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Limestone, Diorite and Radiolarite: First Petrographic Data of Fired Clay Objects from Limyra (Southwest Turkey)

Lisa PELOSCHEK – Martin SEYER – Banu YENER-MARKSTEINER – Philip BES*

Historical Development of Limyra

During the archaeological excavations that have taken place in the ancient city of Limyra in Eastern Lycia since 1969, a number of spectacular individual finds have been made including the Heroon of Perikle, a local ruler of the city in the 4th century B.C.[1], a ruler-cult building for the Ptolemaic dynasty dating to the early 3rd century B.C.[2], and the cenotaph for Gaius Caesar, the grandson and adopted son of Augustus who died in Limyra in 4 A.D.[3]. In addition, numerous structures of the Roman Imperial and the Byzantine periods (1st century B.C. to 7th century A.D.) have been discovered, as well as valuable evidence regarding nearly every aspect of civic life and funerary practices during all phases of the settlement[4].

In the last few years the focal point of research in Limyra has been devoted to the urban development, above all, from the Hellenistic until the Byzantine periods. Within the framework of these investigations, by means of focused excavations in the area of both Byzantine city walls of the eastern and western city (Fig. 1), information has been obtained regarding the various phases of the urban picture, and of the city plan with its street system and contiguous architecture[5]. Of great interest is the question whether a different development of the two city

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1 Borchhardt 1976.

2 Stanzl 2012 with bibliography.

3 Ganzert 1984; Borchhardt 2002.

4 For an overview of the scientific results see Borchhardt et al. 1991/92; Borchhardt 1993; Borchhardt et al. 1997; Seyer 2012a.

5 For the first results of this research see Seyer 2013a, Seyer 2013b, Seyer 2013c.

walls can be determined during the Byzantine period. The division of the settlement into two parts during the Late Antique/Early Byzantine epoch via the erection of two independent, irregular city walls adapted to the topographical conditions indeed seems to have occurred first and foremost due to the fact that the western arm of the river Limyros should not be integrated into the civic area. It is, however, noteworthy that in the Byzantine period two prestigious buildings, the Bishop's Church[6] and the Southern Baths[7] (formerly the Bishop's Palace[8]) are found in the eastern city. The urban development of the western city, on the other hand – with the exception of a small area to the north of the city wall of the Classical period – is still widely *terra incognita*. Since, however, in the Hellenistic and the early Imperial periods, important structures were erected in the western city in the form of the so-called Ptolemaion and the Cenotaph for Gaius Caesar, the question can be raised if, in the course of Christianization, a possible shift in the civic center occurred, with the spiritual-religious focal point being transferred to the eastern area of the city.

Archaeological Find Contexts

In order to gain a thorough understanding of the development and chronological evolution of the urban fabric, ceramic assemblages are decisive. Apart from a morphological assessment of vessels and related ceramic objects, the compositional characterization of representative ceramics might add to the reconstruction of the relationship between the cityscape and the surrounding landscape on a regional scale.

The pottery discussed in this article was brought to light at four different excavation sites in Limyra. These are closely connected with the research focus on urbanism. Sondage 9[9] was part of a large excavation project in the western part of the lower city of Limyra with the aim to gain information about the stratigraphical sequence and thereby the history of the settlement at the southern border of the classical city. This project has been presented in various research papers[10]; the final publication is in preparation.

During the years of 1995/96 and from 2007-2010 a building directly to the west of the Roman theater was excavated, which turned out to be a bathing complex[11] (Fig. 2). With the axial alignment of its heated rooms, it corresponds to the most common type in Lycia. The construction technique of the structure as well as the use of numerous spolia in the masonry point to a date of erection in the 3rd century. Although the complex was abandoned already in the 5th century, later building phases prove a secondary use for at least parts of it.

During 2012/2013 two excavations were undertaken directly inside the outer gates of the lower city[12]. Of great importance for the urban development of Limyra is the defensive wall of the Hellenistic era which was discovered within the excavation at the West Gate (Fig. 3). This structure is oriented almost east-west and proves the hypothesis that the city of the Classical period was enlarged to the south under the Ptolemaic dynasty in the 3rd century B.C. In the

6 Peschlow 1984; Jacobek 1993; Peschlow 1997; Hellenkemper – Hild 2004, 688 s. v. Limyra.

7 Sewing 2015.

8 Jacobek 1991/92, 173; Jacobek 1993.

9 Marksteiner 1988; Marksteiner 1991/92.

10 Marksteiner et al. 2007; Marksteiner – Yener-Marksteiner 2009.

11 Schuh 2012a; Schuh 2012b.

12 Seyer 2012b; Seyer et al. 2012; Seyer 2013a; Seyer 2013b; Seyer 2014; Seyer et al. 2014.

course of the building activities at this time, the city's street grid was established, which obviously was maintained until early Byzantine times. Just a few meters to the north of this wall, a street with a width of ca. 4.5 m of the Roman Imperial or Late Antique time was discovered. This formed the main traffic axis from the west. A junction approximately 20 m from the gate may point to a city with a regular street grid in this period. Several buildings of the Byzantine period testify to the prosperity of the city in this era. The excavation at the East Gate (Fig. 4) brought to light the main traffic axis from the east most probably dating to the Late Antique period. At its northern border a water channel made of stone pipes was found, which provided the city with drinking water. The most spectacular find, however, was a structure adjacent to the inner side of the city wall, which has been partially revealed to date. This building contains some elements – two stone slabs with depictions of menorahs and a water basin (possibly a mikweh) – which suggest that it was used as a public building for the Jewish community of the city, most probably as its synagogue[13].

Significant changes in the urban structure of Limyra in the periods of interest imply shifts in the social structure and orientation of the city, which might also be reflected in the ceramic sector. The cultural identity of the potters and potting practices might have been affected and adjusted to new habits. Diachronic observations on clay selection strategies in the local ceramic manufacture might be observed. An increased sophistication of functional properties of ceramic vessels needs to be monitored, as impulses from other parts of the Eastern Mediterranean might have provoked technological progress in certain periods.

Geological Setting of the Bay of Finike

Geologically, Limyra is located at the southern extension of Bey Dağları Autochthon, a Carbonate platform of the Western Taurides, dating from the Early Cretaceous to the late Miocene in this area[14] and forming the remains of the Neotethyan Ocean. Bey Dağları Autochthon is situated between the geotectonical units of the Lycian Nappes to its northwest, and the adjacent Antalya Complex immediately to the east of modern Kumluca. The landscape around the Bay of Finike is defined dominantly by neritic (shallow-water) carbonates, supplemented by less pelagic (deep-sea) carbonates, with deposits reaching up to a 600 m thickness at some places[15]. The focus of research dealing with the carbonates and bedded limestones of Bey Dağları was primarily dedicated to the identification of microfossil species typical for carbonates of neritic and pelagic origin, reflected in the extensive number of specialist-publications[16]. The microfossil suite of neritic limestone includes benthonic foraminifera and rudist bivalve, while the pelagic part is characterized by planktonic foraminifera[17].

With Bey Dağları being compositionally relatively homogeneous in southwest Lycia, the adjacent Antalya Complex is defined by geological diversity (compare the geological map in Fig. 7). Where both merge close to Kumluca, ophiolites are present[18]. Two ophiolite units are reported in the Southwest-Antalya Complex, the Tekirova ophiolite, and the Gödene ophiolite

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13 Seyer – Lotz 2013; Seyer – Lotz 2014.

14 Hayward – Robertson 1982, 68.

15 Sarı – Özer 2002, 42.

16 For example, Sarı – Özer 2002; Sarı – Özer 2009; Sarı 2009.

17 Sarı 2009, 1105-1108; Sarı – Özer, 2009, 368.

18 Hayward – Robertson 1982, 70; Dilek et al. 1999, 1192-1194.

with the latter spreading all over the mountain Göreke Dağı at the eastern Bay of Finike. The spectrum of rocks associated to the Gödene ophiolite comprises ultramafic and mafic intrusive (igneous) rocks, such as peridotite, gabbro, diorite, and quartz diorite with traces of plagiogranite[19]. Serpentinite is attested in the region as well. However, besides the repertoire of limestones already mentioned for the Bey Dağları Autochthon, also a package of sedimentary rocks reaching up to a 60 m thickness is linked to the Southwest-Antalya Complex. Robertson[20] notices quartzose turbiditic sandstone, chert, and radiolarian chert, while Dilek and collaborators[21] add shales as diagnostic components of the region. Metamorphic rocks have been identified only in small quantities in the area[22], without having been described in more detail.

Understanding the geological setting of Limyra is crucial for pinpointing potential clay mining areas. Fragments of the above-mentioned rocks and associated minerals might be detected in the deriving clay sediments, thus aiding to identify and determine the provenance of locally and regionally produced ceramics.

Sampling Strategy and Initial Conditions

This article discusses the results of petrographic analyses conducted for the first time on ceramic materials from Limyra[23]. We are able to trace human encounters with the surrounding natural environment by means of clay raw material exploitation and its transformation into daily-life items. The sampling strategy of ceramic fragments was targeted towards this research objective, and we attempted specifically to include samples of presumably local and/or regional origin in the analytical program. A macroscopic assessment of ceramics excavated in Limyra revealed some symptomatic features that enable a differentiation of supposedly local and regional products from imported wares. In cross-section, the former are characterized by rounded and dark-reddish rock fragments. The presence of clasts in brick-color hues and yellowish inclusions to be identified as limestone is also common.

Finally, forty-one ceramic samples have been selected for the pilot study presented here[24] (for sample details and results compare Fig. 9). They provide a first overview of the ceramic fabrics identified in Limyra, inferred by their stylistic and macroscopic attributes. Thin-sections have been prepared for all sherds and were subsequently analyzed with a polarizing microscope (Zeiss AxioLab A1) under plane and cross polarized light. We described the thin-sections and classified its components according to a modified version of the established descriptive system proposed by Whitbread[25].

