Tab. XX)[103]. The implements include razors, knives (Fig. 17:c-d), cleavers (Fig. 17:e), blades, and smaller tools, such as awls and needles. Within this group, a razor with incised handle decoration from Langada Tomb 34[104] resembles Italian/European types. The vast majority of the items, however, are characteristic of contemporary LBA mortuary contexts on the Greek mainland and elsewhere in the Dodecanese (Tab. XX)[105].

Weapons are represented by four swords (Fig. 17:a), eight spearheads (Fig. 17:b), and 37 arrowheads (Fig. 25:q). These items generally conform to Mycenaean types, including: swords of I. Kilian-Dirlmeier's Cruciform 1:e and F:2.A type; spearheads of O. Höckmann's Groups C and F:IV; and arrowheads of H.G. Buchholz's Types VI:b and VII:c[106]. On the other hand, a Naue II sword (Fig. 26:a) and another spearhead with a fully cast socket (Fig. 26:b) from Langada Tomb 21 add to the group of Koan objects with a possible Italian/European origin.

Overall, there is a pronounced difference in the quantitative and qualitative distribution of weapons and tools from Eleona and Langada, with the latter standing out in terms of richness (Tab. XX).

The razor with incised handle decoration, the *Scoglio del Tonno* type knife, the two spearheads with a fully cast socket, and the Naue II sword described above, along with other objects, form a group of bronzes from Kos that may have had an Italian/European origin. This relatively small but interesting assemblage also included two violin-bow fibulae from Tombs 10 and 20, the latter of which incorporates a leaf-shaped bow (Fig. 27:a)[107]. The Italian/European type objects discovered on Kos mostly date between LH IIIB2 Late and LH IIIC Middle (Tab. XXI). These items represent seven out of ten total Dodecanese bronzes that may have originated in Italy/Europe. Such a pattern suggests that Kos played a prominent role in forming contacts between these regions during the late Mycenaean period[108]. The circulation of

[96] BLACKWELL 2011, 100-106, 138-145, 157-164.

[97] EVELY 1993.

[98] MAXWELL-HYSLOP 1953, 73-79; ERKANAL 1977; BLACKWELL 2011, 148-151.

[99] MORRICONE 1975, 278-279, fig. 239, first knife from left; BENZI 2009, 157, 163. See also, VITALE-BLACKWELL-MCNAMEE *forthcoming*.

[100] FELSCH 1996, 382, no. 2236, pl. 63; BLACKWELL 2011, 192-193.

[101] MORRICONE 1975, 275, fig. 228:c.

[102] MORRICONE 1975, 275-276, figs. 230-231.

[103] MORRICONE 1967.

[104] MORRICONE 1967, 165, figs.167-168; BENZI 2009, 157; VITALE-BLACKWELL-MCNAMEE *forthcoming*.

[105] IAKOVIDIS 1982, 214-215, 222-223, 226; GEORGIADIS 2003, 98-104.

[106] BUCHHOLZ 1962; HÖCKMANN 1980; KILIAN-DIRLMEIER 1993.

[107] MORRICONE 1967, 102-103, fig. 84:a; BENZI 2009; VITALE-BLACKWELL-MCNAMEE *forthcoming*.

[108] BENZI 2009; VITALE-BLACKWELL-MCNAMEE *forthcoming*.

