



Micromorphological analysis of sediments at the Bronze Age site of Mitrou, central Greece: patterns of floor construction and maintenance



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ABSTRACT

The study of settlement sites is usually based on the analysis of architectural or cultural phases. The sediments that constitute the excavated deposits inside or outside houses are rarely studied. This work presents micromorphological analysis of sediments at the prehistoric site of Mitrou, a small tidal islet in central Greece. Unusually long archaeological sequences have been excavated ranging from the Early Bronze Age to the Early Iron Age (ca. 2400–900 BCE). The occupational deposits in the Early and Middle Bronze Age are characterized by meticulous maintenance practices with multiple replastered floor sequences. These include surfaces made of debris produced inside houses by day-to-day activities. In this way an impressive thick sequence of overlapping worn-out floors and occupational deposits is produced with a characteristic finely layered macroscopic appearance. There is no clear association of a building phase with a single floor level but rather with a thick sequence of floor build-up. This practice ends in the Late Bronze Age, and from then on, floors are not frequently repaired and their construction technique is more standardized. Usually, a relative thin sequence of one or two floors is associated with a new architectural phase. The observed change is broadly correlated with the rise of a prepalatial political elite at Mitrou. The contrasting maintenance techniques also are relevant to discussions about differences between tells and 'flat' settlements. Until the beginning of the Late Bronze Age, Mitrou's indoor surfaces are those of a tell site whereas after that its surfaces resemble those of a 'flat' settlement. In Mitrou it appears that this change is related to a different perception of construction and maintenance of floors that in turn should be traced to the pattern of reconstruction of entire houses. These changes have a social significance that may reflect differences in household processes and use of space.

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1. Introduction

Traditionally, the study of most urban sites and any sites with architectural remains has been based on the analysis of architectural or cultural phases. The sediments (or the so called "earth" or "dirt") that are excavated inside or outside houses rarely are objects of study in themselves. Although everyone would accept that understanding how sediment has accumulated inside a house improves our understanding of the context of archaeological finds, in the overwhelming majority of excavations the earth is thrown onto the backdirt pile without any examination. It may be finely screened for microartifacts and biological markers but rarely is

studied in itself. Moreover, the mere extraction of the sediments from their depositional matrix already precludes any possibility of analysis of their contextual arrangement (Matthews, 1995).

Although several techniques may be used to study archaeological sediments, only micromorphology studies the sediments in their original arrangement and therefore is able to identify the sequence of events in the genesis of occupational deposits (Goldberg, 1980). Indeed, several studies of Near Eastern tell sites have shown that micromorphology can provide the framework for understanding site formation processes in settlement sites and even identify special features related to different maintenance and discard practices as well as other specific activities (Ge et al., 1993; Matthews, 1995; Matthews et al., 1994, 1996, 1997; Shahack-Gross et al., 2005). Micromorphology has also been applied elsewhere in the study of constructed floors and occupational deposits (Macphail and Crowther, 2007; Macphail et al., 2007; Milek, 2005; Milek and French, 2007; Sveinbjarnardóttir et al., 2007; Karkanas

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and Efstratiou, 2009; Matarazzo et al., 2010). In the majority of the cases however, the rarity of preserved constructed floors and their associated occupational debris has prevented assessment of inter- and intra-site variability and identification of changes related to societal or cultural developments.

The Bronze Age and Early Iron Age site of Mitrou in Greece promised to be an ideal site in this respect because it contains a long sequence of settlement strata with thick occupational deposits ranging in date from the Early Helladic IIB to the Late Proto-geometric pottery phases (ca. 2400–900 BCE) – a time span that has witnessed major socio-political and cultural changes. Therefore, this sequence provides a unique opportunity to study changes in the content and structure of occupational deposits through time and relate them to sociocultural developments in the Greek Bronze Age and Early Iron Age.

We will argue in this paper that indoor flooring practices at Mitrou exhibit a broad and pervasive change at the beginning of the Late Bronze Age, in the Late Helladic I pottery phase. We will demonstrate that Mitrou's Early and Middle Bronze Age floors resemble those of tell-sites (settlement mounds), whereas floors dating to the Late Bronze Age and Early Iron Age resemble those of “flat” settlements. This change coincides with the rise of a political elite at Mitrou in the Late Helladic I phase.

2. The site

Mitrou is a small tidal islet in the Bay of Atalante, which is part of the North Euboean Gulf in central Greece (Fig. 1a–b). The islet measures 330 by 180 m and has a surface extension of about 3.6 ha. At low tide it is connected to the mainland, and at high tide it is located only a hundred meters from the mainland coast. Its surface is fairly flat, rising gently to the north to about 12 m above sea level. During the Bronze Age sea level in the area was several meters lower than at present and the site probably was part of the mainland, but still located close to the sea (Lambeck, 1996; Cundy et al., 2000). The rising sea eroded the sides of the islet and produced steep scarps in two areas along its eastern and western shores

(Fig. 1a). The bedrock of the islet consists of Neogene marl and limestone with some outcrops of basic rocks appearing in the deepest part of the northern sea scarp. The bedrock geology of the region consists mainly of a variety of carbonate rocks and serpentinite. Indeed, the present coastal plain and beach contain large amounts of serpentinite gravel and sand.

The ancient site covers the entire islet, and it is in excellent state of preservation (Van de Moortel and Zahou, 2006, 2012: 1131, fig. 2). Systematic excavations by the Mitrou Archaeological Project, carried out each summer from 2004 to 2008, exposed a surface area of 777.52 sq. m., or 2.2% of the islet (Figs. 2 and 3). These were supplemented by geophysical surveys covering the entire islet, and by an archaeological surface survey of almost 25% of the islet. In addition, the stratigraphic sequences of the 45 m long eastern sea scarp as well as part of the western sea scarp of similar length were documented (Tsokas et al., 2012; Van de Moortel and Zahou, 2012: 1131, fig. 2). At the western sea scarp, the lowest level encountered above sea level dates to the Final Neolithic phase, and at the eastern sea scarp it dates to Early Helladic IIB. Excavations revealed stratified sequences with more than 40 occupational phases with indoor floors and exterior surfaces. These showed that the site was occupied without interruption from the Early Helladic IIB into the Late Proto-geometric phase (ca. 2400–900 BCE), i.e., throughout most of the Bronze Age and into the early part of the Early Iron Age. As is common in Bronze Age Greece, all excavated structures at Mitrou had been built with mudbrick walls set on low socles constructed of field stones. Most structures had clay roofs, with the exception of Early Helladic IIB Buildings N and M, which had roofs made of baked roof tiles.

Early Bronze Age architectural remains were uncovered only at the bottom of a 6 × 5 m trench (Trench LX784) at the eastern sea scarp, dug 5 m deep from the modern surface down to sea level (Fig. 2). Parts of two successive buildings, labeled N and M, respectively, were excavated here, and dated to the Early Helladic IIB pottery phase (ca. 2400–2150 BCE). They had substantial walls and ceramic roof tiles. Too little has been excavated to allow for the



Fig. 1. a) Mitrou islet with location of excavation areas and sea scarps (photo K. Xenikakis and S. Gesafidis); and b) map of Central Greece with the location of Mitrou and some important Bronze Age archaeological sites (drawing B. Lis and T. Ross).