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19 Bağcı – Parlak 2009, 390.

20 Robertson 1993, 423.

21 Dilek et al. 1999, 1194.

22 Robertson 1993, 415.

23 It needs to be stressed that this article presents the results of a first and preliminary natural-scientific analysis of ceramics from Limyra. Thin-section petrography has been chosen as technique, as it offers the best insights into the nature of the clay. However, it would be desirable to extend the analytical program in the future by applying supplementary techniques such as X-ray Fluorescence spectrometry or X-ray diffraction analyses for a more thorough characterization of the clay. Moreover, the execution of a geological survey in the area would be valuable in order to conduct a comparative study of clays and ceramic items, also in relation to other possible production sites in the region. Such a study would aid in proving the hypotheses developed in the present research paper.

24 The analysis of forty-one samples chosen should be regarded as a starting point for further detailed natural-scientific studies, allowing a first insight into the variability of compositional ceramic groups detected in Limyra.

25 This includes guidelines for the description of the size, shape and abundance of non-plastic inclusions in ceramic thin-sections (Whitbread 1995, 365-396).

The sample material covers primarily fine wares dating from the 1st century B.C. to the 7th century A.D., but also encompasses a few pieces of domestic ware, roof tiles, and spacer pins, the latter facilitating the separation and fixation of individual tiles of the heated panel walls of the bathing complex[26]. As hitherto exclusively archaeometric investigations employing wavelength-dispersive .X-ray Fluorescence spectrometry have been conducted on ceramics from Limyra[27], our pilot study aimed to establish reference groups for local pottery by petrographic terms. Archaeological objects such as the sampled spacer pins and roof tiles can assist extremely well in the characterization of locally or regionally available clay sediments, as trade of architectural ceramics and integral building elements cannot be confirmed in the archaeological record or through epigraphic testimonies in Limyra. Naturally being coarse-grained, both spacer pins and roof tiles will certainly reflect the range of rock and mineral constituents native to the territory of their origin.

Results of the Petrographic Classification

Considering the setting of Limyra in the northwest part of the Bay of Finike surrounded by purely neritic limestone, the availability of sediments for local ceramic production might be given. Nevertheless, the whole environment of the bay and probably also parts of the hinterland needs to be considered as providing potential clay extraction sites as well. Ethnographic studies have demonstrated that raw materials could have been supplied from within a radius of up to 7 km around ancient habitation sites. However, 1 km has been determined by Arnold as preferred distance for raw material acquisition[28]. In addition, the transportation of sediments by river flows needs to be considered, resulting in a natural mixing of clays and associated sediments.

As expected, all analyzed sherds can be classified as (slightly) calcareous, even though there are considerable variations in the calcium-carbonate level and the accompanying non-plastic constituents. Under consideration of all parameters, including the character, amount, sorting, and grain size distribution of rock and mineral inclusions embedded in the clay matrices, seven petrographic fabric groups (henceforth petrofabrics) have been differentiated. Nevertheless, some of the petrofabrics share certain highly distinctive properties, indicating that for the seven petrofabrics an origin from two different and distinguishable source areas might be assumed.

Before coming to the description of these compositional groups, the fabric-codes used in the following need further explanation. Instead of continuous numbering of the individual petrofabrics, other labels were introduced: a site-specific alphanumeric system of fabric-codes, already successfully applied elsewhere[29]. The names of the petrofabrics refer to the excavation site (here: LIM=Limyra), the main aplastic inclusions detected or character of the clay matrix (e.g. CALC=calcareous; CALC/DIORITE=calcareous with diorite inclusions; CHERT=major inclusions of chert) followed by digits (e.g._01, _02). The latter subdivision denominates variants of broad compositional groups, for instance, when the same spectrum of non-plastic inclusions is preserved but their grain size or frequency varies.

26 Seyer 2011, 441-442; Schuh 2012a, 289.

27 Waksman – Lemaître 2010; Lemaître et al. 2013.

28 Arnold 2005, 16.

29 This system was developed by L. Peloschek when analyzing ceramic assemblages from Aswan and Ephesos, conducted by the Austrian Archaeological Institute at the Austrian Academy of Sciences.

The following discussion gives a summary of the most decisive inclusions of Limyra's petrofabrics with reference to their geological associations. For more details on the rock and mineral constituents of the clay pastes, the Appendix below (pages 252-255) should be consulted.

The majority of samples are defined by calcareous clay matrices and the presence of micritic limestone, applying to sherds subsumed in petrofabrics LIM-CALC/DIORITE_01, LIM-CALC/DIORITE_02, LIM-CALC/DIORITE_03 and LIM-CALC_01. Their most typical feature are angular rock fragments composed of essential plagioclase feldspar and biotite flakes with minor opaques, alkalifeldspar or quartz, as well as discrete clinopyroxene and hornblende. Irregular veins infilled with opaque matter continuously are diffused within the plagioclase grains. Rarely for the plagioclase feldspars, their transformation into clay minerals has been noticed. Few heavily weathered and coarse pyroxenes in petrofabric LIM-CALC/DIORITE_01 (Figs. 5a-b) might give the idea of a geological association to mafic rocks, equivalent with gabbro, but comparative analyses rather suggest differently. The composition of the rock fragments with abundant biotite being present and their grain sizes is coherent with plutonic rocks of intermediate composition, allowing them to be identified as diorite (Fig. 5b). With this knowledge, macroscopically visible dark reddish rock fragments can now be understood as diorite, with biotite flakes forming the dark components visible. Minerals scattered throughout the clay utilized for the production of the vessels discussed, such as plagioclase feldspar, biotite schist, hornblende, and clinopyroxene are remnants of the diorite fragments.

A criterion for separating the samples into individual petrofabrics is the amount and coarseness of mostly diorite inclusions. The coarse wares represented by a *pithos* fragment and a *mortarium* falling within petrofabric LIM-CALC/DIORITE_01 naturally contain coarse inclusions. Table ware falls within petrofabric LIM-CALC/DIORITE_02 (Figs. 5c-d), displaying only an average of three or four diorite fragments in each sample, while in petrofabrics LIM-CALC/DIORITE_03 (Figs. 5e-f) and LIM-CALC_01 (Figs. 5g-h) not more than one small diorite fragment is preserved and the carbonate content is considerably increased.

Few samples, moreover, provide evidence for the rare occurrence of chert, radiolarian chert, sparite, sandstone, serpentinite, volcanic rock fragments of basaltic composition, and foraminifera. In sample LIM 14-041 of petrofabric LIM-CALC/DIORITE_03, benthic foraminifera have been positively identified (Fig. 5f), indicating an associate of this clay paste to neritic limestones[30] rather than pelagic sediments. In the coarse-grained petrofabric LIM-CALC/DIORITE_01, traces of argillaceous inclusions have been detected, likely to be shale.

All three sampled spacer pins and one roof tile constitute petrofabics (LIM-CHERT_01, LIM-CHERT_02 and LIM-CHERT_03) related to sedimentary environments as indicated by the predominance of chert and the absence of diorite fragments. The fine-grained siliceous chert fragments are accompanied by radiolarian chert, the latter particularly dominating and exhibiting an angular shape in petrofabric LIM-CHERT_01 (Figs. 6a-b). It needs to be stressed that the base clay here is less calcareous with a certain iron-oxide content than described for the ones above. Reference has to be made to the increased number of argillaceous inlusions or shale that would fit the presumed geological environment expected for these samples, particularly observable in petrofabric LIM-CHERT_03 (Figs. 6e-f). Still, accessories as described for the fine wares above are preserved in the clay matrices of these petrofabrics, including feldspars, micas, serpentinite, and micrite. Additionally, a limited amount of fine basalt fragments has been

30 Hayward – Robertson 1982, 70-71.

observed for all groups and the particular discovery of microfossils or rather skeletal remains of globorotalid species and one radiolaria in petrofabric LIM-CHERT_02 (Figs. 6c-d, radiolaria in Fig. 6d). There is occasional evidence of potential pellets of kaolinitic clay in sample LIM 14-004 (petrofabric LIM-CHERT_01) that needs further discussion.

Integrating the Ceramics in the Geological Landscape of S-Lycia

Compositional analysis of Roman Imperial, Late Roman, Late Antique, and Byzantine ceramic objects suggests an association to limestone formations that abundantly crop out in the Bay of Finike, most notably in the vicinity of Limyra. Neritic limestones native to the region demonstrably are rich in microfossil species. However, all analyzed samples manifest solely isolated benthic foraminifera and skeletal remains. In all likelihood, the extracted clay sediment cannot be rated as a primary clay but can be perceived as a weathered and transported loam causing the loss of originally embedded microorganisms. The removal of microfossils in the course of intentional clay manipulation through levigation processes can be excluded, as due to the presence of evenly distributed relatively coarse rock fragments their use in a natural state is indicated.

Lemaître and her collaborators[31] explored by geochemical methods a Lycian kaolinitic group ("lyciennes kaolinitiques") when compositionally comparing pottery of the 5^{th} to 7^{th} centuries A.D. from three sites in south Lycia including Limyra but also finds from Xanthos and the Letoon. Significantly, almost exclusively samples from Limyra cluster together in this kaolinitic group. A relationship of the kaolinite to limestone formations or ultrabasic rocks had been proposed, well-known from the periphery of Limyra. Assessing the occurrence of kaolinite deposits, these clays are formed primarily as a result of the alteration of feldspars and silicates rich in alumina, as often applying to rocks of acid composition[32].

Even though synchronous with ceramic assemblages analyzed by Lemaître and her collaborators[33], evidence of kaolinitic clay is scarce in our petrographic groupings. Apart from sample LIM 14-004 containing two possible kaolinitic clay pellets embedded in this elementary cherty clay paste (LIM-CHERT_01), no traces of kaolinitic minerals have been detected. It remains unknown whether the kaolinitic component of our analyzed ceramics relates to limestone or ophiolite, as remains of both formations can be found in petrofabric LIM-CHERT_01. Most importantly, it needs to be stressed that ceramics geochemically falling in the Lycian kaolinitic group typologically are represented by cooking wares[34] – a ceramic class that had not been analyzed petrographically in the current study.