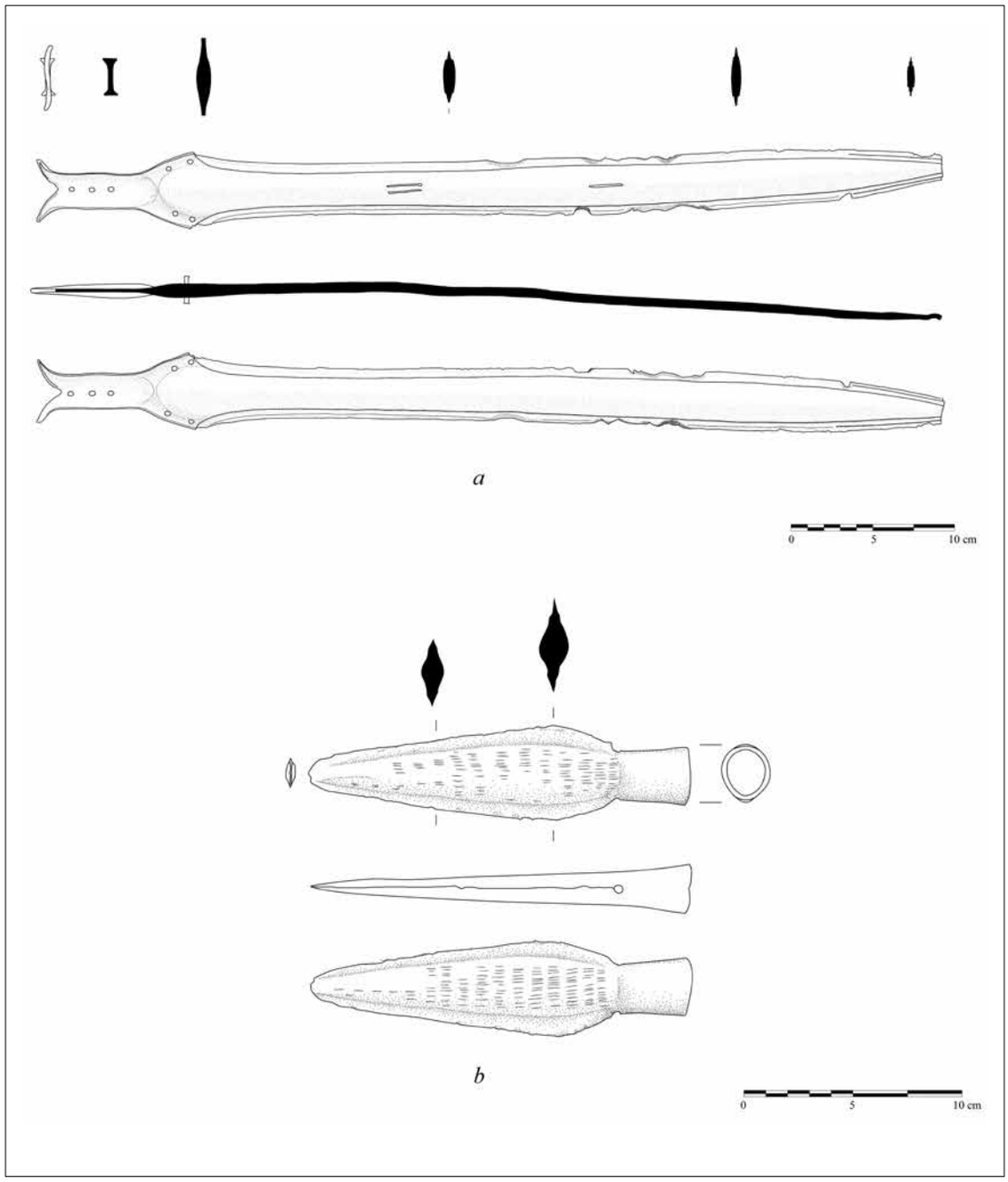


Fig. 26 - LH IIIB2 Late bronze weapons from Langada Tomb 21
(a: S. Regio - A. Trecarichi; b: S. Regio - M. Rossin - T. Ross)

Italian/European type objects in the SE Aegean area may relate to piracy, a phenomenon that likely increased during the troubled final decades of the 13th century B.C. and the eventual collapse of the Mycenaean palaces. Any pirate activity in the eastern Aegean during this period may have been connected with the initial raids by the elusive and enigmatic Sea Peoples[109].

Despite the Mycenaean connections with its tool assemblage, Kos was selective in what implements it adopted. No metal agricultural tools, for instance, appear on the island, while more than 50 examples, usually sickles or ploughshares, have come to light on the Greek mainland. Moreover, in spite of the diversity of the Koan implements, no tool kit exists on the island akin to that found in the Argolid and central Greece. Analysis of the metal hoards from the LBA Greek mainland reveals a standardized tool kit, formed by a double axe, a broad chisel with a cutting edge wider than

[109] See Jung 2009; Vitale-Blackwell-McNamee *forthcoming*.