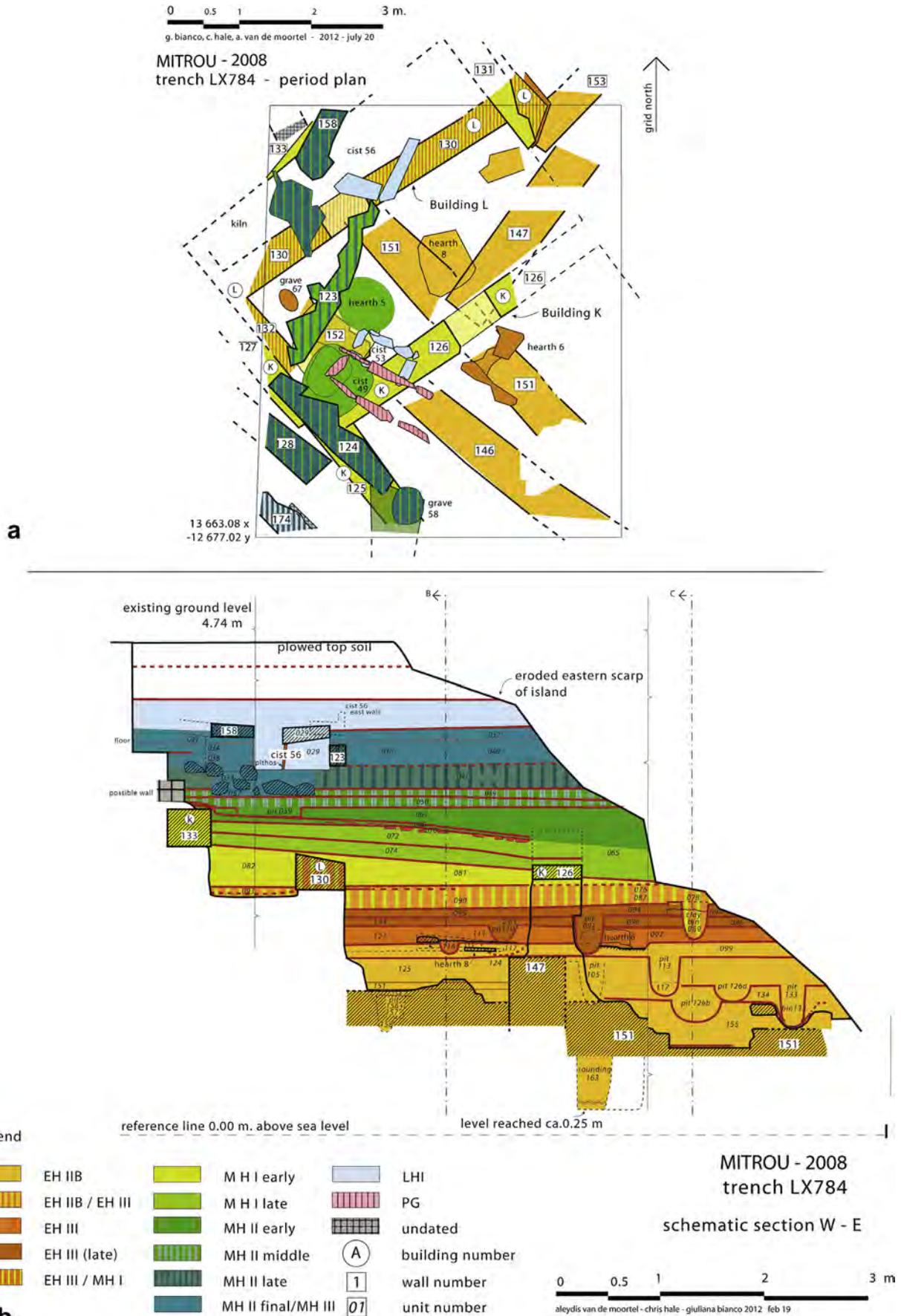
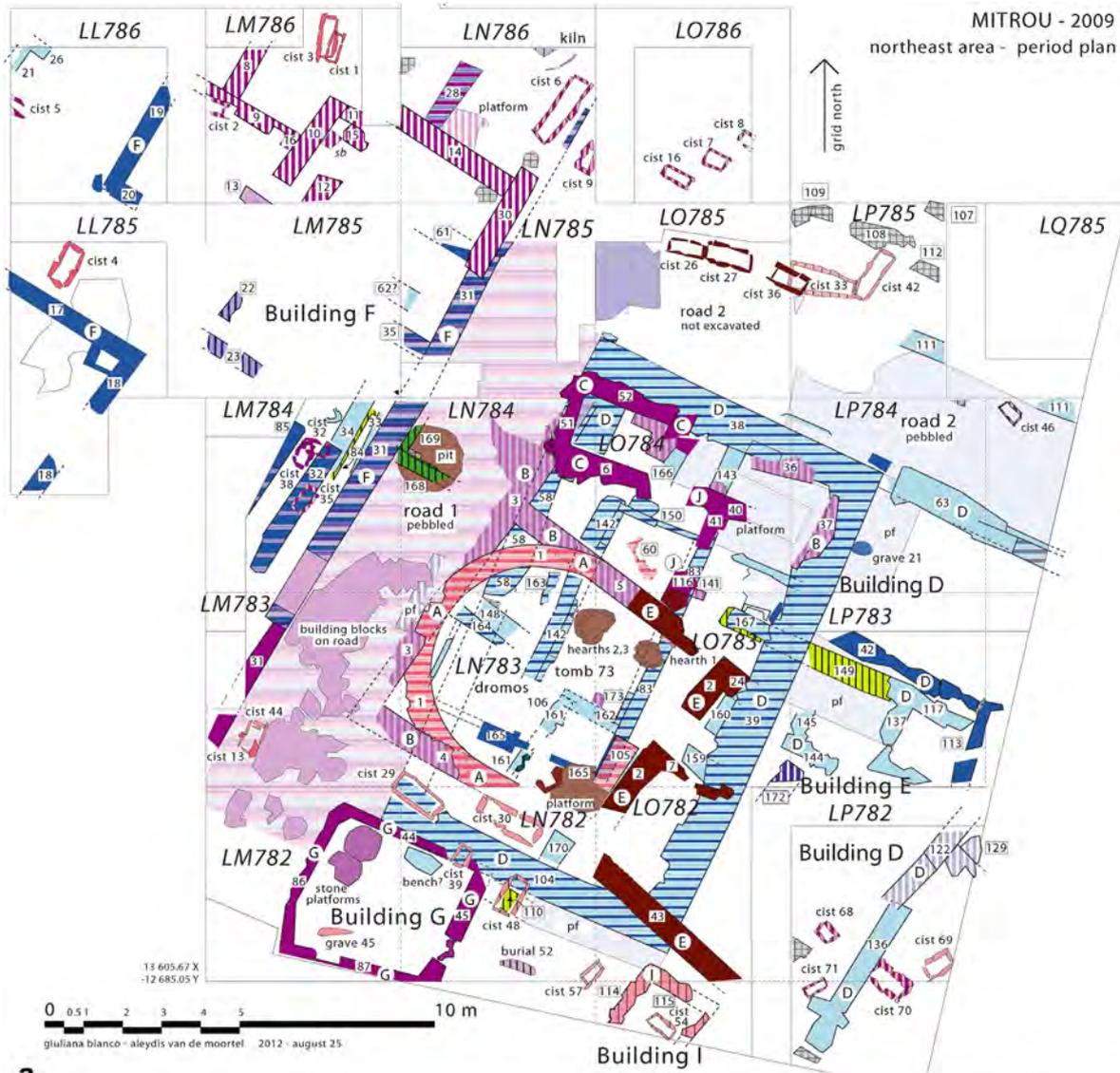
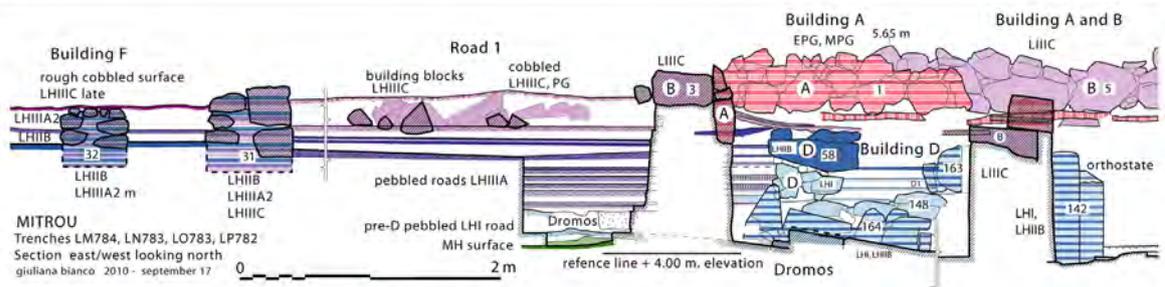


Fig. 2. Trench LX784 at the eastern sea scarp (Early Helladic – Late Helladic I): a) plan view of trench; and b) schematic W–E section. The legend refers to Fig. 2a as well.



a



b

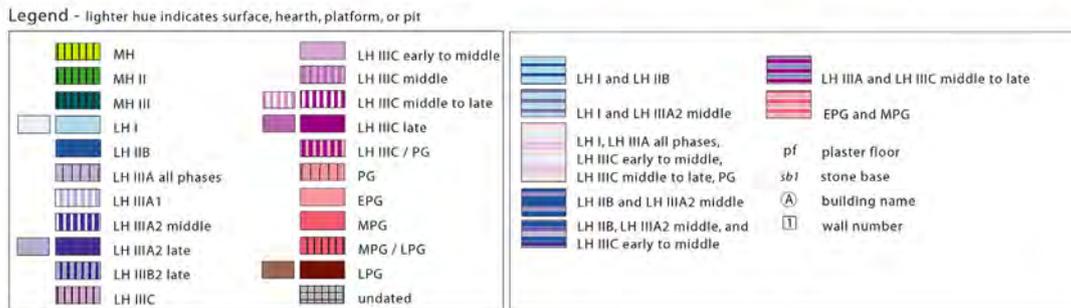


Fig. 3. Northeast excavation sector (Middle Helladic – Late Protogeometric): a) plan view of the sector; and b) east-west section across LM784, LN783, LO782 and LP782 trenches. The legend refers to Fig. 3a as well.

identification of their architectural plans, but their contents indicate that they were important buildings. This is the period of the Corridor Houses—the first administrative centers of mainland Greece (Van de Moortel and Zahou, 2012: 1132). During the Early Helladic III phase and throughout the Middle Helladic period (ca. 2200/2150–1700/1600 BCE), when mainland Greek society had again a simple society with a fairly egalitarian social structure, Mitrou appears to have had a simple settlement as well. Long Middle Helladic stratigraphic sequences have been uncovered in Trench LX784 at the eastern edge of the islet as well as in Trench LE792 (20.25 sq. m) in the northwest part of the islet. Middle Helladic floors and architectural remains were also documented at the eastern and western sea scarps. Only parts of a few buildings (L, K, and O) have been excavated, but there are rough gravel-and-dirt roads and open areas, both littered with trash (Van de Moortel and Zahou, 2012: 1132–1133).

Stratified Late Helladic and Protogeometric architectural remains have been excavated over a much larger area (ca. 700 sq. m) in the northeast and northwest parts of the islet (Figs. 2 and 3). This period sees the rise and fall of Mycenaean palatial society in Greece, and its reversion to the simple, rural societies of the Early Iron Age. In the Prepalatial period (Late Helladic I–IIIA2 Early, ca. 1700/1600 – early 14th century BCE) we see the rise of a ruling elite at Mitrou through the appearance of two elite centers, two elite tombs, imported prestige goods, and a network of orthogonal roads, which are kept clean in contrast to the previous period. Intramural burial practices are abandoned, and it seems that a communal cemetery was created in a formerly residential area. Mitrou thus appears to have become an organized town in this period. The two elite centers are Building H in the northwest excavation sector and Building D in the northeast excavation sector; both have the appearance of sprawling architectural complexes (Van de Moortel and Zahou, 2012: 1133–1136; Tsokas et al., 2012: 418–425; Van de Moortel et al., forthcoming). From the 3rd or 4th phase of Late Helladic I onwards, most of the excavated area of Building D is occupied by large elite tomb 73 and its rectangular funerary enclosure, occupying an area of 13.50 × 8.25 m. A third complex, called Building F, is constructed west of Building D during the Late Helladic IIB phase (late 15th century BCE); it likewise has an elite character.

At the end of this period Mitrou suffers a major destruction and its elite structures are not rebuilt. This suggests a profound change in the settlement's leadership structure, and it has been hypothesized by Van de Moortel that Mitrou was taken over by one of the nascent palatial rulers of neighboring Boeotia – most likely the ruler of nearby Orchomenos. During the ensuing Mycenaean palatial period (Late Helladic IIIA2 Middle – Late Helladic IIIB, early 14th century–ca. 1200 BCE), Mitrou sees very little building activity in the excavated areas, but an important building with baked roof tiles may have been located south of Building D (Van de Moortel and Zahou, 2012: 1137; Tsokas et al., 2012: 425–426).

After the fall of the palaces, in the Late Helladic IIIC Early phase (early 12th century BCE), Mitrou is rebuilt along its prepalatial plan. Building F is apparently rebuilt, and a new imposing structure, Building B, is set on top of Building D (Fig. 3). Before the end of the Late Helladic IIIC Late phase, it reverts to being a village again. The southernmost part of Building F is reused, and flimsy Buildings G and J are now constructed. Over the ruins of the northwest corner of Building B, small rectangular Building C is erected; this may have been a short-lived ritual structure, perhaps covered by a mound of earth. Mitrou remains occupied throughout the Protogeometric period (ca. 1050–900 BCE), which is the first part of the Early Iron Age. In the Early Protogeometric phase, apsidal Building A is constructed over the ruins of Building B, possibly as a leader's dwelling (Fig. 3). Early in the Late Protogeometric phase, Building A is succeeded by Building E, which likewise may have belonged to a

leading household as it has impressive walls and evidence for purple-dye manufacture (Van de Moortel and Zahou, 2011; Van de Moortel and Zahou, 2012: 1137–1138; Tsokas et al., 2012: 426–427; Van de Moortel et al., forthcoming).