Regarding the provenance determination of the identified seven petrofabrics at Limyra, their regional production is plausible, as indicated by the geology of the Bay of Finike.

Neritic limestones are distributed in several parts of Lycia up to the Burdur plain, but the co-occurrence of ophiolitic units with diorite deposits, and sedimentary rocks of dominantly chert and radiolarian chert is a specific feature restricted to a limited number of locations. Data of thin-section analyses in the broader region is available for Byzantine domestic wares from

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31 Lemaître et al. 2013, 195. Compare also Waksman – Lemaître 2010, 782-783.

32 Compare Deer et al. 2013, 229.

33 Lemaître et al. 2013.

34 Waksman – Lemaître 2010.

Myra-Demre, approximately 10 km to the west of Limyra[35]. In Myra, the Lycian Nappes exposes minerals and rocks having certain similarities to those recognized in the ceramics from Limyra. Besides micritic limestone and sporadic microfossils, chert, pyroxenes, and volcanic rock fragments are common constituents of local clay pastes[36]. However, serpentinite and diorite, diagnostic elements of the ceramic repertoire excavated in Limyra, are absent.

Looking closer at the geology of the micro-region around Limyra depicted in Fig. 7[37], differentiated ophiolite-units are located in the valley to the north of Kumluca, namely at the slopes of Görence Dağı spreading westwards to the Bay of Finike. The occurrence of diorite within the ophiolites of the Antalya Complex is known[38], allowing an argument in favor of the local source availability of the plutonic rock. Petrofabrics LIM-CALC/DIORITE_01, LIM-CALC/DIORITE_02, LIM-CALC/DIORITE_03 and LIM-CALC_01 moreover constitute accessory shale (?), serpentinite and, most importantly, limestone and carbonates. These clay pastes seem to derive from a clay mining area where these sedimentary rock and ophiolites geologically are combined. A spot that would fulfil these requirements is close to modern Yeşilköy at the easternmost end of the bay (location "A" in Fig. 7).

For the cherty petrofabics (LIM-CHERT_01, LIM-CHERT_02 and LIM-CHERT_03) another possible source area needs to be considered. Radiolarian chert and chert are widely dispersed at the northeast border of the bay. Ophiolitic units and sporadic neritic carbonates are transported from the hinterland by the river system of Alakır Çayı and adjacent rivers discharging into the plain of Kumluca. It can be estimated that sediments accumulating by river flow in this area would have a similar petrographic signature as recognized in our thin-sectioned samples. One argument for compiling site "B" (Fig. 7) as a likely clay supply area for our petrofabrics related to chert is the presence of basaltic lenses next to the described alluvial fan generated by water flow, fragments of which are found admixed to the utilized clay pastes.

The petrographic analysis proved that fired clay objects excavated in Limyra are discordant to the geology of the mountains Tocak Dağı and Alaca Dağ immediately to the north and west of the ancient settlement. In fact, clay thus was quarried at least from two (broad) areas from the east and northeast part of the plain. As such, clay raw materials matching the composition of ceramics excavated in Limyra are deposited in a distance of 5-8 km to the site.

The Imperial-period Ceramics

The ceramics with the sample nos. LIM 14-021 to 14-027, LIM 14-041 to 14-049, LIM 14-051 to 14-054, LIM 14-056 to 14-059 and LIM 14-060 to 14-064 have the first assessment of petrographic analysis presented here. They belong – besides one sample of a pilgrim flask (LIM 14-027) – to tableware coming from Roman deposits from two excavations, one in the West City (So9South) and one in the Northwest City of Limyra (bath complex SoQ18). The study of the pottery from both contexts is still in progress[39].

The shape repertoire of vessels falling within petrofabrics LIM-CALC/DIORITE_02, LIM-CALC/DIORITE_03 and LIM-CALC_01 consists mainly of eating/drinking and serving cups such

35 Türker 2006.

36 Türker 2006, 118-134.

37 See also the geological map by Şenel 1995.

38 Hayward 1984, 107; Bağcı – Parlak 2009, 390.

39 Marksteiner et al. 2008, 351; Seyer et al. 2012, 225-226; Yener-Marksteiner 2012, 371-386; Seyer et al. 2013, 408-409.

as semi-circular bowls with inverted rims[40], conical bowls with triangular rims[41], cups with Π-formed handles (so-called "Knidian cups"[42]), and finally jugs[43] and large bowls (Fig. 8a) decorated with paint or through dipping. These are partly presented in a group of ceramics of so-called *pate calcaire fabric*[44]. Twenty-nine of a total of thirty-one samples belong to the petrofabrics LIM-CALC/DIORITE_02 and LIM-CALC/DIORITE_03. However, these two petrofabrics cannot be seen separated from each other from the form-typological point of view. Only two samples constitute the third major compositional group of petrofabric LIM-CALC_01, which have their form-typological representatives in the groups of LIM-CALC/DIORITE_02 and LIM-CALC/DIORITE_03. Further analyses with conclusive results must be awaited for this group.

However, it is interesting to observe that certain widespread shapes such as Roman cups with Π-handles (the so-called Knidian cups) and Late Antique pilgrim flasks[45], appear in the same group – LIM-CALC/DIORITE_03 – as described above. Moreover, the samples LIM 14-007 and LIM 14-014 from the deposits of the East Gate excavations, which originate from Late Antique contexts, are attributed to petrofabric LIM-CALC/DIORITE_02. This situation points not only to the existence of local imitations in Limyra, which is not surprising, but also to the remarkably long duration of usage of the same clay source near Limyra, a fact which is also of interest for the environmental aspects of the area.

The Late Roman and Early Byzantine Ceramics

The nine samples of the Late Roman/Early Byzantine period[46] analyzed in this paper originate from several excavations in Limyra, including the Late Roman gates (East Gate and West Gate) which are part of the city's fortification walls[47]. They were particularly selected because of similarities in visual/macroscopic characteristics that, together with the function of these objects, prompted the notion of a possible origin around Limyra, or in southeast Lycia more generally.

The two roof tile samples (LIM 14-009 and LIM 14-010) concerned only small fragments. These new results nevertheless merit a more systematic selection of fragments of roof tiles and other ceramic building materials for analyses; this is currently underway.

Three samples, namely LIM 14-002, LIM 14-003 and LIM 14-004, belong to spacer pins, a category of ceramic building materials that is particular to bath buildings, specifically their heated spaces, even if different interpretations were forwarded in the past[48]. Their appearance is placed in the 2nd century A.D., and their use may have continued into the Late Roman period[49]. It is noteworthy that these three samples belong to two geologically related petrofabrics (LIM-CHERT_01 and LIM-CHERT_02). The analyses of more samples could clarify whether or not this homogeneity occurs throughout this functional group. One specimen was excavated

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40 Marksteiner et al. 2007, 205, pl. 20-21.

41 Marksteiner et al. 2007, pl. 2, 15-17.

42 Compare Kögler 2010, 83-91

43 Marksteiner et al. 2007, pl. 7, 1-14.

44 Marksteiner et al. 2007, 206.

45 For a possible regional production see Marksteiner – Yener-Marksteiner 2009, 227-252. Compare also Yener-Marksteiner 2016.

46 Bes 2014.

47 Seyer 2013a, 83-87; Seyer 2013b, 59-63; Seyer 2014.

48 Farrington – Coulton 1990; Kelly 2006; Kelly 2013.

49 Farrington – Coulton 1990, 63-64.

in the so-called Bishop's Palace in 1989, which thus indicates that this building, or at least part of it, was equipped with a heated space, which in turn was probably part of a larger bath complex. The other two examples were excavated in the Theater Baths in 2009 (Fig. 8c). Interestingly, a hitherto mere cursory examination of the spacer pins excavated in the Bishop's Palace and the Theater Baths show that many conform rather well to those found at and described for Balboura[50]. Some specimens from the Theater Baths excavations, however, are very robust and can have a circular shank, whilst a third "type" tapers – as all specimens in fact do, presumably a function of the manner in which these pins were inserted into the wall – yet is again rectangular in section. It has two small projecting clay "props" opposite one another at the pin's end that projected from the wall, and as such this "type" is vaguely reminiscent of a capital "T"[51]. Last, a sizeable group of spacer pins – unfortunately its provenance could no longer be made out – presents yet another variant, and with no apparent exception has a lightly tapering shank that usually has a neatly made (cut?) square section. The observed typological similarity between Cretan and Lycian spacer pins, however, thus appears to be more subtle than was previously noted[52].

Samples LIM 14-007 and LIM 14-014, both attributed to petrofabric LIM-CALC/DIORITE_02, belong to a category of Late Roman closed vessels that is well known at Limyra, and both samples concern a so-called *einhenkeligen Kanne*, or a one-handled jug/jar[53]. These turn up relatively often in the East Gate deposits (from where both samples were taken) – in stratigraphic unit 99, for instance, they comprise nearly 11% by sherd count, and ca. 10% by weight – and the macroscopic differences that are noted possibly represent different fabrics and/or, more likely perhaps, variations on a single fabric theme. Of morphological significance are their fairly large size (Fig. 8b, from stratigraphic unit 114a), the (single) ridged strap handle that is often lightly bowed, and the concave floor with no ring base. An unevenly applied red(dish) slip usually covers a vessel's (upper) half. The pottery from the East Gate excavations confirms their 6th-7th century A.D. date[54], though the type may have evolved out of Early to Mid-Roman predecessors.