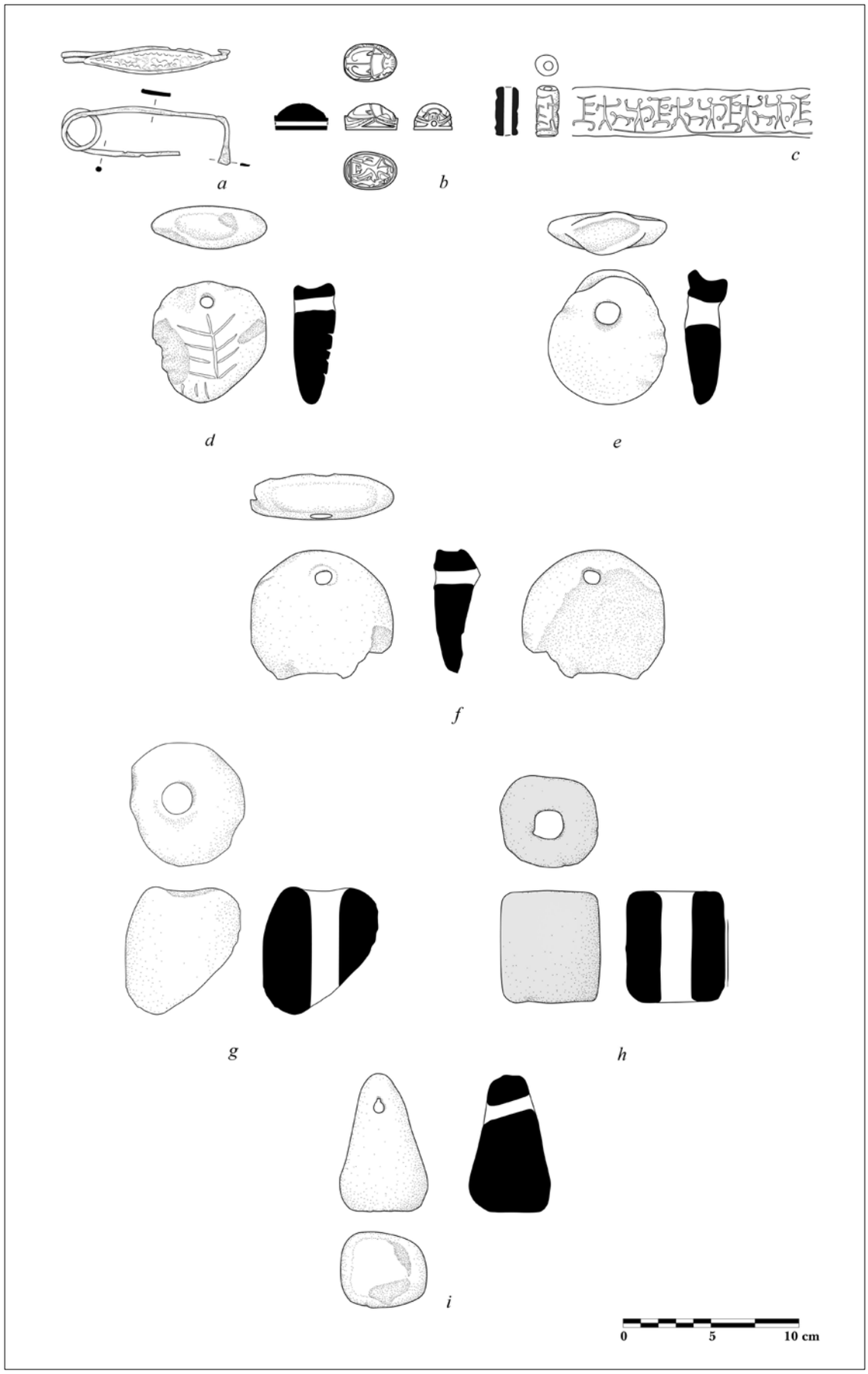


Fig. 27 - a-c: Adornments from Langada Tombs 10 and 50 and from Eleona Tomb 22; d-f: Discoid loomweights from the 'Serraglio'; g: Cylindrical loomweight from the 'Serraglio'; h: Cylindrical loomweight with a "squared off" profile from the 'Serraglio'; i: Pyramidal loomweight from the 'Serraglio' (a-c, e, h-i: M. Rossin - T. Ross; d, g: S. Regio - T. Ross; f: S. Regio - M. Rossin - T. Ross)