3. Methodology

Micromorphological samples were taken from exposed profiles and surfaces during all excavation seasons. Sampling followed the gradual exposure of architectural phases and most sampled areas were later excavated. The sampling strategy was adjusted to the research questions imposed by the excavators but also to the needs of the geoarchaeological approach. The main research goals were as follows:

- Define purposely constructed floors and relate them to architectural or occupational phases. This led to an extensive sampling of most indoor sequences, following sometimes lateral variations of the same level.
- Define changes in the construction and maintenance of floors and other household processes related to the uses of those floors. The present study is particularly focused on this research question.
- Differentiate indoor from outdoor sediments, and purposely constructed floor sequences and outside surfaces from constructional fills (leveling and foundation fills), occupational fills or casual accumulations trampled down and forming informal surfaces. We believe that this is the backbone of any interpretation of occupational deposits.

In this work we focused mainly on the indoor floors and purposely constructed outdoor surfaces (e.g., Fig. 4a–c). Natural formation processes are not examined although they have been taken under consideration when studying the different types of indoor phases. The analysis of the outdoor deposits and the detailed correlation of sediments with architectural phases are in progress and will be part of a forthcoming work. Specific features like plastered pits, wall plaster and mud brick walls, although sampled, are not presented here but occasionally will be taken under consideration in the final interpretations.

In all, 101 undisturbed blocks of sediment (monoliths) from the archaeological sequence (Table 1) and 7 control samples from sediment and soils of the area were collected. The dimension of the sampled blocks varied from large monoliths of 40 × 15 × 15 cm to more typical 20 × 10 × 10 cm blocks. These blocks were carved using a sharp implement and gypsum cloth was used to secure them as undisturbed samples. The samples were oven-dried at 50 °C for several days and then impregnated with polyester resin diluted with styrene. Finally, 240 thin large format thin sections (7 × 5 cm) were prepared and studied. Descriptive terminology of the thin sections follows that of Stoops (2003) and Courty et al. (1989).

4. Results

4.1. Sedimentary microfacies

An important concept for understanding the processes that shaped the sediment deposits is that of microfacies (Courty, 2001). Rather than working with layers, micromorphologists think in terms of groups of sediments that have specific characteristics. If such groups are recognized macroscopically, we call them facies. If they are identified under the microscope, we call them microfacies. A facies or microfacies represents a unique formation process or combination of formation processes. By relating the thin section to

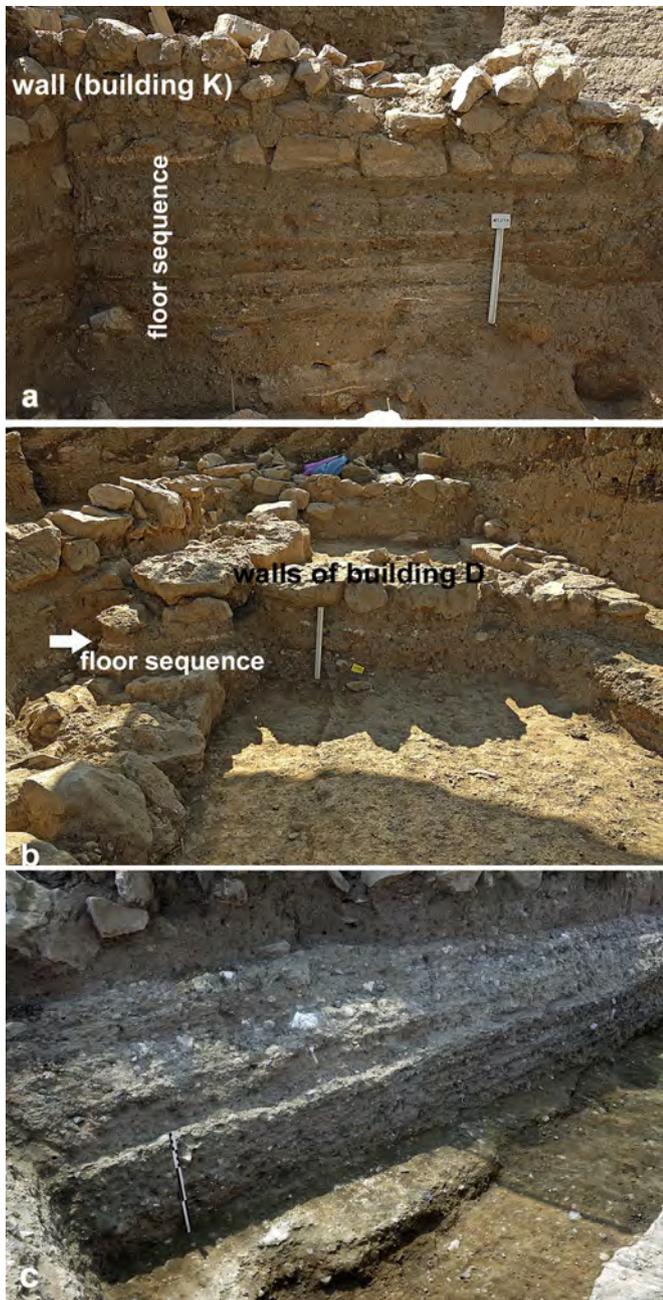


Fig. 4. Field photos of a) thick occupational EH IIB–MH I Early sequences with thin layered appearance in scarp below Wall 126 of Building K, Trench LX784 (looking northwest); b) thin sequence of LH I floors with lime finishing coats (arrow) preserved between complex close overlapping sequence of walls in Building D in Trench LP783, east of funerary enclosure of Tomb 73 (looking east); and c) pebbled street deposits of Road 1, LH I phase 2 – LH IIIC Early, just west of Building D (looking southeast). Photos P. Karkanas.

the site's stratigraphy, we can link sedimentary changes to cultural developments and their associated human activities (Goldberg et al., 2009). A sedimentary microfacies can be the product of a specific human behavior. When this same behavior is carried out at different places at the site or at different times, the same microfacies will be produced. Only by studying sediments as microfacies can we structure the data so we can reveal the human behavior or natural processes that create complex settlement deposits. The terms facies and microfacies are often used interchangeably because most of the facies in the field are actually confirmed as

such under the microscope. However, there are cases where there is a distinct combination of sedimentary structures and textures in the field that as a whole composes a separate facies but it is made up of several different microfacies. The essence of the definition of facies or microfacies is that it is a distinct combination of sedimentary features and characteristics observed at a particular scale. The existence of a distinct combination in one scale does not pre-empt the existence of simpler or more detailed combinations at another scale.

Based on field descriptions and micromorphological observations, the following sedimentary microfacies were identified at Mitrou (Table 2 and Figs. 5–11):

4.1.1. Microfacies A

In the field, microfacies A has the form of tabular compact beds with mostly sharp planar contacts. In some cases they are revealed as discontinuous patches with horizontal surfaces, but often they are preserved as remnants close to walls and other constructions (Fig. 4b). A variety, called microfacies A1, is the most obvious in the field; it consists of serpentinite gravel embedded in a fine brownish matrix. Microscopically, it contains sediment rich in gravel to sand-sized, rounded to subrounded serpentinite and subordinate limestone clasts in a red clay-rich matrix (Figs. 5 and 6a, b, c, and d). The tabular bodies of this microfacies have sharp, wavy to irregular upper contact and a generally sharp but looser and discontinuous lower contact (Figs. 5 and 6a, b, and c). Their thickness ranges from 1 to 10 cm. One of the most characteristic features of microfacies A in general is its 'mosaic' fabric where larger clasts are embedded in a dense finer groundmass (porphyric coarse-fine related distribution). The overall homogeneity of this fabric varies but the groundmass in between the gravel can be quite homogeneous (Fig. 6d). The groundmass is dense, almost poreless, but areas with vugs and vesicles are noted as well as disturbed and bioturbated parts (Fig. 6a, b, c and d). Often the uppermost part of the microfacies is denser with domains characterized by preferred orientation of the coarser elongated particles (Fig. 6a and b). In some cases the uppermost surface contains discrete reddish clay aggregates or more assimilated clay in the form of horizontal intercalations (Fig. 6b). Thin planar voids (straw imprints) and fine cracks are also horizontally aligned (Fig. 6a). Downwards the sediment often becomes looser, more aggregated and gravelly. In a few samples the lower part is rich in burnt clay aggregates with straw imprints.

Varieties of microfacies A have been identified, having the same overall geometry, fabric and microstructure but different content. Typical microfacies A2 is more fine-grained than A1, does not contain so much serpentinite gravel and clay and is more silty and calcareous (Fig. 6c and d). It also contains elevated amounts of anthropogenic content such as charcoal, ash, bone and sherds. Nevertheless, varieties of microfacies A with combinations of all described materials have been also noted.

Microfacies A also appears as separate small bodies of variable sizes and orientations making up a distinct component of microfacies B sediment (Fig. 6f).