Finally, it is interesting that two further samples, LIM 14-005 and LIM 14-017, despite their obviously different functions, are grouped under the same petrofabric (LIM-CALC/DIORITE_01). At the same time, however, this is not completely surprising: both a *pithos* (a large(r) vessel for the storage of foodstuffs; Latin: *dolium*)[55] and a *mortarium* (English: mortar, usually combined with a pestle, Latin: *pistillum*) are not infrequently found in clays with a rather coarse composition. A distinctive feature for the surface of the *mortarium* fragments (Fig. 8d) in question is a very pale greyish-pinkish hue which "disappears" when held in direct sunlight. That this macroscopic feature is also observed for, amongst others, one-handled jugs/jars and open tablewares from the same stratigraphic unit (1039, East Gate excavations) – though certainly not all – gains added significance in light of the analyses presented in this paper.

50 Farrington – Coulton 1990, 56-57, fig. 1.

51 Though different from those illustrated in Çevik et al. 2009, 260, fig. 30.

52 Kelly 2006, 241-242, 245, figs. 2-3.

53 Yener-Marksteiner 2009, 232, 241, pl. 7; fig. 12; cat. 51.

54 Yener-Marksteiner 2009, 232.

55 Yener-Marksteiner 2009, 234-235, 241, pl. 8; fig. 16; cat. 58.

Conclusion

The geologically heterogeneous environment of the Bay of Finike combined with the distinctive petrographic fingerprint of the analyzed samples allowed the identification of two possible clay mining areas that seem to have been exploited in antiquity – or at least ancient clay sources might have been situated in the two areas indicated. Geological field studies will provide more detailed data on the exact rock and mineral composition of clays outcropping in and at the edges of the fertile plain around Limyra that might further refine our provenance determination.

Obviously, a continuum in raw material selection existed from the Early Imperial period to the Early Byzantine period, as demonstrated by the utilization of similar clay pastes for ceramic objects of different date. The most suitable explanatory model for these diachronic craft habits might be related to the quality and performance properties of the identified clays. A functional component can be recognized when comparing the repertoire of ceramic objects of the two main compositional groups (see Fig. 9), namely those associated with ophiolitic formations and those defined by essential sedimentary (chert) rock fragments. In the analyzed sample spectrum, clay associated to the latter sedimentary environments (petrofabrics LIM-CHERT_01 to _03) was exclusively used in the manufacture of ceramic building materials. A more extensive sampling of ceramic building materials would be required in order to test the validity of this observation and subsequently the creation of hypotheses. Another indicator for the choice of clays connected to functional aspects is the fact of cooking pots relating to calcareous clays that most likely might be associated to neritic limestone outcrops just north of the excavation site. Fineware and tableware were manufactured exclusively from calcareous clay pastes (petrofabrics LIM-CALC/DIORITE_02 and _03, LIM-CALC_01) that are generally defined by their relative fineness. A coarser variant of this paste is represented by petrofabric LIM-CALC/DIORITE_01, compositionally corresponding to the afore-mentioned pastes, but characterized by the much larger size of inclusions. This evidence implies the intentional selection of clay corresponding to intended vessel technology and functionality.

From a cultural-historical view the typological classification of a few ceramics falling within the regional petrographic groups of Limyra are of particular interest. Referring to the form repertoire of the ceramics investigated, vessels stylistically inspired by Knidian (samples LIM 14-021, LIM 14-022, LIM 14-023) or even Cretan prototypes (sample LIM 14-006) were replicated in Limyra.

Archaeometric analyses contributed to the knowledge that – at least from the 1st century B.C. to the 7th century A.D. – presumably the bulk of clays processed in the potteries was obtained from outside Limyra, challenging the perception of the existence of the city's local ceramic production. To date, no primary evidence for a production scenario, as the discovery of kiln structures, potter's workshops, or ceramic wasters would promote, has been uncovered. It can be assumed that the city was supplied with clay raw materials or even ceramic products from the area around today's Kumluca.

The eastern part of the Bay of Finike cannot be classified as the "remote hinterland" of Limyra, as there were synchronic vivid settlements or urban communities. Most notably, Rhodiapolis[56] and Korydalla must be mentioned as urban centers in the area of modern Kumluca. Of Rhodiapolis we know it was producting pottery during the Late Roman/Early

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[56] Çevik et al. 2010, 33-38.

Byzantine period[57]. Limyra, sourcing its clay raw materials from the territory of those neighboring cities, as such cannot be seen as isolated from this civic topography. The orientation of Limyra for specific needs towards the east of the bay at present might best be explained on the basis of the natural landscape and the availability of more suitable sediments. The river bed of Alakır Çayı and associated river flows can be regarded as a key feature for subsistence and any kind of associated quotidian and professional activities in the region, including the provision with (clay) sediments.

Appendix

Descriptions of Petrofabrics

1) Petrofabric LIM-CALC/DIORITE_01

Definition: Micrite and very coarse intermediate rock fragments (diorite)

Samples: LIM 14-005, LIM 14-017

Clay matrix: calcareous, reddish-brown in PPL, strong reddish-brown in XPL. Optically active clay matrix.

Voids: 9-11% (often macro- and mega-vughs)

Inclusions: 15-18%, a.-sr., <2.44 mm, unimodal grain size distribution, very poorly sorted.

Types of inclusions: Frequent: igneous rock fragments of intermediate composition (composed of primarily plagioclase+biotite+opaques±alkalifeldspar(?)±clinopyroxene) that can be identified as diorite, its diagnostic feature being the presence of opaque veins in the plagioclase feldspars. Common: fine monocrystalline quartz; micrite. Few: plagioclase feldspar; biotite schist; sparite. Very few: iron oxides and dark reddish brown argillaceous inclusions (sharp boundaries with a high optical density). Rare: plagioclase feldspar, hornblende. Very rare: clinopyroxene, chert, foraminifera, biotite, muscovite.

Interpretation: A coarse petrofabric associated to igneous rocks of dioritic composition. Pores emerge around the angular rock fragments, which are surrounded by a generally calcareous clay. This fabric consists of rock fragments composed of biotite, plagioclase feldspar, alkali feldspar and quartz. This petrofabric relates to an igneous and sedimentary environment.

2) Petrofabric LIM-CALC/DIORITE_02

Definition: Micrite and few intermediate rock fragments (diorite)

Samples: LIM 14-006, LIM 14-007, LIM 14-014, LIM 14-023, LIM 14-044, LIM 14-047, LIM 14-049, LIM 14-052, LIM 14-060, LIM 14-062, LIM 14-064

Clay matrix: highly calcareous, reddish-brown in PPL, strong reddish brown in XPL. Optically active to inactive clay matrices.

Voids: 4-8%

Inclusions: 7-15%, a.-r., <1.7 mm, weak unimodal grain size distribution, poorly sorted.

Types of inclusions: Dominant-frequent: limestone (micritic; sometimes containing silt-sized quartz; can be vitrified or partially decomposed). Common: fine monocrystalline quartz. Few: igneous rock inclusions of intermediate composition (plagioclase+ biotite+ hornblende(?)± opaques± clinopyroxene) likely to be identified with diorite; the feldspar-constituents of the diorite can show signs of alteration to clay minerals (e.g. sample LIM 14-007); iron oxides; dark reddish brown argillaceous inclusions (sharp boundaries and high optical density). Rare: chert, radiolarian chert (e.g. sample LIM 14-023); mica (including both biotite and muscovite),

57 Dündar 2016, 515-517, fig. 14.

plagioclase; fine brown hornblende. Very rare: serpentinite, clinopyroxene. Almost absent: sandstone (clast-supported; composed of quartz and few grains of alkalifeldspar; in sample LIM 14-023); alkalifeldspar; chalcedony (brown siliceous radial and fibrous structure, in sample LIM 14-062); grog (sample LIM-14-049).

Interpretation: This petrofabric is closely related to petrofabric LIM-CALC/DIORITE_01 and is distinguished and characterized by a smaller amount of rock fragments (prominently diorite). Clay seems to have been mined from the same geological environment but having been extracted from a source naturally defined by finer grain sizes.

3) Petrofabric LIM-CALC/DIORITE_03

Definition: Micritic petrofabric with traces of diorite

Samples: LIM 14-010, LIM 14-021, LIM 14-022, LIM 14-024, LIM 14-025, LIM 14-026, LIM 14-027, LIM 14-041, LIM 14-042, LIM 14-043, LIM 14-045, LIM 14-046, LIM 14-048, LIM 14-051, LIM 14-053, LIM 14-054, LIM 14-056, LIM 14-057, LIM 14-058, LIM 14-059, LIM 14-061, LIM 14-063

Clay matrix: calcareous, reddish-brown in PPL, strong reddish brown in XPL. Optically slightly active to inactive clay matrices.

Voids: 5-7%

Inclusions: 8-14%, a.-sr., <1.9 mm, unimodal grain size distribution, moderately sorted.

Types of inclusions: Dominant-frequent: micritic limestone (can rarely contain silt-sized quartz, ferruginous particles ± clinopyroxene, can be vitrified, elongated shape). Common: fine monocrystalline quartz. Few: muscovite. Rare: dark reddish brown argillaceous inclusions (sharp boundaries, high optical density); iron oxides. Very few: small pieces of rock fragments composed of plagioclase and biotite (in samples LIM 14-022, LIM 14-024, LIM 14-048, LIM 14-057). Rare: dark reddish mudstone. Very rare: plagioclase, serpentinite (oxidised), hornblende, small clinopyroxene, biotite-schist, grog (sample LIM 14-048; similar composition as surrounding clay paste but greenish vitrified), sparite, benthic foraminifera (sample LIM 14-041). Almost absent: basalt (?) and chert, both in sample LIM 14-010 (roof tile).

Interpretation: Even though rock fragments are rare and have a small dimension, diorite can be reconstructed as parent rock for those, as this petrofabric directly relates to petrofabrics LIM-CALC/DIORITE_01 and LIM-CALC/DIORITE_02. This association is also verified on the basis of the character of the clay paste in general, although the clay paste constituents are finer in grain size. The choice for a fine grained (natural) clay sediment in this case is plausible, as it was utilized primarily for the production of fineware ceramics.