Type	LH IIIB 2 Late	LH IIIB2 Late-LH IIIC Middle	LH IIIC Middle	LH IIIC Early-Middle	Not Datable	Total
Scoglio del Tonno Type Knife (the 'Serraglio', stray find)	-	-	-	-	1	1
Spearhead with a Fully Cast Socket (the 'Serraglio', stray find)	-	1	-	-	-	1
Violin Bow Fibula (Langada, Tomb 10)	-	-	-	1	-	1
Naue II Sword (Langada, Tomb 21)	1	-	-	-	-	1
Spearhead with a Fully Cast Socket (Langada, Tomb 21)	1	-	-	-	-	1
Violin Bow Fibula, Leaf-Shaped Bow (Langada, Tomb 20)	-	-	1	-	-	1
Razor with Incised Handle Decoration (Langada, Tomb 34)	-	-	1	-	-	1
Total	2	1	2	1	1	7

Tab. XXI - Chronological Distribution of Italian/European Type Bronze Objects from the 'Serraglio', Eleona, and Langada

3 cm, a narrow chisel with a cutting edge less than 3 cm, a knife (usually a single-edged version), and a sickle[110]. The pairing of broad and narrow chisels is common on the mainland, yet most Koan chisels are wide types and only one example of a narrow chisel (from Langada Tomb 58) has been recovered.

Nicholas G. Blackwell - Salvatore Vitale

5.8 - Jewelry and Adornments

The analysis of precious and semiprecious adornments for clothes and body was completed during SELAP's 2014 and 2015 study seasons. The vast majority of these objects come from Eleona and Langada and represent an important component of the offerings displayed in the Koan burial arena during the Mycenaean period. The results of SELAP's study have significantly enhanced our understanding of the social and cultural meaning of these materials compared to previous publications[111].

The analysis presented within this report concerns exclusively the 55 chronologically qualified finds groups from Eleona and Langada (Tab. VI). During LBA IIIA1 and LH IIIA2 (Fig. 16:c-d), the number of precious and semiprecious adornments was small in quantity, quality, and diversity. The typology of the objects was constant and simple. However, differentiation for certain individuals is apparent, since in both phases adornments are mostly concentrated in one tomb, that is Eleona Tomb 22 during LBA IIIA1 and Langada Tomb 38 during LH IIIA2[112]. Despite the increase in the total number of graves in LH IIIB, the overall wealth displayed during this phase in terms of jewelry was not particularly impressive, although the introduction of bronze (Fig. 16:e) and ivory[113] as manufacturing materials should be noted. LH IIIB precious and semiprecious small finds are spread evenly throughout the tombs, suggesting that the practice of placing adornments within the graves was not reserved for elite or special members of the society. In fact, during LH IIIB, especially the final part of this period, distinguished social status was underlined by an emphasis on the display of weapons rather than the presence of jewelry. This fact is shown particularly well by the rich finds from Lan-

[110] For metal agricultural tools and metal hoards from the Greek mainland, see Blackwell 2001, 73-75, 281-285, fig. 3.b.

[111] For previous publications, see Morricone 1967; Georgiadis 2003, 101-103; For SELAP's results, see Vitale 2012a, 1236; Vitale 2012b; Vitale 2016a, 84, fig. 5:2.j-k; Vitale 2016b.

[112] Morricone 1967, 80-82, 178-182, figs. 55-57, 188-192; Vitale 2016b, 259-260, 263, figs. 1-3, pl. 1:a-c, tab. 2.

[113] Morricone 1967, 260, fig. 283:a; Vitale 2012b, 409, 411, pl. XCIII:l; Vitale 2016b, 260, fig. 4:a, pl. 1:d.