4.1.2. Microfacies B

This microfacies is the most difficult to be interpreted in the field because it appears as brownish, disorganized, massive bodies of sediment, firm to loose and of varying thickness and geometry (Fig. 5). Two general types are defined microscopically. Microfacies B1 is generally fine-grained, loose, very porous aggregated sediment in a chaotic appearance (Fig. 6a, b and c). It contains large amounts of ash, and other occupational debris but also fine aggregates of microfacies A. Bodies of this type of sediments are not more than a few cm thick (Fig. 5). It is always

Table 1
Sample location and corresponding approximate cultural phases and architectural feature.

a/a sample (monolith)	Excavation sector	Trench	Cultural phase, architectural feature
MT1, MT2	NE	LL785	LH IIB – PG, Building F
MT3, MT4	NE	LL785	LH IIB, Building F
MT5, MT6, MT7, MT8, MT9, MT10, MT11	NE	LL786	LH IIB, Building F
MT12, MT13	NE	LM786	LH IIIC – MPG, Building F
MT14, MT15	NE	LM786	LH IIIC – MPG, Building F
MT16, MT17, MT18	NE	LM786	LH IIIC, Building F
MT19, MT20, MT21, MT22	NE	LM785	LH I – LH IIB – LH IIIB – LH IIIC, building below Building F and Building F
MT23, MT24, MT25	NE	LN784	LH IIIC Middle – LPG, Buildings B and A
MT26	NE	LN786	LH IIIC Early, Building F
MT27	NE	LN783	LH IIIC Middle – EPG – MPG, Buildings B and A
MT28	NE	LM786	PG clay column, above Building F
MT33, MT34	NE	LO784	LH IIIC Late, Building C
MT36	NE	LO783	MPG, Building A
MT37	NE	LO784	LH IIIC Middle, Building B
MT38	NE	LN786	LH IIIA, LH IIIC, Building F
MT39	NE	LN783	LH IIIC Middle – EPG – MPG, Buildings B and A
MT40, MT41	NE	LP784	LH I phase 3 or 4 – LH IIIC, Funerary enclosure of Tomb 73 in Building D: white lime-plaster coatings, and Building B
MT42	NE	LO784	LH I phase 3 or 4 – LH IIIC, just east of mudbrick Wall 83, Funerary enclosure of Tomb 73 in Building D, Building B
MT43	NE	LN784	LH IIIC Late, Building C
MT44	NE	LO784	LH IIIC Late, Building C
MT45, MT46	NE	LO782	LH IIB – LH IIIC – EPG, Funerary enclosure of Tomb 73 in Building D, Buildings B and A
MT47	NW	LG789	LH I phase 1, Building H
MT48, MT49	NW	LH792	LH I – LH IIB, Building H
MT50	E sea scarp	LX786	MH II (Early) building
MT51	NE	LO783	LH IIIC Middle – EPG – MPG, Buildings B and A
MT52	E sea scarp	LY782	Road of as yet uncertain date
MT53, MT54	E sea scarp	LX785	MH II, south of MH II (Early) building
MT55	E sea scarp	LX784	EH IIB – EH III Late, above Building M with roof tiles
MT56	NE	LN785	LH IIIC Late, Building C
MT81	NE	LN783	LH IIIC Middle – EPG – MPG – LPG, Buildings B, A and E
MT82	NE	LO784	LH IIIC Middle – EPG, Buildings B and A
MT83	NE	LN783	LH IIIC Middle – EPG, Buildings B and A
MT84	NE	LO784	LH I phase 3 or 4 – LH IIB mudbrick wall 83 of Tomb 73 in Building D
MT85	NE	LN783	LH IIB – LH IIIC Middle – EPG, Funerary enclosure of Tomb 73 in Building D, Buildings B and A
MT86	NE	LO784	LH IIIC Middle – EPG, Buildings B and J
MT87	NE	LP783	LH IIB – LH IIIA2: Late, Building D
MT88	NE	LP782	LH I phase 3, Building D
MT89	E sea scarp	LX784	EH IIB or III plaster pit lining, inside unknown building
MT90, MT91	E sea scarp	LX784	MH II Middle – MH II Final/MH III
MT92	E sea scarp	LX784	MH I Early hearth
MT93, MT94, MT95, MT96, MT97	E sea scarp	LX784	EH IIB – MH I Early buildings
MT98	E sea scarp	LX784	EH III – EH III/MH I Building L
MT99	E sea scarp	LX784	EH IIB building N
MT100	E sea scarp	LX784	MH I Early – Late, above Building K
MT101	NE	LO782	LH I phase 3 – LH IIB, Building D and Funerary enclosure of Tomb 73 in Building D
MT102	NE	LO784	LH I phase 3 – LH IIB, Building D and Funerary enclosure of Tomb 73 in Building D
MT103	NE	LP785	LH II – EPG, area north of Building D and Road 2
MT104	NE	LP784	LH I phase 3 – LH IIIB, Funerary enclosure of Tomb 73 in Building D
MT105	NE	LP783	LH I phase 3, Building D
MT106	NE	LP782	LH I phase 3–4, Building D
MT107	NE	LO784	LH I phase 3 or 4, west face of mudbrick wall 83 of Tomb 73, Building D
MT108	E-central	LR770	LH IIB – PG, Road 4
MT109, MT110	E sea scarp	LX784	MH I Early (-Late?)
MT201, MT202	NE	LO784	LH I phase 3 or 4, white plaster floors east and west of Wall 143, Funerary enclosure of Tomb 73 in Building D
MT203, MT204	NE	LO784	LH I phase 3 – LH IIB, Funerary enclosure of Tomb 73 in Building D
MT205, MT206	NE	LN783	LH I phase 3 – LH IIB, Funerary enclosure of Tomb 73 in Building D
MT207, MT208, MT209	NE	LN783	LH I phase 3 or 4 – LH IIB – LH IIIC, Tomb 73 in Building D, Building B
MT210, MT211	NE	LN783	LH I phase 3 or 4 – LH IIB – LH IIIC, Dromos of Tomb 73 in Building D
MT212, MT213, MT214	NE	LN783	LH I phase 2 – LH IIB – LH IIIA:2 Middle, pre-D building, Building D, Funerary enclosure of Tomb 73 in Building D
MT215	NE	LN783	LH IIIA: 2 Middle – LH IIIC Middle, Funerary enclosure of Tomb 73 in Building D, Building B
MT216, MT217	NE	LN783	LH I phase 3 – LH IIB, Building D, Funerary enclosure of Tomb 73 in Building D
MT218, MT219, MT220	NE	LM783	LH I phase 2 – LH IIIC Early, Road 1

associated with microfacies A which overlies or underlies it with sharp contacts.

Microfacies B2 is usually more compact, with large aggregates and serpentinite gravel floating inside a generally porous fine-

grained matrix (Fig. 6f). The aggregates are often fragments of microfacies A having variable orientations inside the matrix. This type of sediment is most affected by bioturbation and therefore a complex microstructure is also noted. Since some aggregates can be

Table 2
Micromorphological descriptions of microfacies.

Microfacies	Summary of micromorphological descriptions	Sample (MT)	Archaeological context: Interpretation and date range
A1	Sandy loam with fluctuating amounts of rounded serpentinite gravel, a few sherds, radiolarite chert and limestone. Occasionally some bone and charcoal. Porphyric coarse/fine related distribution in all scales of observation; in high magnifications is almost close porphyric. The groundmass is generally massive with only some vughs and vesicles. Often horizontally aligned fine cracks and few straw imprints. Speckled b-matrix.	10, 20, 27, 33, 34, 40, 41, 44, 47, 49, 51, 53, 54, 56, 81, 82, 83, 88, 90, 91, 93, 94, 95, 98, 99, 100, 102, 202, 203, 205, 209, 210, 215	Interior of buildings: constructed floor sequences; EH IIB – LPG
A2	Same as above but enriched in limestone gravel. The porphyric related distribution is more open; Crystallitic b-fabric. Groundmass is rich in calcitic ash crystals, fine charcoal flakes, bone and pottery.	9, 17, 20, 36, 37, 50, 55, 87, 88, 90, 91, 93, 94, 95, 96, 102, 103, 106, 201, 205, 211	Interior of buildings: constructed floor sequences; EH IIB – LH IIC, MPG
B1	Loose sediment with single grain to granular microstructure, a high amount of complex packing voids and frequent chamber and channel voids. Elongated coarse clasts have variable orientations. Aggregates with more massive appearance float in the loose groundmass and have variable orientations. The aggregates are usually of microfacies A types, but large aggregates of intact grass ashes full of articulated phytoliths are often observed.	9, 10, 17, 20, 27, 33, 34, 36, 41, 44, 47, 48, 49, 50, 51, 53, 54, 56, 81, 82, 87, 88, 90, 91, 93, 94, 95, 96, 98, 99, 100, 101, 102, 103, 106, 202, 205, 208, 210, 211, 215	Interior of buildings: fills and leveling in-between floor sequences; EH IIB – LPG
B2	Similar to microfacies B1 but more compact and with large aggregates of coarse gravel-size. Bioturbation is locally intense.	1, 2, 11, 16, 19, 39, 42, 43, 45, 46, 86, 107, 209, 212, 216	Interior of buildings: fills; LH I – PG
C	Red silty clay with porphyric related distribution. The coarse component is sorted silt quartz. Speckled to locally striated b-matrix. Dense almost poreless groundmass but occasionally vughs and vesicles.	81, 91, 93, 94, 98, 201, 209	Interior of buildings: constructed platforms on floor surfaces; EH IIB –LPG
D	Silty calcite with dense, poreless groundmass. Calcitic pseudomorphs after calcium oxalate crystals and plant structures.	17, 82, 90, 93, 95, 102, 103, 201, 202	Interior of buildings: wood ash always associated with hearths; EH IIB – EPG
E	It is finely stratified with alternative massive and porous lenses and laminae. Layers can be clayey, sandy, or silty with calcitic ash and thin out laterally. The pores are always fine vughy to vesicular with horizontal alignment and usually concentrated in zones. The more massive laminae have thin horizontal planar voids due to decay of fine organic matter. Some slaking features are observed. The sediment is rich in burnt remains, bone, charcoal and calcitic ashes. Pedofeatures related to directional pressure are observed.	50, 53, 54, 55, 90, 91, 93, 94, 95, 98, 99, 100, 106, 201, 202	Interior of buildings: frequently patched and repaired floor sequences; EH IIB – MH II Final/ MH III, except for MT106, 201, and 202, which are LH I phase 3–4
F	Facies consisting of sequence of certain microfacies. The base always consists of matrix- or clast-supported serpentinite and limestone rounded gravel. Matrix is mostly loose aggregated silty loam with packing voids. It is overlain by a couple of layers of microfacies A type sediment. Occasionally the sequence is capped by a thin layer of microfacies A3 or B1 microfacies.	52, 108, 218, 219, 220	Outdoor deposits; constructed Roads 1, and 4 (LH I – LH IIC Early) and a road of as yet uncertain date.
G	Pure calcareous dense micromass with a high amount of sand-sized and gravel limestone and calcitic aggregates; few coarse sandy serpentinite inclusions. The calcareous matrix appears cemented with dark gray almost isotropic micritic bands and with a lot of horizontally aligned cracks.	33, 40, 50, 81, 90, 92, 94, 99, 101, 105, 203, 211	Outdoor deposits and interior of buildings: lime floors and surfaces; EH IIB – LPG

larger than the size of thin section, more than one thin section and sample of the same body has to be analyzed in order to understand its morphology.

4.1.3. Microfacies C

In the field the sediment of this microfacies appear as very thin, distinct red tabular to lenoid features (Fig. 7a). They are so thin that in most cases they are difficult to see with the naked eye. Under the microscope, they appear as thin compact tabular layers of red clay rich in silt-sized quartz with sharp contacts (Figs. 8c and 9h). In several cases they are closely associated with burnt remains (Fig. 7). They mostly have a dense poreless microstructure with silty quartz embedded in the groundmass. The clay matrix locally preserves striated birefringence fabric inherited from the soil source.