4) Petrofabric LIM-CALC_01

Definition: Highly calcareous/micritic

Samples: LIM 14-055, LIM 14-065

Clay matrix: calcareous, greenish-brown in both PPL and XPL. Optically inactive clay matrix.

Voids: 4-6%

Inclusions: 7-10%, sa.-sr., <1.36 mm, unimodal grain size distribution, moderately sorted.

Types of inclusions: Predominant-dominant: micritic limestone. Common: fine quartz. Rare: biotite. Very Rare: micrite with silt-sized quartz inclusions; serpentinite; perithite; oxidised chert; fine clinopyroxene. Almost absent: rock fragment in sample LIM 14-065 composed of plagioclase and biotite (to be identified as diorite, similar as identified in petrofabric LIM-CALC/DIORITE_01).

Interpretation: This fine-grained petrofabric is characterized by a high carbonate content in its groundmass, in which micritic limestone is embedded. The clay utilized derives from an environment of calcareous sediments and geologically relates to the petrofabrics described above.

5) Petrofabric LIM-CHERT_01

Definition: Radiolarian chert

Samples: LIM 14-003, LIM 14-004

Clay matrix: dark reddish-brown in PPL, reddish-brown in XPL, optically inactive clay matrix.

Voids: 8-12%

Inclusions: 13-17%, va.-sr., <2.5 mm, weak bimodal grain size distribution, very poorly sorted.

Types of inclusions: Dominant: fine monocrystalline quartz. Frequent: chert (very often radiolarian); fine iron-oxides. Few: micritic limestone (greenish-brown vitrified in XPL); sandstone (clast-supported; composed of quartz and alkalifeldspar-grains). Very few: alkalifeldspar/orthoclase feldspar; plagioclase; biotite; hornblende; dark reddish-brown argillaceous inclusions (high optical density). Rare: muscovite, clinopyroxene, serpentinite. Very rare: kaolinitic clay pellets (?), being grayish-golden in XPL with high optical activity (in sample LIM 14-004); volcanic rock fragments of basic composition (fine plagioclase laths and dark iron-rich minerals), possibly being basalt (?).

Interpretation: This petrofabric relates to a sedimentary environment with few volcanic components. A great amount of chert inclusions is diagnostic in this petrofabric. Due to the particularly angular shape of chert it might be assumed that it had been deliberately added as temper to the clay paste.

6) Petrofabric LIM-CHERT_02

Definition: Chert and micrite

Sample: LIM 14-002

Clay matrix: ferruginous, slightly calcareous, reddish-brown in both, PPL and XPL. Optically slightly active clay matrix.

Voids: 5%

Inclusions: 12%, a.-sr., <0.82 mm, unimodal grain size distribution, moderately sorted.

Types of inclusions: Frequent: monocrystalline quartz, biotite. Common: micritic limestone (can be vitrified); fine chert. Few: quartzite; fine iron-oxides. Rare: alkali feldspar; serpentinite; dark reddish brown argillaceous inclusions: sharp boundaries, high optical density; Iron oxides; quartzite. Very rare: muscovite; hornblende; volcanic rock fragment (fine plagioclase laths and dark minerals, possibly basalt?). Almost absent: clinopyroxene; plagioclase; serpentinite; microfossil/skeletal remain (possibly globorotalid species).

Interpretation: Due to the micritic limestone and chert inclusions, this petrofabric seems to derive from sedimentary rock formations. There are certain analogies to petrofabric LIM-CHERT_01 concerning the character of the clay matrix and the appearance of most of the accessory minerals.

7) Petrofabric LIM-CHERT_03

Definition: Few chert, micrite and shale

Samples: LIM 14-009, LIM 14-010

Clay Matrix: slightly calcareous and ferruginous, reddish-brown in PPL and in XPL, optically active clay matrix.

Voids: 10%

Inclusions: 8%, sa.-r., <1.40 mm, unimodal grain size distribution, moderately sorted.

Types of inclusions: Frequent: monocrystalline quartz. Frequent: reddish-brown argillaceous inclusions/shale (diffuse boundaries, low optical density). Common: chert. Few: micritic limestone;

iron oxides; biotite micas. Very few: chert (radiolarian chert?). Rare: quartzite; hornblende; muscovite.

Interpretation: The character of the clay is compatible with a sedimentary geological environment. Most symptomatic for this petrofabric is the continuous presence of shale. Chert appears only in small size and quantities but allows a link to the other cherty petrofabrics described above.

Abbreviations

PPL (plain polarised light)

XPL (cross polarised light)

va. (very angular)

a. (angular)

sa. (sub-angular)

sr. (sub-rounded)

r. (rounded)

Abbreviations and Bibliography

Arnold 2005 D. E. Arnold, "Linking Society with the Compositional Analysis of Pottery: A Model from Comparative Ethnography", in: A. Livingstone Smith – D. Bosquet – R. Martineau (eds.), Pottery Manufacturing Processes: Reconstitution and Interpretation. BAR International Series 1349 (2005) 15-21.

Bağcı – Parlak 2009 U. Bağcı – O. Parlak, "Petrology of the Tekirova (Antalya) Ophiolite (Southern Turkey): Evidence for Diverse Magma Generations and their Tectonic Implications during Neotethyan-subduction", International Journal of Earth Sciences 98, 2009, 387-405.

Bes 2014 P. M. Bes, "Late Antique-Early Byzantine Pottery", in: Seyer 2014, 78-79.

Borchhardt 1976 J. Borchhardt, Die Bauskulptur des Heroons von Limyra: Das Grabmal des lykischen Königs Perikles. IstForsch 32 (1976).

Borchhardt 1993 J. Borchhardt, Die Steine von Zẽmuri: Archäologische Forschungen an den verborgenen Wassern von Limyra (1993).

Borchhardt 2002 J. Borchhardt, Der Fries vom Kenotaph für Gaius Caesar in Limyra. Forschungen in Limyra 2 (2002).

Borchhardt et al. 1991/92
J. Borchhardt et al., "Grabungen und Forschungen in Limyra aus den Jahren 1984–1990", Jahreshefte des Österreichischen Archäologischen Instituts 61, 1991/92, Beiblatt 125-192.

Borchhardt et al. 1997
J. Borchhardt et al., "Grabungen und Forschungen in Limyra aus den Jahren 1991-1996", Jahreshefte des Österreichischen Archäologischen Instituts 66, 1997, Beiblatt 321-426.

Çevik et al. 2009 N. Çevik – I. Kızgut – S. Bulut, "Rhodiapolis Baths: The First Evaluation following the Excavations and its Contribution to the Knowledge on Lycian Baths Architecture and Technique", Adalya 12, 2009, 231-260.

Çevik et al. 2010 N. Çevik – I. Kizgut – S. Bulut, "Rhodiapolis as a Unique Example of Lycian Urbanism", Adalya 13, 2010, 29-63.

Deer et al. 2013 W. A. Deer – R. A. Howie – J. Zussman, An Introduction to the Rock Forming Minerals (2013).

Dilek et al. 1999 Y. Dilek – P. Thy – B. Hacker – S. Grundvig, "Structure and Petrology of Tauride Ophiolites and Mafic Dike Intrusions (Turkey): Implications for the Neotethyan Ocean", Geological Society of America Bulletin 111.8, 1999, 1192-1216.

Dündar 2016 E. Dündar, "Likya'da Seramik: Üretim ve Ticarete Genel Bir Bakış/Ceramics in Lycia: an Overview on Production and Trade", in: H. İşkan – E. Dündar (eds.), Lukka'dan Likya'ya. Sarpedon ve Aziz Nikolaos'un Ülkesi/From Lukka to Lycia. The Land of Sarpedon and St. Nicholas. Anatolian Civilizations Series 5 (2016) 504-519.

Farrington – Coulton 1990
A. Farrington – J. J. Coulton, "Terracotta Spacer Pins in Lycian Bath Buildings", AnatSt 40, 1990, 55-67.

Ganzert 1984 J. Ganzert, Das Kenotaph für Gaius Caesar in Limyra. IstForsch 35 (1984).

Hayward 1984 A. B. Hayward, "Sedimentation and Basin Formation related to Ophiolite Nappe Emplacement, Miocene, SW Turkey", Sedimentary Geology 40, 1984, 105-129.

Hayward – Robertson 1982
A. B. Hayward – A. H. F. Robertson, "Direction of Ophiolite Emplacement Inferred from Cretaceous and Tertiary Sediments of an Adjacent Authochthon, the Bey Dağları, Southwest Turkey", Geological Society of America Bulletin 93.1, 1982, 68-75.

Hellenkemper – Hild 2004
F. Hellenkemper – F. Hild, Lykien und Pamphylien. Tabula Imperii Byzantini 8 (2004).

Jacobek 1991/92 R. Jacobek, "Die Arbeiten am sog. Bischofspalast (Grabung 1989)", in: J. Borchhardt et al. 1991/92, 171-176.

Jacobek 1993 R. Jacobek, "Limyra als Sitz byzantinischer Bischöfe", in: Borchhardt 1993, 112-113.

Kelly 2006 A. Kelly, "The Roman Baths of Mylopotamos: A Distribution Study", in: I. Gavrilaki – G. Z. Tziphopoulos (eds.), Ο Μυλοπόταμος από την αρχαιότητα ως σήμερα. Περιβάλλον – Αρχαιολογία – Ιστορία – Λαογραφία – Κοινωνιολογία (2006) 239-252.

Kelly 2013 A. Kelly, "Roman Bathhouses on Crete as Indicators of Cultural Transition: The Dynamics of Roman Influence", in: A. Gardiner – E. Herring – K. Lomas, Creating Ethnicities and Identities in the Roman World (2013) 131-167.

Kögler 2010 P. Kögler, Feinkeramik aus Knidos vom mittleren Hellenismus bis in die mittlere Kaiserzeit (2010).

Konecny – Marksteiner 2007
A. Konecny – Marksteiner, "Zur Bebauungsgeschichte des Areals hinter der klassischen Stadtmauer im Bereich der Weststadt von Limyra", in: M. Seyer (ed.), Studien in Lykien. Ergänzungshefte zu den Jahresheften des Österreichischen Archäologischen Institutes 8 (2007) 15-28.