Function	Eleona	Langada	Total
Head/Hair	-	6	6 (2.2%)
Neck	12	161 (215)*	173 (227)* (62.4%)
Hand/Arm	-	34	34 (12.3%)
Clothes	15	49	64 (23.1%)
Total	27 (9.7%)	250 (90.3%)	277 (100.0%)
Materials	Amber (7) Carnelian (2) Glass (2) Steatite (14) Terracotta (2)	Agate (1) Amber (12) Amethyst (1) Bronze (35) Carnelian (19) Coral (2) Crystal (1) Faience (93) Glass (20) Gold (59) Ivory (3) Ivory or Bone (4) Lead (3) Shell (2) Silver (2) Steatite (25) Stone (3) Terracotta (19)	Agate (1; 0.3%) Amber (19; 5.7%) Amethyst (1; 0.3%) Bronze (35; 10.7%) Carnelian (21; 6.3%) Coral (2; 0.6%) Crystal (1; 0.3%) Faience (93; 28.1%) Glass (22; 6.6%) Gold (59; 17.9%) Ivory (3; 0.9%) Ivory or Bone (4; 1.2%) Lead (3; 0.9%) Shell (2; 0.6%) Silver (2; 0.6%) Steatite (39; 11.8%) Stone (3; 0.9%) Terracotta (21; 6.3%)
* The numbers in parentheses refer to the counts for individual beads. A single adornment, for example a necklace, may consist of multiple beads. Thus, the count for individual beads is higher than the count for individual neck adornments.			

Tab. XXII - Distribution of Adornments from Eleona and Langada by Function and Material

gada Tombs 21and 46 (Figs. 17, 26), two single burial graves dating to LH IIIB2 Late (see above, section 5.7)[114].

LH IIIC Early brought a rise in the total quantity of precious and semiprecious adornments (Fig. 16:f-g), as well as a change in the quality and diversity of the offerings to include more exotic and curious materials and shapes. Evidence for social distinction through the display of jewelry occurs, as shown by the concentration of the finds within Group 2 of Langada Tomb 57 (Fig. 16:g)[115]. By LH IIIC Middle (Fig. 27:b), the total quantity of adornments decreases in relation to the number of tombs. Their distribution within particular graves, however, still provides argument for the use of jewelry as an indicator of social distinction, as most of the offerings are concentrated in Langada Tomb 34[116].

In addition to these shifting patterns in the display of jewelry as an indicator of social status, SELAP's study of the adornments from Eleona and Langada resulted in three main further conclusions. First, as in the case of bronze weapons and miscellaneous implements, the uneven distribution of precious and semi-precious objects suggests the existence of a socio-economic distinction between the two sites. Langada contained 90.3% of the total jewelry (Tab. XXII) and therefore appears to have been the resting place of the wealthier members of the Koan community. Second, although the overall character of the Koan jewelry reflects the standard Mycenaean repertoire of burial offerings, the occurrence of exotic types and/or materials reveals the wide range of Koan contacts outside of the Aegean area, including Italy/Europe

[114] MORRICONE 1967, 136-142, 212-220, figs. 121-128, 225-233; VITALE 2016b, 260-261, 263, figs. 4-5, pl. 1:d-l, pl. 2:a-b, pl. 3, tab. 3.

[115] MORRICONE 1967, 247-253, figs. 273-277; VITALE 2016b, 261-264, figs. 6-7, 10, pls. 2:c-i, 4, tab. 4.

[116] MORRICONE 1967, 163-168, figs. 166-171; VITALE 2016b, 262-264, figs. 8-10, pl. 4, tab. 4.

(Fig. 16:g, first from right; Fig. 27:a), Egypt (Fig. 27:b), and the Near East (Fig. 27:c)[117]. Third, a comparison with the evidence from the cemetery of Ialysos on Rhodes shows the existence of similar chronological and cultural trends, especially in the shifting trajectories of jewelry as an indicator of social status and in the wealth of the LH IIIC repertoire of the adornments[118]. These common traits suggest that, within the second part of the LBA period, despite its strong connections with the Greek mainland, the SE Aegean may have formed a distinct sub-region within the Mycenaean world[119].