4.1.4. Microfacies D

Macroscopically these microfacies have the form of lenses of white to gray ashy material (Fig. 7). It is a pure calcitic wood ash with microscopically layered or massive appearance. Calcitic wood ash crystals and ash pseudomorphs of larger plant structures are noted. There are cases where microfacies D also appear as arrays of distorted lenses incorporated inside microfacies E (Figs. 8c and 9d).

4.1.5. Microfacies E

In the field this microfacies usually is finely interbedded with all other types of microfacies including microfacies A (Fig. 4a). In general it has multiple shades of gray color, it is relatively firm and appears in the form of tabular bodies of sometimes several meters length (Figs. 7 and 8). Microscopically it consists of fine occupational debris (charcoal, ash, bone, charred material, etc.) often finely stratified and occasionally as alternating massive and more porous lenses and laminae (Fig. 9a, b, e and f). Areas with compact bedded microstructure are characterized by horizontal referred orientation of the components, fine horizontal oriented elongated pores and vesicles and fine plant imprints usually concentrated in zones (Fig. 9a, b, c and g). Individual laminae can be clayey, sandy, or silty with calcitic ash, thinning out laterally (Fig. 9e and f). The bodies of this microfacies have sharp upper contacts but the lower contacts are often gradational at a microscopic scale to microfacies A (Figs. 9a and 8). Sublayers with distinct content, occasionally enriched in serpentinite clasts, or with contacts outlined with decayed organic matter are observed (Fig. 10a). Some of these sublayers have indications of directional pressure, that is, rotational features (Fig. 10c and d) or stratified silty intercalations with arrays of oriented fine vughs and vesicles that transect diagonally the whole width of the sublayer (Fig. 10a and b). In other cases sublayers truncate underlying sediment with a cemented dense

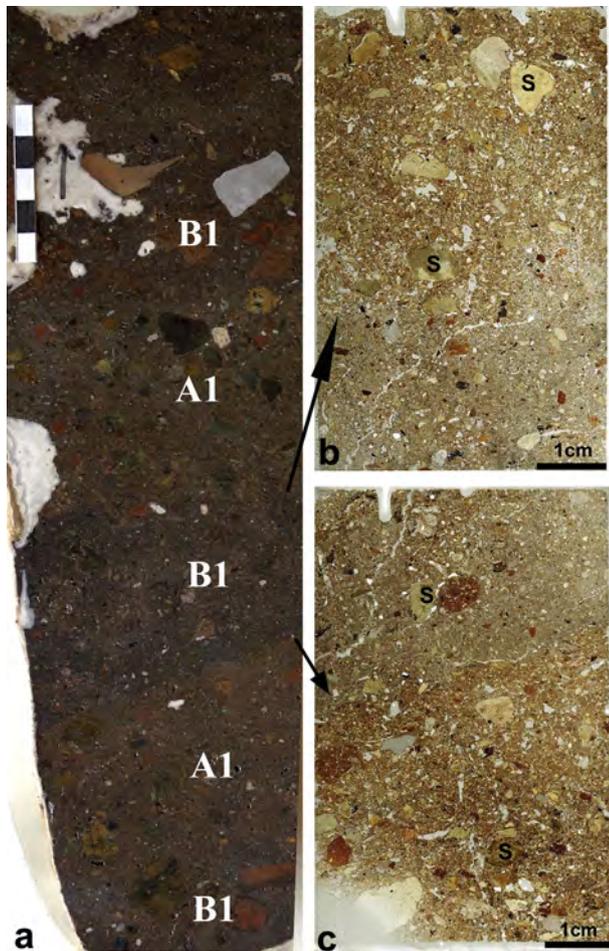


Fig. 5. a) Resin-impregnated slab showing alternating tabular layers of microfacies A1 and B1. Sample MT49 (LH I – LH IIIA levels in Trench LH792 of Building H, in the northwest excavation sector), scale = 5 cm. b) Corresponding thin sections showing the undulating lower contact (upper arrow) and the sharp upper contact (lower arrow) of microfacies A1 layers. The yellowish-green coarse clasts are serpentinite (s). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

groundmass and fine oriented pores that downwards become gradually looser (Fig. 9g). Note also that microfacies E is intimately mixed with microfacies C and D described above (Fig. 7).

4.1.6. Facies F

This is a complex facies consisting of several microfacies of alternating gravel and mud layers (Figs. 4c and 11). They make thick sequences, some 80 cm thick, in Road 1, a well-defined pebbled street bordering Building D on the west (Fig. 3). Under the microscope the gravelly microfacies can be clast or matrix-supported and consist mainly of rounded serpentinite and limestone clasts (Fig. 11). Overlying these gravelly substrates are successive layers of typical microfacies A sediment as described above, occasionally capped by microfacies B1 (Fig. 11b). Even thin lime coatings were identified capping layers of microfacies A (Fig. 11c).

4.1.7. Microfacies G

In the field this microfacies appears as indurated white lime floor and plaster constructions (Fig. 4b). It has the form of tabular compact beds with mostly sharp planar contacts. This microfacies is characterized by a dense gray calcareous matrix of neofomed micrite (Fig. 6e). Embedded limestone aggregates with reaction

rims to micrite are assigned to half-reacted lime, as described by Karkanas (2007).

4.2. Interpretation of microfacies

It should be stressed that it is not the mere presence or absence of a sedimentary microfacies but the spectrum of microfacies and their presence in certain combinations that are indicative of distinct conditions during their formation and define accurately how a particular area has been formed. Therefore it is of particular importance to interpret each microfacies in relation to its spatial association with other microfacies.

In addition to their field geometry, the dense compacted matrix of the sediments of microfacies A, their homogeneous embedded fabric and particularly the sharp upper and lower contacts can be attributed only to purposely constructed floors and their replasterings. Its constituents, the serpentinite gravel and red clay, obviously have been derived from the coastal plain in the area of the site. The material used also includes occupational debris and lime. Lime was used as a finishing coat or mixed with debris for the construction of thick floors (microfacies G). Microfacies A often underlies and overlies loose aggregated occupational debris of microfacies B1 (Figs. 5 and 6a, b, and c). Often there is clear alternation of microfacies B1 and A making sequences of two or three floors that cannot be differentiated in the field (Figs. 5 and 6d). As already described, fragments (rip-up clasts) from the underlying floors are at times incorporated in the overlying debris. The lower contact of these sediment bodies is of particular importance in the interpretation of some varieties of microfacies A as constructed floors. For instance, the more ashy variety of microfacies A2 cannot be interpreted as compacted gradually accumulated occupational debris because its lower contact would be expected to be gradual to the underlying loose layers of microfacies B1, and this is not the case. Cases where different varieties of microfacies A are in sharp contact with each other also have been noted (Fig. 6d) as well as sequences of layers (distinct floors) of the same variety of microfacies.

The regular occurrence of microfacies B1 in association with the constructed floors of microfacies A is of special importance. The thickness of this loose occupational debris is not more than a few cm and based on its content (ash, bone, organic material) we interpret it as the product of everyday activities. Continuous trampling would have made it more compact than it is. Since its lower contact is as a rule uneven the most parsimonious explanation for its appearance is that microfacies B1 represents the application of a last-moment leveling layer without compaction before the application of a new floor. Alternatively, they can also represent remains of demolition debris mixed with occupational debris that was most cleared away. Floors are also associated with another type of compacted occupational debris, microfacies E, described below. The thick massive sequences of microfacies B2 often separating floor sequences are interpreted as construction fills. Often they have been leveled and compacted before being overlain with a floor. They mostly consist of displaced floor material but also contain other construction materials that could represent packed demolition debris (Shillito et al., 2011).

The field appearance, microstructure, and fabric of the sediments of microfacies C suggest that they represent surfaces purposely constructed of red clay (Figs. 7 and 9h). Their content is the typical terra-rossa soil found on carbonate rocks of the Mediterranean environment. Such soils are not found on the islet, so they were probably brought in from the limestone areas close to the site. Based on their field appearance they probably are not floors but small platforms. They are always associated with floors, but they do not cover their whole surface. Very often they have been found in