Lemaître et al. 2013 S. Lemaître – S. Y. Waksman – M.-C. Arqué – E. Pellegrino – C. Rocheron – B. Yener-Marksteiner, "Identité régionale et spécificités locales en Lycie antique: l'apport des céramiques culinaires", in: P. Brun – L. Cavalier – K. Konuk – F. Prost (eds.), Euploia. La Lycie et la Carie antiques. Dynamiques des territoires, échanges et identités. Actes du colloque de Bordeaux, 5, 6, et 7 novembre 2009 (2013) 189-461.

Marksteiner 1988 T. Marksteiner, "Sondage 9 in der Weststadt", KST 10.2, 1988, 113-116.

Marksteiner 1991/92 T. Marksteiner, "Die Grabungen in der Weststadt von Limyra", in: Borchhardt et al. 1991/92, 133-140.

Marksteiner et al. 2007
T. Marksteiner – S. Lemaître – B. Yener-Marksteiner, "Die Grabungen am Südtor in Limyra: Die Grabung der Jahre 1982-1986 am Südtor von Limyra", Jahreshefte des Österreichischen Archäologischen Institutes 76, 2007, 171–277.

Marksteiner et al. 2008
T. Marksteiner und Mitarbeiter, "Bericht zur Grabungskampagne Limyra", KST 30.1, 2008, 347-358.

Marksteiner – Yener-Marksteiner 2009
T. Marksteiner – B. Yener-Marksteiner, "Die Grabungen in Sondage 30/36/37 in der Weststadt von Limyra: Der archäologische Befund und die Keramik", Jahreshefte des Österreichischen Archäologischen Institutes 78, 2009, 221-252.

Peschlow 1984 U. Peschlow, "Die Bischofskirche in Limyra (Lykien)", Studi di antichità Cristiana 37 (2), 1984, 409-421.

Peschlow 1997 U. Peschlow, "Nachuntersuchungen an der Bischofskirche", in: Borchhardt et al. 1997, 384-390.

Robertson 1993 A. H. F. Robertson, "Mesozoic-Tertiary Sedimentary and Tectonic Evolution of Neotethyan Carbonate Platforms, Margins and Small Ocean Basins in the Antalya Complex, Southwest Turkey", in: L. E. Frostick – R. J. Steel (eds.), Tectonic Controls and Signatures in Sedimentary Successions. Special Publication No. 20 of the International Association of Sedimentologists (1993) 415-465.

Sarı 2009 B. Sarı, "Planktonic Foraminiferal Biostratigraphy of the Coniacian-Maastrichtian Sequences of the Bey Dağları Autochthon, Western Taurides, Turkey: Thin-section Zonation", Cretaceous Research 30, 2009, 1103-1132.

Sarı – Özer 2002 B. Sarı – S. Özer, "Upper Cretaceous Stratigraphy of the Bey Dağları Carbonate Platform, Korkuteli Area (Western Taurides, Turkey)", Turkish Journal of Earth Sciences 11, 2002, 39-59.

Sarı – Özer 2009 B. Sarı – S. Özer, "Upper Cretaceous Rudist Biostratigraphy of the Bey Dağları Carbonate Platform, Western Taurides, SW Turkey", Geobios 42, 2009, 359-380.

Schuh 2012a U. Schuh, "Die Theaterthermen von Limyra: Ergebnisse der Ausgrabungen 2007-2009", in: Seyer 2012a, 287-299.

Schuh 2012b U. Schuh, "Die Ausgrabungen in den Theaterthermen von Limyra: Vorläufige Ergebnisse 2007–2009", in: C. Reinholdt – W. Wohlmayr (eds.), Akten des 13. Österreichischen Archäologentages Salzburg, 25. bis 27. Februar 2010 (2012) 161-167.

Şenel 1995 M. Şenel, Geological Map of the Antalya-M10 and M11 Quadrangle. Scale 1:100.000 (1995).

Sewing 2015 K. Sewing, "Die Südthermen (ehemals Bischofspalast) in Limyra. Bauaufnahme und Interpretation", Jahreshefte des Österreichischen Archäologischen Instituts 84, 2015, 213-257.

Seyer 2011 M. Seyer, "Limyra 2010", KST 33, 2011, 441-452.

Seyer 2012a M. Seyer, 40 Jahre Grabung Limyra. Akten des internationalen Symposions Wien, 3.-5. Dezember 2009. Forschungen in Limyra 6 (2012).

Seyer 2012b M. Seyer, "Limyra 2011", Anmed 10, 2012, 59-64.

Seyer 2013a M. Seyer, "Limyra 2012", Anmed 11, 2013, 83-89.

Seyer 2013b M. Seyer, "Urbanistische Forschungen in Limyra (Lykien)", Archäologie Österreichs 24, 2013, 55-63.

Seyer 2014 M. Seyer, "Limyra 2013", Anmed 12, 2014, 73-80.

Seyer et al. 2012 M. Seyer et al., "Limyra 2011", KST 34, 2012, 221-234.

Seyer et al. 2013 M. Seyer et al., "Limyra 2012", KST 35, 2013, 404-418.

Seyer et al. 2014 M. Seyer et al., "Limyra 2013", KST 36, 2014, 535-554.

Seyer – Lotz 2013 M. Seyer – H. Lotz, "A Synagogue in Limyra? – Preliminary Report on a Byzantine Building with Jewish Elements", Journal of Ancient Judaism 4, 2013, 133-148.

Seyer – Lotz 2014 M. Seyer – H. Lotz, "A Building with Jewish Elements in Limyra/Turkey – A Synagogue?", in: A. Colella – A. Lange – M. Seyer (eds.), The Menorot of Limyra and Judaism in Asia Minor: Archaeology, Visual Culture, and Literature. Journal of Ancient Judaism 5, 2014, 142-152.

Stanzl 2012 G. Stanzl, "Zur Neuaufnahme der Arbeiten am Ptolemaion in Limyra", in: Seyer 2012a, 327-342.

Türker 2006 A. C. Türker, "Myra Seramik Hamur Gruplarının Kap Tipleri ile Değerlendirilmesi", Adalya 9, 2006, 117-148.

Waksman – Lemaître 2010
Y. Waksman – S. Lemaître, "Céramiques culinaires de Lycie (Turquie) aux époques romaine et proto-byzantine: approches archéologiques et archéométriques", in: S. Menchelli – S. Santoro – M. Pasquinucci – G. Guiducci (eds.), LRCW 3. Late Roman Coarse Wares, Cooking Wares and Amphorae in the Mediterranean: Archaeology and archaeometry. Comparison between Western and Eastern Mediterranean. BAR International Series 2185 (II) (2010) 781-790.

Whitbread 1995 I. K. Whitbread, Greek Transport Amphorae. A Petrological and Archaeological Study. Fitch Laboratory Occasional Paper 4 (1995).

Yener-Marksteiner 2012
B. Yener-Marksteiner, "Frühkaiserzeitliche Sigillata der Weststadtgrabung in Limyra 2002-2003", in: Seyer 2012a, 371-386.

Yener-Marksteiner 2016
B. Yener-Marksteiner, "Limyra als Bischofssitz. Einblicke in die Keramik mit christlicher Symbolik", in: F. Blakolmer – M. Seyer – H. D. Szemethy (eds.), Angekommen auf Ithaka. Festgabe für Jürgen Borchhardt zum 80. Geburtstag (2016) 185-199.

Özet

Kireçtaşı, Diyorit ve Radyolarit: Limyra (Güneybatı Türkiye) Buluntusu Pişmiş Toprak Objelerin İlk Petrografik Analizleri

Bu makalede Limyra antik kentinden alınan seramik örneklerin ilk petrografik analizlerinin sonuçları verilmektedir. Analizlerin amacı, Limyra kent alanındaki Roma Hamam Yapısı Batı Kapısı, Doğu Kapısı ve Batı kentteki 9 no.lu sondaj gibi değişik kazılardan gün ışığına çıkartılmış MS 1.-7. yy. arasına tarihlenen ve kendi içerisinde makroskopik olarak bir grup oluşturan seramiklerin hammadde kaynaklarının antik kent çevresindeki coğrafyada yerlerinin belirlenmesidir.

Yapılan bu petrografik analizler Finike Körfezi coğrafyasında Limyra'nın seramik üretimine dair ilk verileri sunmaktadır. Analizlerin en önemli sonucu belirli formlar ve amaçlar için farklı kil hammaddesinin kullanılmış olduğunun belirlenmesidir. Yerel olduğu düşünülen çanak çömleklerin yanı sıra pişmiş toprak yapı malzemesi de analiz edilmiştir.

Mineral ve kaya bileşenlerine dayanan toplam yedi petrografik doku grubu (petrofabrik) belirlenmiştir. Bunlardan dördü kalkerli kil matriksi ve farklı miktar ve büyüklükteki diyorit parçalarının varlığı ile karakterize edilir: LIM-CALC/DIORITE_01, LIM-CALC/DIORITE_02, LIM-CALC/DIORITE_03, LIM-CALC_01). Diğer üç petrografik doku grubunun (LIM-CHERT_01, LIM-CHERT_02, LIM-CHERT_03) özelliği hepsinin çört (silisli şist) ve radyolarit içermesi ve bileşiminde ayrıca mikritik kalker bulundurmasıdır. Bu petrografik dokuların içerdiği maddelerin tanecik büyüklüğü ve miktarı da kendi aralarında değişebilmektedir. Jeolojik harita yardımıyla Limyra seramiklerinin hammaddesinin gelebileceği iki kil yatağı tespit edilebilmiştir. Bu tespit, çömlekçi ustalarının ofiyolitli formasyonların bulunduğu Finike Körfezi'nin doğusundaki kil yataklarını tercih ettiklerini göstermektedir.