Salvatore Vitale

5.9 - Loomweights

A problematic aspect for the study of Koan loomweights is the almost complete lack of contextual evidence[120]. Despite this circumstance, SELAP's analysis produced some preliminary chronological observations, based on typology and macroscopic fabric observations[121].

The loomweights that could be securely attributed to the Bronze Age include discoid with flattened or grooved tops (Fig. 27:d-f), cylindrical (Fig. 27:g), and cylindrical with a 'squared off' profile specimens (Fig. 27:h). The majority of the discoid loomweights made in coarse and medium-coarse fabrics may reflect Cretan influence and should most probably be dated between LBA IA Mature and LBA IB (Fig. 27:d-e). Some other discoid specimens in a medium-fine fabric can only be dated generally within the LBA[122]. One medium-fine discoid loomweight from the fill above the final floor of the House of the Figs (Fig. 27:f) can be assigned safely to LH IIIC, based on the find context.

The majority of the cylindrical loomweights may also date to LBA IA Mature and LBA IB (Fig. 27:g), as most of the specimens from Miletus come from Phase IV contexts, corresponding to LM IA and LM IB-LM II[123]. Alternative dates, however, cannot be ruled out. In fact, cylindrical loomweights at Miletus also occur during the MBA (Phase III) and in the second half of the LBA (Phases V-VII), while on Rhodes published examples come from LBA II-LBA IIIA1 contexts[124]. Finally, cylindrical loomweights with a 'squared off' profile (Fig. 27:h) have parallels in LBA contexts at Miletus[125].

In addition to discoid, cylindrical, and cylindrical with a 'squared off' profile specimens, a prehistoric date cannot be excluded also for two pyramidal loomweights manufactured in a rather coarse fabric (Fig. 27:i). In fact, although this shape is more common after the end of the Bronze Age, some MBA examples are known from Mallia on Crete[126].

The Koan loomweights included in SELAP's collection belong to the same macroscopic fabric groups and sub-groups defined based on ceramic evidence and described above in section 5.2 (Tab. XVII). One of the most intriguing, and at the same time puzzling, results of SELAP's 2015 season was the discovery of discoid loomweights with grooved tops assignable to Sub-Groups C-I and D-II. These loomweights combine EBA fabric mixes with a LBA shape inspired by Minoan prototypes.

The most common surface treatments identified through the analysis of SELAP's loomweights include wiping and smoothing. Most of the specimens are unpainted, but some loomweights are washed in a similar manner to Monochrome Dark Local Tradition ceramics (Fig. 27:h). It is particularly worth noting that one discoid loomweight with grooved top has a Linear A incised mark (Fig. 27:d), a case that is unparalleled at the moment in the whole SE Aegean area. The results of macroscopic fabric analysis indicate that this loomweight may be the only imported specimen in SELAP's collection.

By the end of the 2015 season, all of the loomweights under study were catalogued, drawn, and photographed. Future research on these materials will be focused on a more in-depth evaluation of the functional parameters and on the wider chronological, social, and cultural implications of the Koan assemblage.

Salvatore Vitale - Eleonora Ballan

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117 Vitale 2016b, 259-260, 262-263, 265, figs. 1:a, 4:a, 7:d, 8:e, 9, 10:o, pls. 1:a, d, 2:i, 4:o.

118 Benzi 1992, 99-111, figs. 81-91; Vitale 2016b, 264-265.

119 Vitale 2016b, 265.

120 See Morricone 1975, 279, fig. 240.

121 SELAP's team is grateful to J. Cutler for pointing out some of the parallels proposed within this section between the Koan loomweights and other materials from the wider Aegean area.

122 Cutler 2016, 173-174.

123 Gleba-Cutler 2012, 116.

124 Gleba-Cutler 2012, 116; Papazoglou-Manioudaki 1982, 146-147, 176-177, pl. 83:γ.

125 J. Cutler (pers. comm. 2015).

126 Cutler-Andersson Strand-Nosch 2013, 98-99, 103, 107, 112, 115, figs. 5:1, 3-7, 9 -11, 18, 20-21.

6 - SUMMARY AND FINAL STATEMENTS

The work carried out during SELAP's 2011 to 2015 study seasons in close collaboration with Marketou significantly increased our knowledge of prehistoric and EIA Kos. The materials recovered in the Asklupis area indicated the existence of a long but discontinuous history of human activity from the LN/FN to the LPG period. Within this time span, a long occupational gap occurred between the EBA 3 and the end of the MBA, while possible smaller gaps may have existed during the LBA IB to LBA IIIA1, LH IIIC Early, and MPG phases.