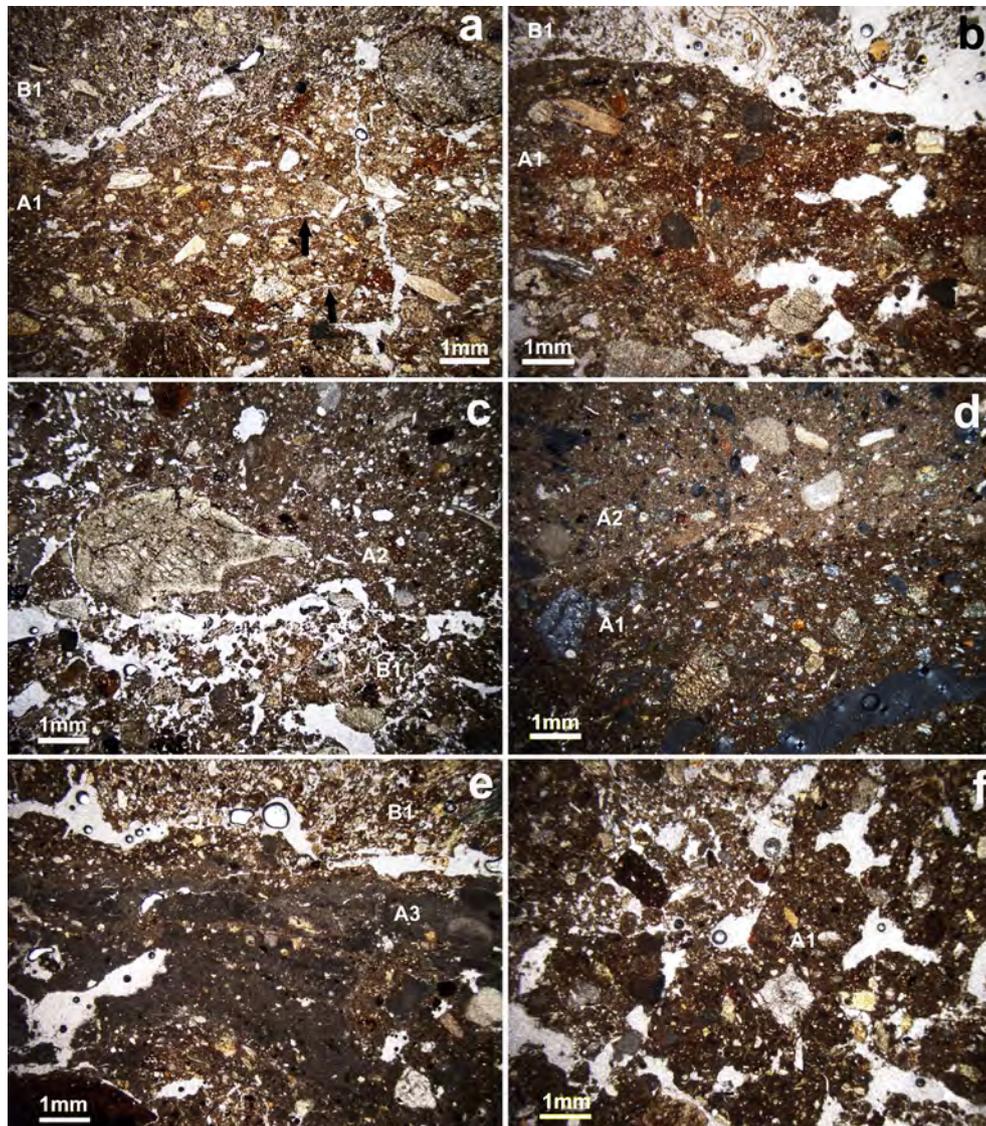


Fig. 6. Photomicrographs of microfacies A and B. a) sharp wavy contact between dense microfacies A1 and loose microfacies B1. Also shown are fine horizontal cracks (arrows), generally horizontal alignment of elongated clasts and some red clay aggregates in A1. Sample MT49, seen in Plane Polarized Light (PPL). b) Loose occupational debris (B1) overlies sharply compact microfacies A1 characterized by red-clay intercalations and some large vughs. Sample MT93, PPL (EH III/MH I – MH I Early east scarp below doorway in Wall 126 of Building K, Trench LX784). c) Loose occupational debris (B1) sharply underlies compact microfacies A2. The vughy to fine porosity of microfacies A2 is seen. Sample MT50, PPL (MH II (Early) building in grid square LX786 of eastern sea scarp). d) Layers of microfacies A1 and A2 in sharp contact. Note the contrasting birefringence colors between the calcareous microfacies A2 and the red clayey microfacies A1. Also shown is the relatively homogeneous porphyric related distribution of both microfacies. Sample MT50, Crossed Polarized Light (XPL). e) Lime-rich microfacies G overlain by loose occupational debris (B1). Sample MT101, PPL (LH I phase 3 floor of Building D in Trench LO782, south of funerary enclosure). f) Microfacies B2 with large inclined fragments of microfacies A1 floating in a loose aggregated matrix. Sample MT216, PPL (demolition debris in funerary enclosure of Tomb 73 in Building D, Trench LN783). (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

close association with burnt remains or they are themselves burnt, so it is possible that they were parts of fire places (Fig. 7a).

Microfacies D represent typical in situ or slightly disturbed hearth remains often with well-preserved bedded structure and fragile ash pseudomorphs after plant structures (Courty et al., 1989). Both microfacies C and D are in close association with the following microfacies E and some remains of microfacies D are displaced and made into a surface (see below).

Microfacies E is the most difficult to interpret but also interesting type of sediment. There are several lines of evidence that it represents trampled occupational debris but often repeatedly leveled and deliberately made into a surface. It is not one piece of evidence that can alone support this interpretation but it is the combination of features that sustains this explanation. The content

of this microfacies is typical occupational debris dominated by fine-grained burnt remains, mostly ashes (Fig. 9b). It is always associated with constructed floors of microfacies A and in some cases the contact with the underlying floors is microscopically gradual (Figs. 8 and 9a). The overall thickness of each separate body is comparable to that of the constructed floors and replasterings of microfacies A and it is often made up of several thin sublayers (Figs. 8 and 10a). The latter implies that there is an incremental and not continuous build-up. Upper contacts of these sublayers can be very sharp, some of them having been truncated, whereas others showing evidence of exposure in the form of organic staining of the surface. There are also sublayers with a more compacted and cemented surface relative to their substrate (Fig. 9g) and others that have clear evidence of directional pressure and ductile deformation

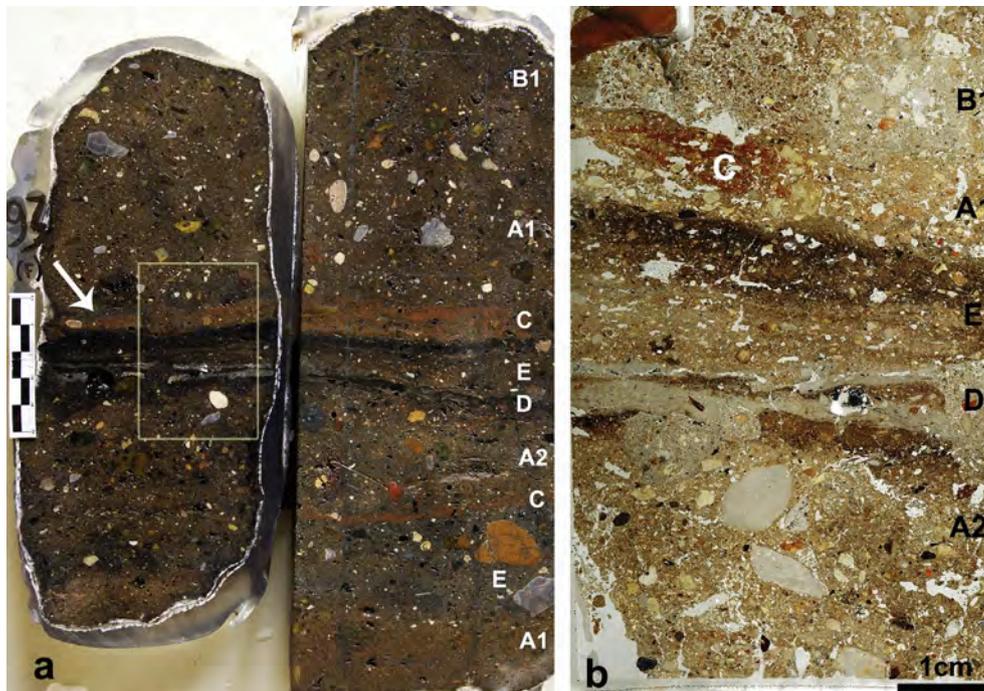


Fig. 7. a) Two resin-impregnated slabs from the same sample MT93, about 15 cm apart (scale = 5 cm). Although there is an overall resemblance in the sequence of microfacies there is also quite a lot of lateral variation. Note for example the complex appearance of the upper layer of microfacies C which is intercalated laterally to microfacies A1 (see thin section in 7b) or overlain by burnt remains (see left side of left slab marked with arrow). b) Thin section corresponding to the rectangle marked in the left slab of a). Note that the burnt substrate of A2 is overlain by intact white layers of ash (microfacies D) which are also separated by a burnt thin substrate of A2 type (not marked). The overlain layer of microfacies E is also burnt implying that it was also used as a hearth substrate.

formed during application of the material (Fig. 10). In one case the deformation feature transects and affects the whole width of the sublayer implying that it was formed at the same time as the entire sublayer (Fig. 10a and b). These ductile deformation features and the appearance of zones of horizontally aligned elongated fine pores also imply a wet condition of formation since only at elevated moistures level ductile deformation in clay-rich sediments is possible (Jim, 1990). Moreover, microfacies C and D are integral parts of microfacies E. Intact red clay constructions are found inside layers of microfacies E, de facto creating distinct surfaces. In the same line of evidence lenses of pure ashes (microfacies D) are deformed and incorporated inside microfacies E, a feature that cannot be produced only by trampling but by the use of an implement that could sweep the burnt remains over the substrate without destroying their overall integrity (Figs. 7c and 9d). Dense bedded occupational debris with evidence of sorting has been interpreted as beaten floor material made by trampling and not constructed floors per se (Macphail et al., 2004; Macphail and Goldberg, 2010). We do not exclude this possibility for parts of the indoor deposits of Mitrou but in most of the cases there is ample evidence that the occupational debris was also maintained and made into surfaces. Similar processes have been reported in geo-ethnoarchaeological studies of floor formation processes (Milek, 2012). The exact process is not obvious, though, but could be simply wetting and intensive sweeping to make the floor even and firm. However, rotational features like that of Fig. 10c would need an implement that can spread material with a more even pressure.

Even though we do not know what tool was used, it is very important to point out that occupational debris was not removed by the inhabitants, but was left in the rooms and incorporated into the living surface. Likewise, the recycling of occupational debris for constructing typical floors of microfacies A or sublayers of

microfacies E is of interest as well. All these processes have important implications for the interpretation of the sedimentary sequences formed inside buildings and for human behavioral patterns (see Discussion below).

Finally, facies F contains, to judge by its field appearance and development, deposits typical of constructed roads (Fig. 4c). Such roads laid with pebbles or made of hard-packed earth and pebbles, have been excavated in four areas at Mitrou, and to judge by the results of the geophysical survey, they are part of a well developed orthogonal network in the settlement (Van de Moortel and Zahou, 2012: 1133–1134; Tsokas et al. 2012: 422–423; Van de Moortel et al., forthcoming). Such gravel mud couplets are observed in constructed roads in other prehistoric settlements of Greece, but there they are not as well prepared (e.g. Felten et al., 2006). What is impressive about Road 1 at Mitrou is the repeated replastering of the street surfaces, occasionally with finishing lime coats, and the excellent state of preservation of these surfaces, which in Road 1 range in date from LH I to LH IIIC Early (Fig. 11). In addition, there is no significant accumulation of occupational or windblown debris between the surfaces, suggesting that they were regularly swept. This would rather imply ceremonial use of this road and not regular traffic, something that is also supported by the close proximity of the sampled part of Road 1 to elite complex Building D. In the field the mud layers appeared crudely bedded, but it was impossible to understand what this bedding represented.