Seramiklerin tipolojik tasnifi ve petrografik inceleme sonuçları bir arada değerlendirildiği zaman Knidos tipi ve Girit stili kapların Limyra yerel-bölgesel seramik atölyelerinde üretildiği ve benzer kil malzemenin Erken İmparatorluk Dönemi'nden Bizans Dönemi'ne kadar kullanılmış olduğu belirlenmiştir.

Limyra seramik repertuarının detaylı sınıflandırılması ve tanımı bu bölgedeki ilk petrografik referans gruplarının oluşturulmasını sağlamış ve hem Likya hem de çevresindeki pişmiş toprak eserlere yönelik gelecekte yapılacak çalışmalara bir temel oluşturmuştur. Çalışmaların en önemli sonucu ise bölgesel seramik stillerinin ve bir mikro-bölge içerisinde iç bağlantıların belgelenmiş olmasıdır.

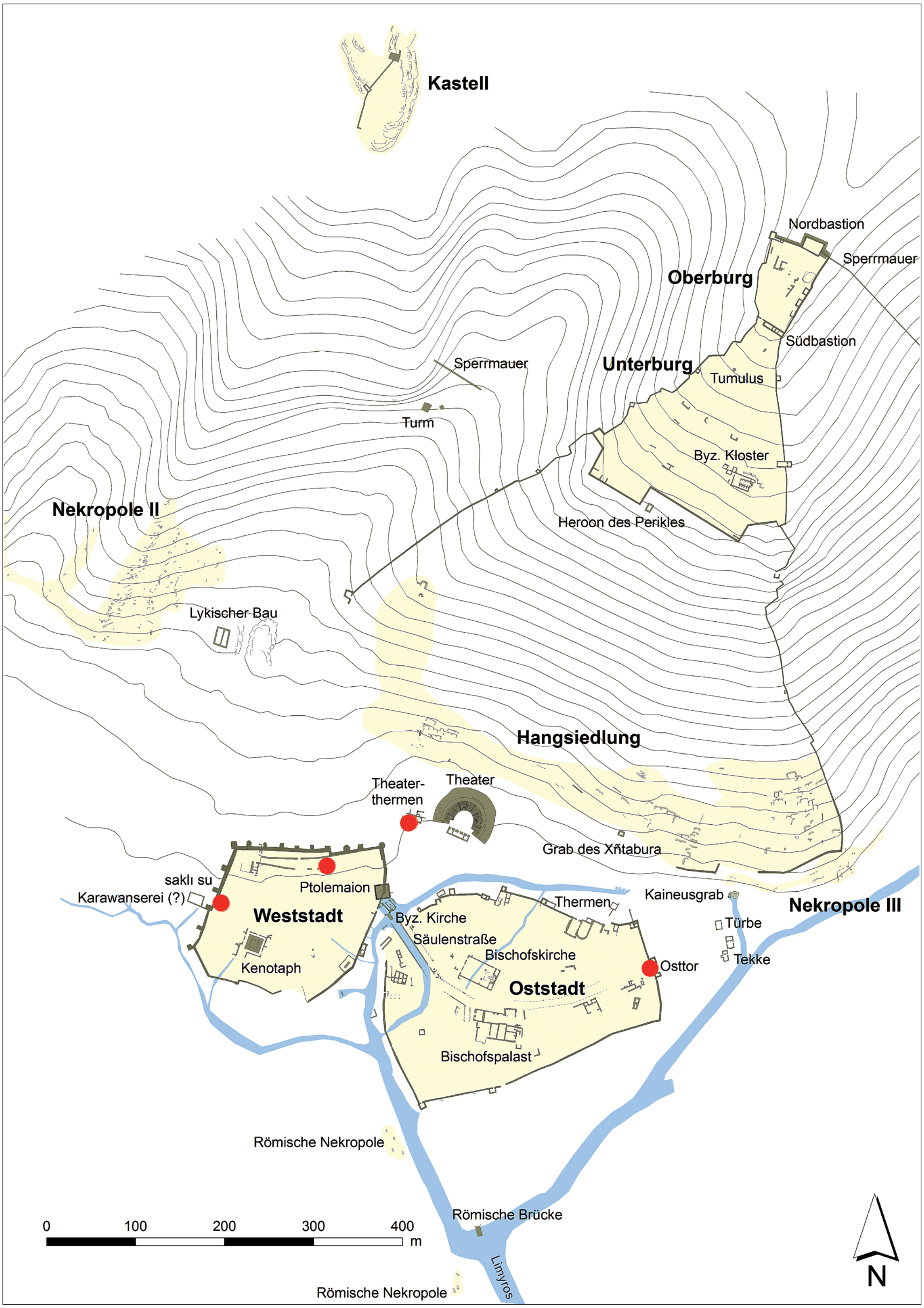


Fig. 1 City map of Limyra, sample locations indicated with dots
(C. Kurtze, © ÖAI-ÖAW, Limyra Excavation)

Fig. 2 Roman baths at the theater (R. Hügli, © ÖAI-ÖAW, Limyra Excavation)

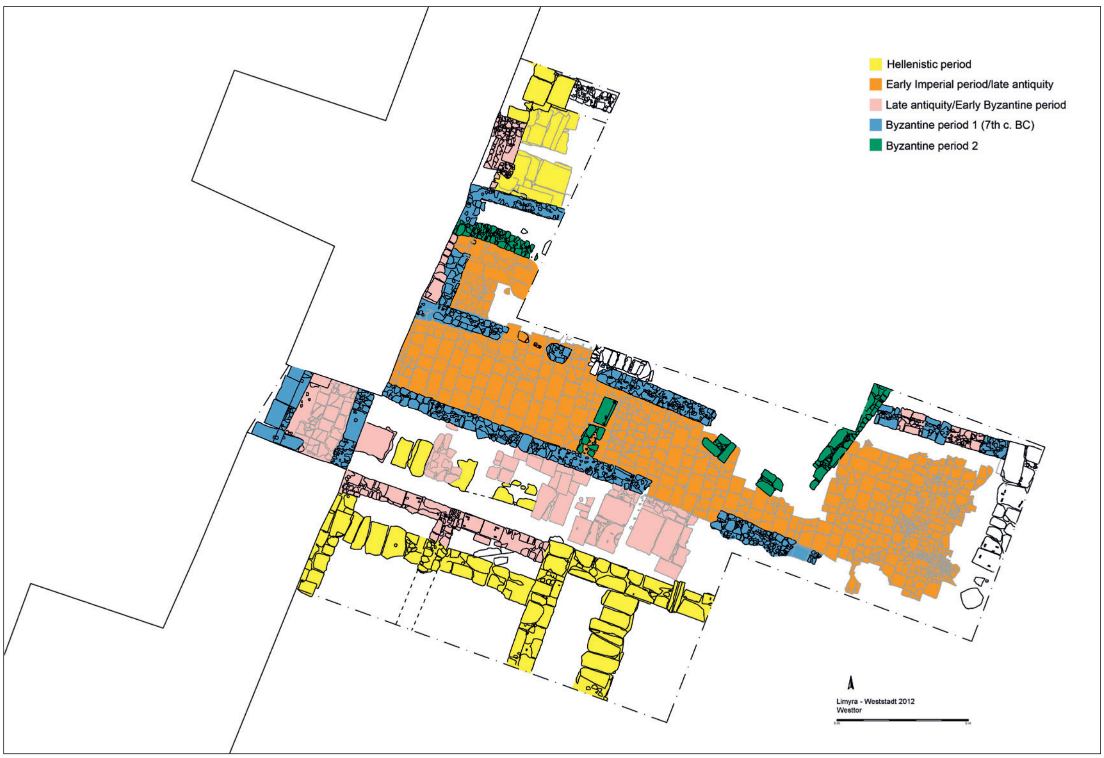


Fig. 3 Excavation at the West Gate, map (U. Schuh, © ÖAI-ÖAW, Limyra Excavation)

Fig. 4 Aerial photo of the East Gate
(P. Brandstätter, © ÖAI-ÖAW, Limyra Excavation)

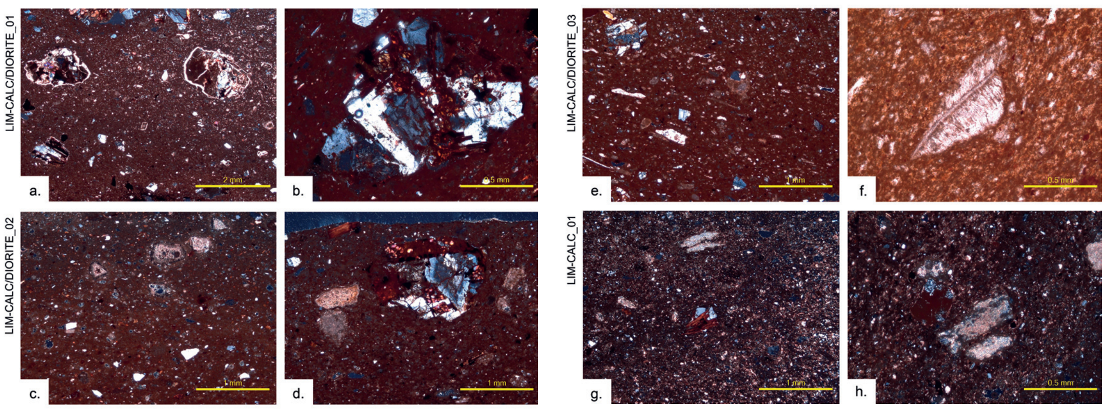


Fig. 5 Photomicrographs of ceramics associated with ophiolitic rock formations
(L. Peloschek, © ÖAI-ÖAW)