The results of Italian and Greek excavations were combined to produce a comprehensive chronological sequence at the 'Serraglio' from the end of the EBA to the end of the LBA period. In addition, the study of fine decorated pottery suggested that the area of the 'Serraglio' was continuously occupied during the LBA-EIA transition, thus confirming Morricone's original conclusions on this controversial part of the Koan sequence.

SELAP's research has revealed important elements of continuity and change, which define the complex cultural and socio-political trajectories of Kos during prehistory and the EIA. In the LN/FN, EBA, and MBA periods, Kos belonged to a cultural assemblage including the Dodecanese, the Aegean islands located in the vicinity of the Anatolian coast, and the W Anatolian coast. This is demonstrated by multiple indicators, which include specific preferences in settlement patterns, subsistence strategies, burial practices, and ceramic repertoire. It is within this particular cultural environment that the defining characteristics of the Koan local tradition were shaped, especially during the EBA and the MBA[127]. From the beginning of the LBA, Kos was exposed to Minoan and Mycenaean cultures. The impact of Minoan and Mycenaean influence, however, was different in terms of duration, quality, and quantity. The former was relatively brief and the impact on material culture was mostly confined to the ceramic and weaving equipment repertoire[128]. The latter was a longer process resulting not only in major changes in pottery consumption and manufacturing patterns, but also in the adoption of a wider range of cultural practices, which included Mycenaean funerary behaviors, architecture, jewelry, weapons, and bronze implements. SELAP's research indicates that by the beginning of LH IIIA2, when the Langada cemetery was founded, the Koan community in the wider area of the 'Serraglio' had adopted the defining cultural diacritics of Mycenaean civilization[129].

The exposure to Minoan and Mycenaean cultures does not imply that Koan earlier local traditions had a marginal role during the LBA. On the contrary, the study of ceramics indicates the enduring role played by Local Tradition classes, fabric mixes, and technology throughout the Bronze Age and demonstrates that the Koan local tradition was a dynamic component of entanglements between cultural elements of different origin, especially during the peak of Minoan influence. The analysis of burial practices at Eleona and Langada also suggests that the pervasive adoption of Mycenaean cultural diacritics in the second half of the LBA was combined with the occurrence of local idiosyncrasies. This cultural mix appears to be a prominent element of Koan Mycenaean identity and of a wider regional Mycenaean identity, which may have included the SE Aegean islands and the W coast of Anatolia.

The study of space, built environment, and funerary landscape, as well as the analysis of ceramic and non-ceramic finds produced a significant amount of fresh information on the socio-political trajectories of Kos during the second half of the LBA. More specifically, SELAP's data indicate the occurrence of important differences between the Palatial and Postpalatial phases of the Mycenaean civilization. These differences include a shift towards a less carefully built architectural environment, a less organized use of the space, and an overall more fluid social structure. At Eleona and Langada, these changes are accompanied by an increased variability in tomb types, demonstrated by the growth in the number of less formalized burials, such as pit graves.

SELAP's research also indicated that LH IIIB was a prominent phase of expansion in NE Kos, as implied by the number of settlement and cemetery sites, the quantity of the chamber tombs built at Langada, and the quantity and quality of the finds, especially the bronze weapons from Langada Tombs 21 and 46. These data suggest that the importance of Kos within LH IIIB may have grown at the expense of Rhodes, where Ialysos underwent an apparent decline, and that Kos may have had a prominent political role in the SE Aegean as well

[127] VITALE 2013; VITALE 2016a, 76-77 (both with previous bibliography).

[128] Minoan features attested on Kos during the LBA IA Mature phase include also a *polythyron*. This structure, however, was built following local tradition rather than Cretan construction practices (MARKETOU 2010a, 763-764, fig. 57:1). For a complete review of Minoan cultural diacritics on Kos, see VITALE 2016a, 77-82, 86, tab. 5:4 (with previous bibliography).