5. Discussion

From Early Helladic IIB to the end of the Middle Helladic phase, and in three Late Helladic I phase 3–4 samples in elite Building D and its funerary enclosure (MT106 and MT201–202), the indoor sequences are characterized by repeated alternations of constructed floors and their replasterings (microfacies A), occupational

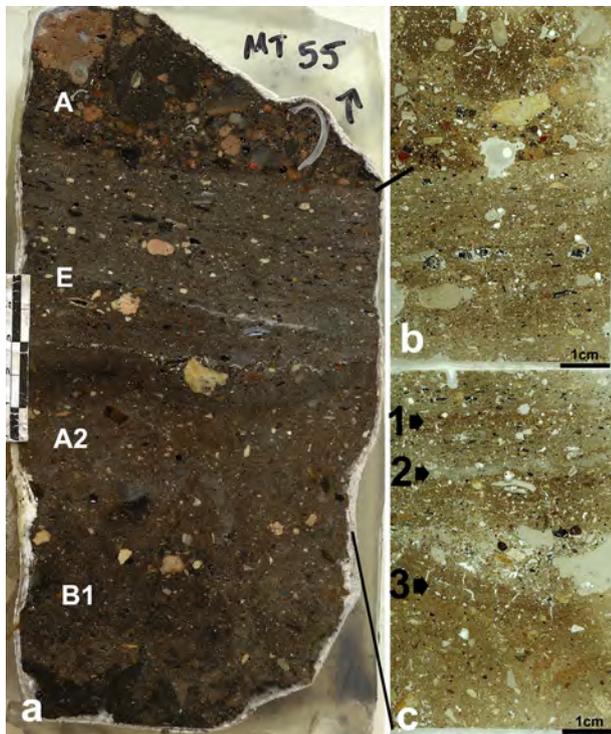


Fig. 8. a) Resin-impregnated slab showing a finely stratified layer of microfacies E between layers of microfacies A. The lower one overlies microfacies B1. Sample MT55. b) and c) Corresponding thin sections showing a thin red clay surface (arrow 1), a white layer (arrow 2) corresponding to Fig. 9d and the interface between microfacies A2 and E (arrow 3) corresponding to Fig. 9a.

debris compacted and leveled (microfacies E) or loose (microfacies B1), in situ hearth remains (microfacies D), and surfaces constructed of red clay (microfacies C) (Figs. 4a and 8). We believe that this is evidence of meticulous maintenance practices with multiple replastered floor sequences. Similar practices have been observed in tell sites of Anatolia and the Near East (Matthews, 1995; Matthews et al., 1994, 1996, 1997). At Mitrou, these sequences also include the leveling of debris produced inside houses by day-to-day activities, incorporating them into the surface. Occasionally material from areas outside the settlement, such as alluvial serpentinite sand and gravel and terra rossa soil, was used alone or mixed with occupational debris for making floors or replastering. Although floors occasionally appear truncated, there is no evidence that they were regularly removed, because we did not observe truncations of several layers at a time. The palette of materials and techniques used for constructing and replastering floors is rather broad and probably idiosyncratic. In this way an impressive thick sequence of overlapping worn-out floors and occupational deposits was produced with a characteristic finely layered appearance to the naked eye (Fig. 4a). There is no clear association of a single floor level with a specific building phase but rather thick sequences of floor build-up in each architectural phase (Fig. 4a).

In Late Helladic I phase 1, this behavior ends. From now on, floors as a rule are not frequently repaired and their construction technique is more standardized. These floors are mostly made of alluvial serpentinite gravels and their associated red clay. Usually, a relative thin sequence of a few floors is associated with a new buildings phase instead of the thick floor sequences seen before (Figs. 4b and 5). Occupational debris is only a couple of cm thick, occasionally forming intervening deposits between several cm thick floors. The earliest such floors we have identified so far is a sequence of clay floors in elite Building H dated to Late Helladic I phase 1 (sample MT47), and clay floors with finishing lime coats of

elite Building D dated to Late Helladic I phase 3 (samples MT88, MT101, and MT105). Thus the observed change in Late Helladic I is broadly correlated with the building of elite complexes and the rise of a local ruling elite at Mitrou. This interpretation is supported by the appearance of constructed Road 1 in the Late Helladic I phase, which is associated with Building D and show evidence of ceremonial use (see above, microfacies F; Fig. 4c).

We believe that the changes in construction and maintenance practices of floors that we found at Mitrou reflect different cultural practices. The exact use of the individual indoor spaces is still under study, but the chronological and spatial distribution of the sampled floors is sufficiently large to allow us to conclude that these changes are not related to the specific uses of those floors, but they represent a pervasive change in flooring practices throughout the excavated parts of the site at the beginning of the Late Bronze Age. This different attitude towards the construction and maintenance of floors in turn must have led to a different pattern in the maintenance and reconstruction of buildings. The Early and Middle Bronze Age floors that were sampled belong to Early Helladic IIB elite buildings N and M as well as to simpler Early Helladic III and Middle Helladic structures. In all of these, recycling of the produced occupational debris in making floors led to the accumulation of large amounts of indoor deposits and the quick elevation of floor surfaces and accumulations of relatively large amounts of indoor deposits. The solution that Mitrou's inhabitants chose was not to remove these deposits. We should therefore expect that the EH and MH buildings needed frequent reconstruction because the heights of buildings and doorways must have been seriously reduced by the accumulation of indoor deposits. Subsequent buildings must have followed the same layout, at least for a considerable period of time; hence their association with a thick occupational sequence. This continuity of the layout of houses has been a regular practice in the Neolithic tells of the Near East and has been linked to the construction of social memory (cf. Hodder and Cessford, 2004). At Mitrou there is no evidence in the EH and MH periods for the frequent raising of walls, but we have excavated fairly few walls of this period.

Early in the Late Helladic I phase this practice changed. From now on, buildings probably were not frequently reconstructed and the produced occupational debris was not constantly recycled inside houses. To give a striking example: in the roughly 200 years of its lifetime, Late Helladic Building D had 3 or 4 surfaces, and saw a total accumulation of about 20–30 cm. In contrast, the Early and Middle Helladic levels in the deep trench at the sea scarp had a thickness of about 4 m, accumulated over about 800 years, that is, 1 m per 200 years or about 4 times more than Building D. In addition, new Late Helladic houses did not always follow older foundations, and thus a complex close overlapping sequence of walls occurred.

The major change in floor maintenance practices observed at Mitrou at the beginning of the Late Bronze Age is pertinent to an ongoing fervent discussion in Greek archaeology about the difference between tells and so called “flat” settlements. Tells are tall settlement mounds with accumulated occupational levels. Flat settlements have little accumulation of occupational levels, even if they were occupied for the same amount of time. The reason for this difference is not well understood and is much debated (Kotsakis, 1999, 2009; Valamoti, 2007 and references therein). We want to argue that these two types of settlements were the result of different cultural practices with respect to floors. In tells, floors were continuously patched and relaid, resulting in a rapid accumulation of deposits. In flat settlements, people constructed floors once and did not frequently replaster them. They also discarded their occupational debris elsewhere instead of incorporating it into surfaces. Therefore there was little accumulation.

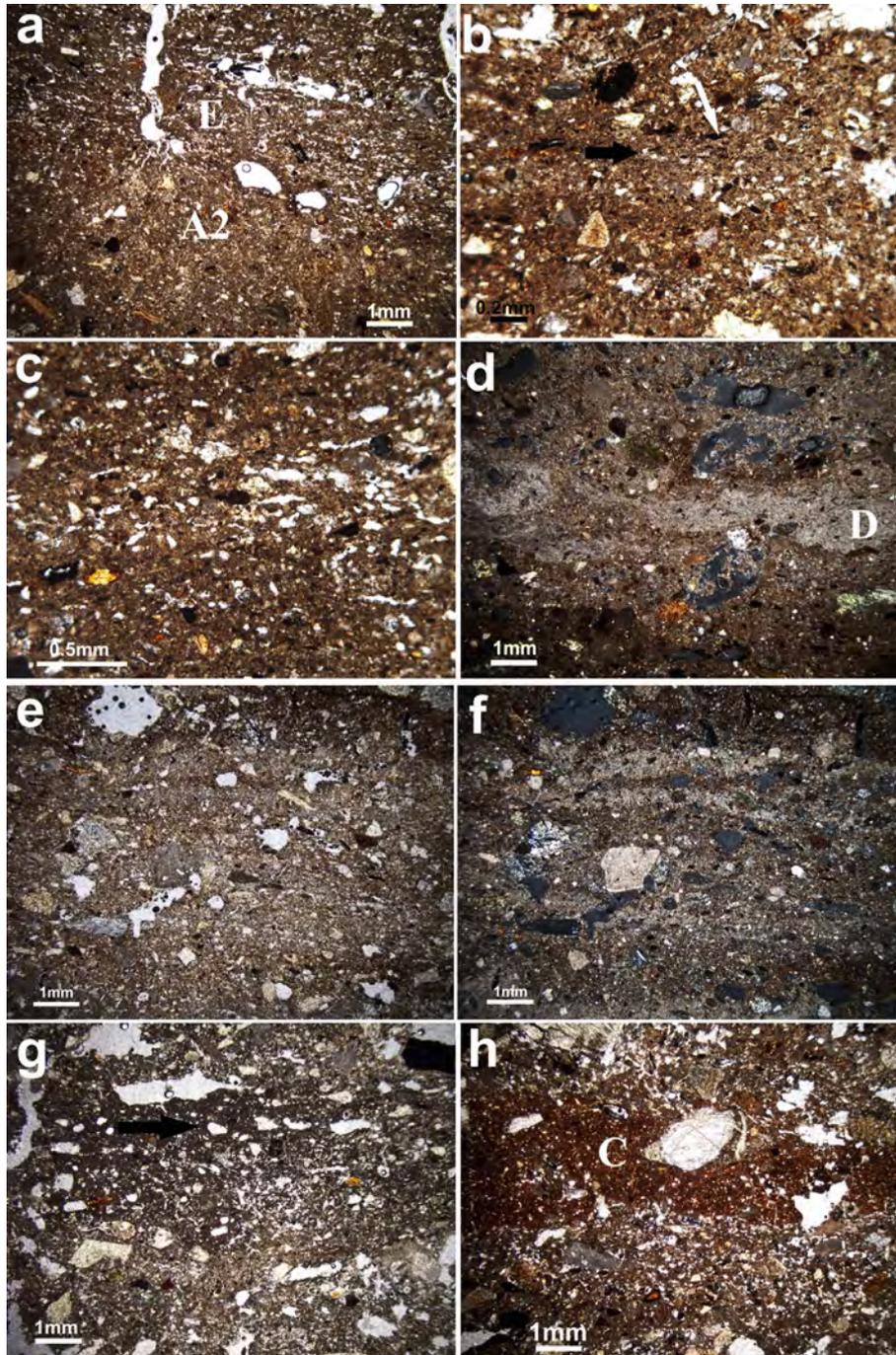


Fig. 9. Photomicrographs of microfacies E (a–g) and C (h). a) Compact microfacies A2 gives way to stratified microfacies E (see also Fig. 8c). The upper part of microfacies E layer is denser than its lower part. Sample MT55, PPL (EH IIB – EH III Late floors above EH IIB Building M and EH III/MH I Building L, Trench LX784). b) Dense groundmass of microfacies E with some arrays of fine vughs (black arrow). Note the horizontal alignment of charred flakes (white arrow) closely associated with light gray aggregates of ash. Sample MT55, PPL. c) A band of horizontally aligned elongated vughs and vesicles of microfacies E. Sample MT55, PPL. d) Light gray stretched and deformed lenses of pure ash (microfacies D) inside microfacies E (see also Fig. 8c). Sample MT55, XPL. e) Alternating red clay-rich and gray ash-rich laminae of microfacies E. Sample MT93, PPL. f) Same as e) in XPL. g) A sublayer of microfacies E with its upper part cemented (dark opaque area) and characterized by arrays of elongated vughs and vesicles. Sample MT98, PPL (EH III/MH I floors of Building L and EH III floors below; in southern scarp below Wall 126 of Building K, Trench LX784, cf. Fig. 4a). h) Red clay layer of microfacies C rich in fine silty quartz. Sample MT93, PPL. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