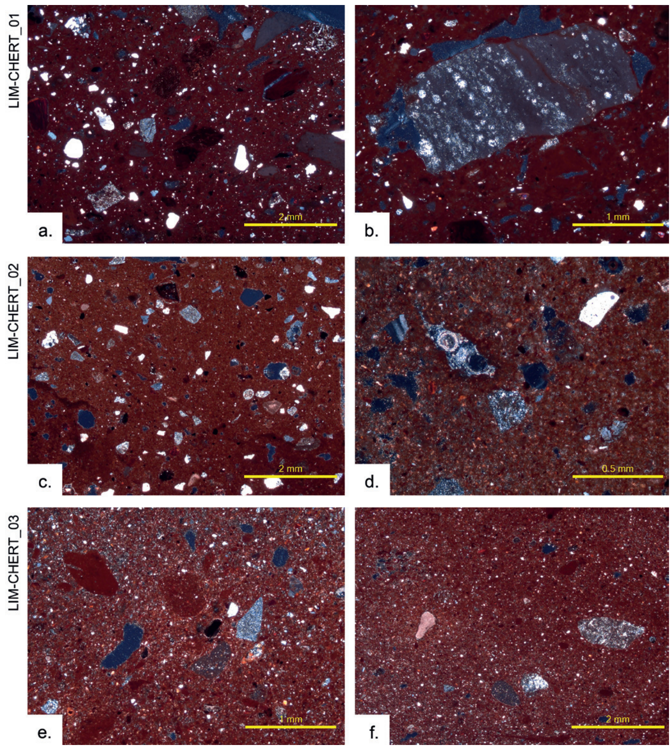


Fig. 6 Photomicrographs of ceramics relating to sedimentary environments (L. Peloschek, © ÖAI-ÖAW)

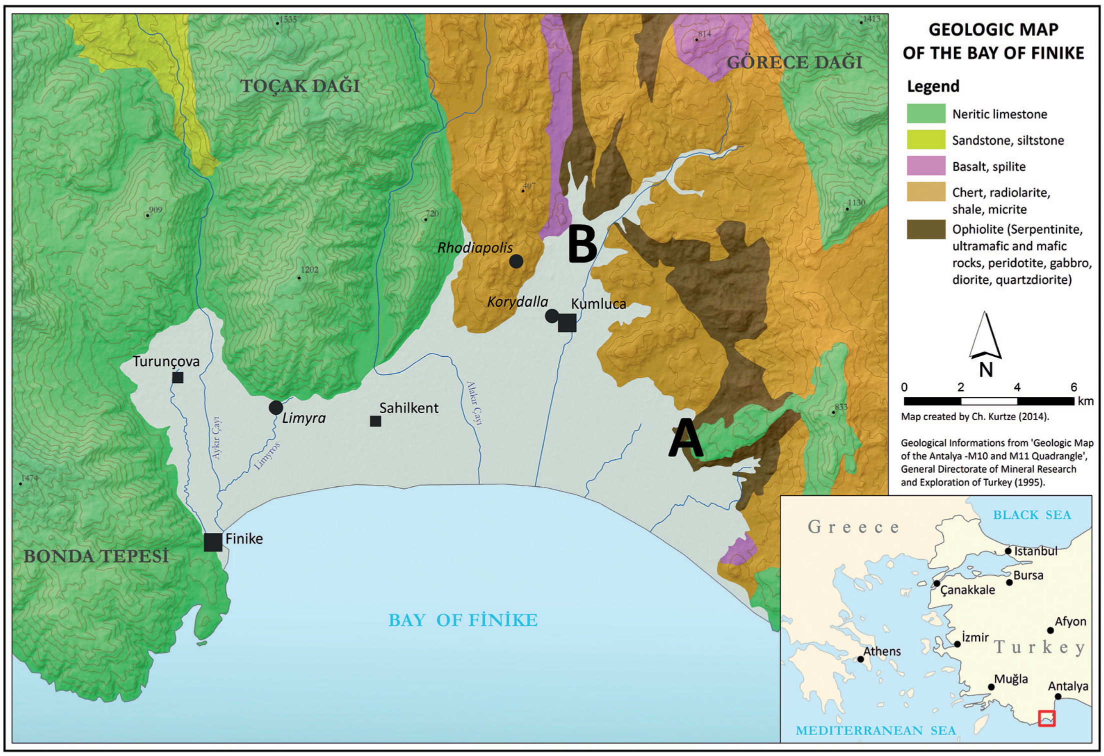
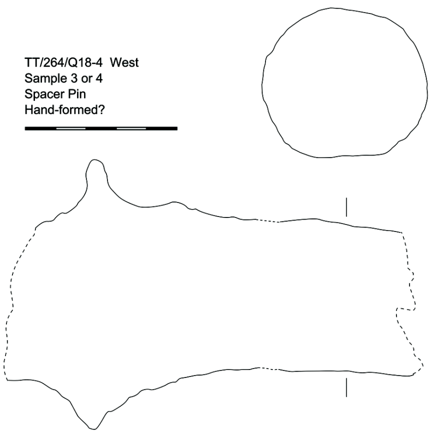


Fig. 7 Geological map of the Bay of Finike, adapted from Şenel 1995 (map by Ch. Kurtze, © ÖAI-ÖAW)

a)

b)

c)



d)

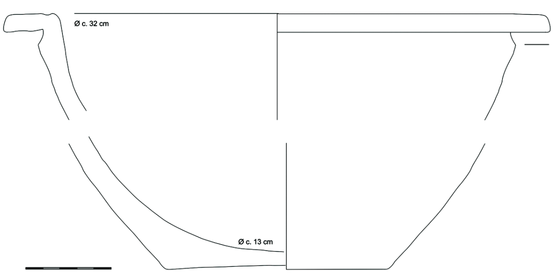


Fig. 8
Examples of the shape repertoire of ceramics dating from the Imperial period to the Early Byzantine period.
a) Wall fragment of a large bowl (© ÖAI-ÖAW, Limyra Excavation);
b) One-handled jug from the West Gate (R. Hügli, © ÖAI-ÖAW, Limyra Excavation);
c) Spacer pin (drawing by P. Bes, © ÖAI-ÖAW, Limyra Excavation);
d) Mortarium from the East Gate excavations (drawing P. Bes, © ÖAI-ÖAW, Limyra Excavation)

Petrofabric	Sample No.	Shape	Chronology	Notes
LIM-CALC/DIORITE_01	LIM 14-005	Pithos	Late Roman	
LIM-CALC/DIORITE_01	LIM 14-017	Mortarium	6^{th}-7^{th} c. A.D.	
LIM-CALC/DIORITE_02	LIM 14-006	Amphora	6^{th}-7^{th} c. A.D.	Cretan?
LIM-CALC/DIORITE_02	LIM 14-007	One-handled jar	Late Roman	
LIM-CALC/DIORITE_02	LIM 14-014	One-handled jug	Late Roman	
LIM-CALC/DIORITE_02	LIM 14-023	Cup	1^{st}-2^{nd} c. A.D.	Knidian type
LIM-CALC/DIORITE_02	LIM 14-044	Jug	1^{st}-2^{nd} c. A.D.	
LIM-CALC/DIORITE_02	LIM 14-047	Bowl	2^{nd} c. A.D.	
LIM-CALC/DIORITE_02	LIM 14-049	Jug	1^{st}-2^{nd} c. A.D.	
LIM-CALC/DIORITE_02	LIM 14-052	Bowl	2^{nd}-3^{rd} c. A.D.	
LIM-CALC/DIORITE_02	LIM 14-060	Dish	2^{nd}-3^{rd} c. A.D.	
LIM-CALC/DIORITE_02	LIM 14-062	Dish	2^{nd}-3^{rd} c. A.D.	
LIM-CALC/DIORITE_02	LIM 14-064	Dish	2^{nd}-3^{rd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-010	Roof tile	Late Roman	
LIM-CALC/DIORITE_03	LIM 14-021	Cup	1^{st}-2^{nd} c. A.D.	Knidian type
LIM-CALC/DIORITE_03	LIM 14-022	Cup	1^{st}-2^{nd} c. A.D.	Knidian type
LIM-CALC/DIORITE_03	LIM 14-024	Bowl	1^{st}-2^{nd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-025	Bowl	1^{st}-2^{nd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-026	Bowl	1^{st}-2^{nd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-027	Ampulla	5^{th}-7^{th} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-041	Jug	aug.-1^{st} c. A.D.	Painted
LIM-CALC/DIORITE_03	LIM 14-042	Jug	1^{st}-2^{nd} c. A.D.	Painted
LIM-CALC/DIORITE_03	LIM 14-043	Large bowl	1^{st}-3^{rd} c. A.D.	Painted
LIM-CALC/DIORITE_03	LIM 14-045	Jug	1^{st}-2^{nd} c. A.D.	Dipped
LIM-CALC/DIORITE_03	LIM 14-046	Jug	1^{st}-2^{nd} c. A.D.	Painted
LIM-CALC/DIORITE_03	LIM 14-048	Jug	2^{nd}-3^{rd} c. A.D.	Painted
LIM-CALC/DIORITE_03	LIM 14-051	Bowl	2^{nd}-3^{rd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-053	Bowl	2^{nd}-3^{rd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-054	Bowl	2^{nd}-3^{rd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-056	Bowl	1^{st}-2^{nd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-057	Bowl	1^{st}-2^{nd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-058	Bowl	1^{st}-2^{nd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-059	Bowl	1^{st}-2^{nd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-061	Dish	2^{nd}-3^{rd} c. A.D.	
LIM-CALC/DIORITE_03	LIM 14-063	Dish	2^{nd}-3^{rd} c. A.D.	
LIM-CALC_01	LIM 14-055	Dish	2^{nd}-3^{rd} c. A.D.	
LIM-CALC_01	LIM 14-065	Bowl	2^{nd}-3^{rd} c. A.D.	
LIM-CHERT_01	LIM 14-003	Spacer pin	-	
LIM-CHERT_01	LIM 14-004	Spacer pin	-	
LIM-CHERT_02	LIM 14-002	Spacer pin	-	
LIM-CHERT_03	LIM 14-009	Roof tile	-	

Fig. 9 Sample details of the analyzed ceramics