[129] VITALE 2016a, 86-87 (with previous bibliography).

as in the so-called Ahhijawa Kingdom during the 13th century B.C.[130].

Overall, the social and cultural developments described in the previous sections of this paper are characterized by the alternation between phases of acceleration and stability, with acceleration being initiated during dynamic periods of engagement with neighboring areas. The phases of stability include the periods from the LN/FN to the EBA 2, as well as the MBA. The phases of acceleration include the EBA 3, when NE Kos participated in the so-called Anatolian Trade Network system, as well as large portions of the LBA, when NE Kos was involved in cultural and ideological exchanges with Minoan and Mycenaean civilizations.

The alternation of phases of acceleration and stability may be thoroughly understood through the lenses of social agency and cultural entanglement[131]. The episodes of acceleration may be linked to the appearance of local elites aiming to participate in commercial and cultural relationships with neighboring areas and thus needing to redefine and reshape Koan practices, styles, and identity. Unlike previous episodes of acceleration, the adoption of Mycenaean material culture produced deep and irreversible changes, resulting in the replacement of the long standing local traditional practices as the defining component of Koan identity.

The dynamics that originated the actual spread of Minoan and Mycenaean cultures from their homelands on Crete and the Greek mainland to the wider Aegean region have been explained through different lenses, which include migration, acculturation, colonization, colonialism without colonies, and more recently mobility[132]. In the specific Koan case, mobility provides the most satisfactory framework. Considering the strategic location of Kos on the maritime trade routes between the Aegean and W coastal Anatolia and/or W coastal Anatolia and the Near East (via Rhodes and Cyprus), recurrent visits of small groups of different peoples, as well as the seasonal or semi-permanent presence of limited communities of travelers and merchants appear to be highly likely. These diverse groups of people may have been the vehicles of Minoan and Mycenaean material cultures and may have played an active role in the concrete exchange of goods with the Koan local elites and their wider community.

In addition to enhancing the understanding of Koan cultural and socio-political trajectories, SELAP's 2011 to 2015 study seasons shed new light on a variety of specific aspects of Koan Bronze Age and EIA material culture. The results of spatial analysis at the settlement of the 'Serraglio' clarified important topographic issues, such as the identification of the W boundaries of the LBA town in the Fadil area. The macroscopic analysis of ceramic fabrics and the study of raw clay materials have deeply broadened our understanding of the complex relationships between ancient potting practices, landscape, and natural resources on NE Kos. The uneven distribution of weapons, bronze implements, and jewelry at Eleona and Langada provided evidence for a status distinction, with the latter cemetery including the wealthier individuals of the Koan community. At the same time, the presence of exotic jewelry types and/or materials demonstrates that Koan long distance contacts included Italy/Europe, Egypt, and the Near East. Finally, the progress in the study of the human bones from Eleona and Langada had two significant outcomes. First, it revealed new information on the lifestyle and activities before death of the Koan community. Second, it demonstrated that cremation was more common than previously thought, suggesting that Kos may have played a key part in the spread of this rite from Anatolia to the western Aegean.

The future completion of SELAP's archaeological study of Koan loomweights and stone tools, as well as the results of ceramic petrographic and chemical analyses, isotope analyses of the human osteological remains, and microbotanical analyses of pottery vessels and stone grinding tools are expected to supplement our current information and enhance our understanding of cultural practices, identity, and society on prehistoric and EIA Kos.

Salvatore Vitale - Toula Marketou - Calla McNamee

[130] See Vitale 2012a, 1246; Vitale 2012b, 413; Vitale 2016a, 87 (all with previous bibliography).

[131] Giddens 1984; Hodder 2012.

[132] Branigan 1981; Wiener 1990; Melas 1991; Knappett-Nikolakopoulou 2008. See also Broodbank 2004; Davis-Gorogianni 2008; Niemeier 2009. For recent reviews of these frameworks, see Vitale 2016, 86-88; Mokrišová 2016, 44-47 (both with previous bibliography).

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