It is remarkable that until the end of the Middle Helladic period, Mitrou has all the characteristics of a tell site whereas from the early Late Helladic I phase onwards it resembles a ‘flat’ settlement, even though occupation continues in the same locations and there is a continuation in the build-up of sequences of occupational levels. It is possible that this reflects merely a change in people’s

attitude towards cleanliness and order. However, at Mitrou, this change happens at the same time as major changes in the settlement: the laying of the new roads, the abandonment of intramural burials, and the building of elite centers and elite tombs. Perhaps it is no coincidence that also the new Late Helladic I roads are kept clean, whereas in the previous Middle Helladic period roads and

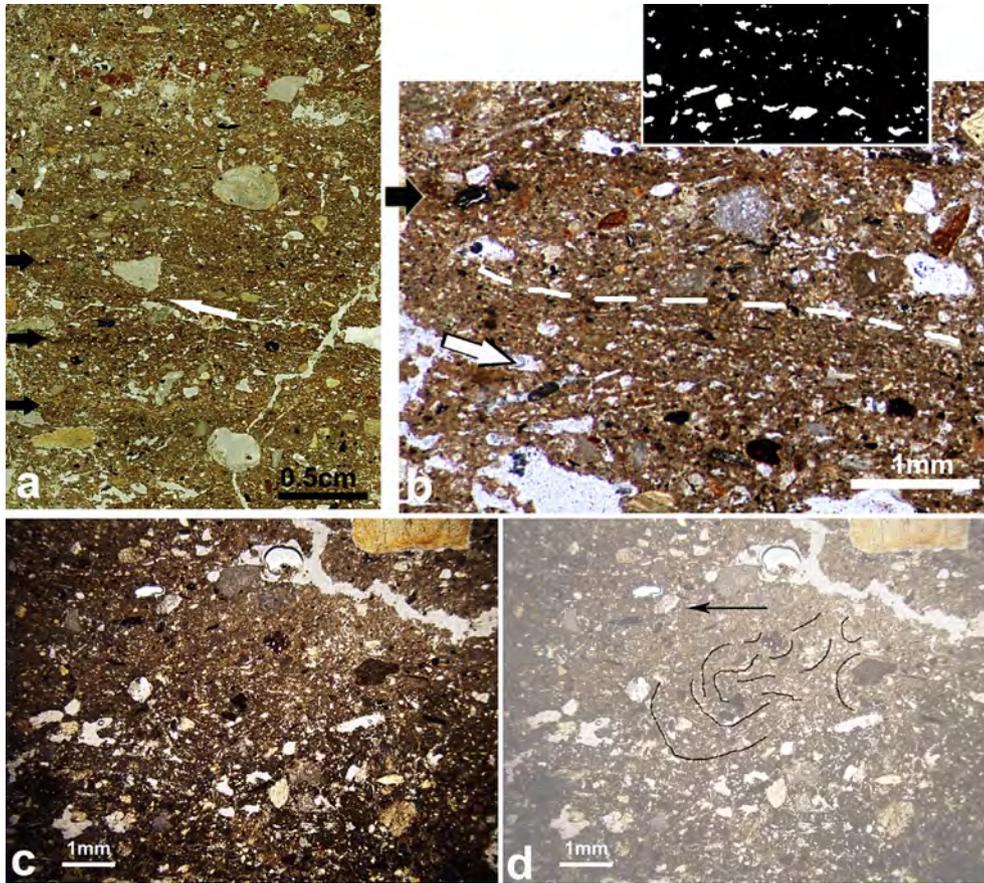


Fig. 10. Indications of directional pressure. a) Part of thin section showing sublayers of microfacies E separated by discrete clay or organic-rich surfaces (marked with black arrows). A diagonal feature transects the upper sublayer (marked with white arrow). Sample MT98. b) Detail of the diagonal feature of the previous photo (black arrow pointing to the upper surface of the sublayer). The feature is a dense silty intercalation with stratified appearance and arrays of fine vesicles and vughs. Its lower contact is marked with a line of larger elongated vughs (pointed with white arrow). PPL. Detail of the vughy porosity of this area is shown in the processed image of the inset. c) Rotational feature of microfacies E. Sample MT98, PPL. The main deformation lines are drawn in the next figure d). The arrow indicates the sense of movement.

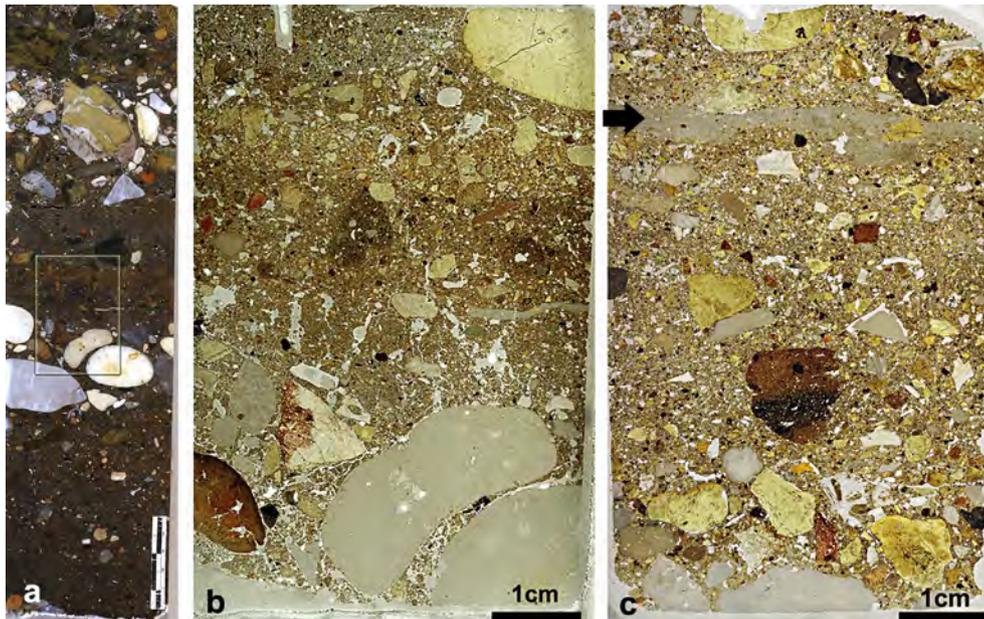


Fig. 11. Deposits of constructed roads (facies F). a) Resin impregnated slab of road deposits showing alternating mud and gravel layers. Sample MT52 (Grid square LY782 at eastern sea scarp). b) Thin section corresponding to the rectangle of a) showing that the mud layer consists of three successive layers of microfacies A1 with distinct appearance. c) Road 1: thin section of a gravel mud couplet capped by lime finishing coat (with arrow). Note the upper sharp contact and the lower wavy and irregular contact implying in situ application. Sample MT220 (LH I phase 2 – LH IIIA, Trench LM783 just west of Building D).

open spaces were always littered with trash (large animal bones, shells, broken pottery, building debris). These changes in the settlement must reflect the rise of a stronger central authority that was concerned with cleanliness, and since they coincide with the building of elite centers and graves with elite features, it is logical to assume that this strong authority was exercised by a rising political elite. With respect to the changes within the houses, the observed change from “tell” to “flat settlement” behavior may reflect a more controlled and systematic building behavior related to the rise of elite centers rather than the organic growth of village occupation. In other cultural periods and geographic regions the reason for adopting the development of tells or flat settlements may be different. However, the core of any explanation may be sought in the maintenance practices and their regulations. The different perception of construction and maintenance of floors is part of the social practice of a society that can reflect differences in household activities and use of space. Therefore these changes have a social significance and are imposed by cultural rules and codes of behavior, which may or may not involve centralized regulating authorities.

The new flooring practices have been observed at various locations in Prepalatial elite complexes H, D, and F as well as in very partially excavated fragmentary buildings north of Building D (sample MT103; Table 1). They continued in areas rebuilt in the Palatial period as well as in built and rebuilt structures of the Postpalatial Bronze Age, and persisted in the simpler structures of the Early Iron Age, both in possible leader's dwellings (Buildings A and E) and in more humble structures (Building J: sample MT86). Thus, even though the new flooring practices appear at first to be related to the rise of Mitrou's Prepalatial elite, once introduced they were adopted also outside the elite centers and persisted even after the demise of Mycenaean palatial society. They continued even when Mitrou reverted to a rural settlement in the final Bronze Age and Early Iron Age, and outside areas again were littered with trash, as they were in the Early and Middle Bronze Age.

6. Conclusions

The micromorphological study of Bronze Age settlement strata at Mitrou has shown that sediments in densely inhabited sites, being predominately anthropogenic, can reflect cultural behaviors that in turn can contribute to the understanding of cultural phases. Therefore, we believe that understanding the way sediments have been deposited is essential for the archaeological interpretation of the site and is not merely extraneous information.

From the Early Helladic IIB phase until the early Late Helladic I phase Mitrou has all the characteristics of a typical tell site with thick-layered occupational sequences associated with each building phase. The microstratigraphic analysis of these sediments reveals that they are the result of the continuous, meticulous maintenance of multiple replastered floor sequences and their associated occupational debris. The latter was recycled inside houses and made into constructed surfaces. The rise of a local elite at Mitrou at the beginning of Late Helladic I is clearly reflected in the appearance of new flooring practices. From now on, building phases are associated with thin floor sequences with more standardized construction techniques and the produced debris by day-to-day activities is no more recycled inside houses but carried outside to some unknown location. This radical change is traced to the construction of elite centers and from the Late Helladic I phase onwards, Mitrou appears as a 'flat' settlement, even though the build-up of occupational levels continues. The different perception of construction and maintenance of floors may reflect a more controlled and systematic building behavior as well as changes in

household activities and the use of space, and all this may be related to emergence of a political elite.

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