Evidence for the Use of Baskets, Mats, and Painted Plaster from a Double Child Burial

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Introduction

Although often beyond the visual record, covering, wrapping, staining, and containment were fundamental elements of Neolithic funerary practices in the Near East. The widespread practice of wrapping human remains in the Epipalaeolithic and Neolithic of the Levant has recently been reviewed by Boyd (2017). Covers can act as means for materialising social identities and are attributed to transformative, performative, protective, organisational, and metaphorical capacities (Cooper *et al.* 2019). Evaluating the complexity of these covers allows us to assess the care, effort, and time needed for covering the corpse/ bones, and may help to understand the relation between living and dead.

Despite the perishable nature of organic materials, plasters and impressions can open a window to the "missing majority" (Hurcombe 2014) of prehistoric material culture, and provide a glimpse into covering and wrapping practices beyond exceptionally well-preserved burials. The importance of plaster in prehistoric burials is evidenced not only by the famous plastered skulls (for further references, see Haddow this volume) but also by various skeletons and objects completely covered with plaster (*e.g.,* Özkaya and Coşkun 2011).

The recovery of hundreds of tiny red plaster fragments from the double child Burial CG5 at Ba`ja raised several questions, concerning the materials themselves, in terms of functional aspects, and also the possible evidence of details of burial practices unknown until now.

Material and Methods

The material examined in this study originates from Burial CG5, Loc. CR6:23a/ b and comprises an extensive set of sediment samples (F.no. 117024) collected from two areas of the burial that exhibited concentrations of tiny, red stained plaster-like fragments: a) from the skull and chest area of Individual I (Loc. CR6:23a) and b) from a round-shaped hollow (*c.* 10cm in diameter) north of the skull (Loc. CR6:30, including perhaps some dislocated samples which originally belonged to the lime plaster Loc. CR6:21.1, see Fig. 1). During the fieldwork, impressions of presumably organic materials were observed on most of these fragments, and a total of 28 samples were taken for further analyses (F.nos. 117024.1-117024.28).

Bulk samples of the loosely packed sediment were sieved using a 0.5mm sieve to separate as many plaster particles as possible. More than 150 red stained fragments maximum 1cm in size were sorted from the sediment samples using stereo microscopy (*Zeiss Stemi 508*) and 3D digital microscopy (*Keyence VHX 5000*). Prior to further instrumental analyses, technological and micro-stratigraphic features of both the plaster and associated impressions were visually examined. In this way, a first grouping of four different types of plasters was set, and sub-samples from each type were selected for further analyses.

To determine their mineralogical and elemental compositions (*i.e.*, matrices and specific fillers), a series of micro-analyses was carried out. Non-prepared samples were directly analysed by Fourier transform infrared (FT-IR) spectroscopy with diamond cell preparation (*PerkinElmer, Frontier/ Spotlight* 400). Polished cross-sections were produced and analysed by using light and fluorescence microscopy (*Olympus AX70*, halogen and UV-light/ excitation filter 330-385nm, elimination filter 420nm), along with scanning electron microscopy coupled with energy dispersive

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X-ray spectroscopy (SEM/ EDS, *SEM Philips XL40/ EDS Bruker AXS X-Flash Detector 5010*).

Moreover, to trace any direct links between the plaster fragments and the buried children, the skeletal remains of both individuals were visually examined for any staining or adherences using a standard stereomicroscope (*Zeiss*). Significant features were recorded by means of macro photography (*Sony α 7R II; Sony 90 mm 1:2.8 Makro G OSS FE*).

Three plaster samples, two from the collective Burial CG11 and one with possible impressions from a domestic context (F.nos. 117009, 117016, 117021) have so far not been examined in detail and, therefore, are not included in the current study. They contain only a few up to 1cm-size plaster fragments, with close similarities to a lime plaster which was part of the studied bulk sample set (see below, results for lime plaster Type 1).

Results

The studied material revealed four different types of red painted plaster, whereby two types contain clay as the main mineral, and two types are based on calcite. In contrast to more or less random or accidental staining, we explicitly use the words painted (with pigments)/ dyed (with dyestuffs)/ or treated, in order to make clear that the application of the colour was a deliberate act.

Most of the fragments belong to the clay plasters, and only these two types are associated with impressions of basketry (Fig. 1). The two calcite-based plasters are represented by only a few isolated fragments. For all samples, the red paint is based on red ochre mixed with calcite, and had formed lighter hues of red, in some cases towards a pink tone. Further details of the different plaster types are discussed below.

Clay Plaster Type 1

Fragments of this type are composed of a very compact, two-layered red paint on a clay base (Fig. 2, Table 1). Their spatial distribution in the burial was concentrated within a round-shaped hollow north of the skull of Individual I (Fig. 1, Loc. CR6:30). Photos taken during the excavation show that plaster fragments orientated with the red paint on top were quite widely scattered, whereas other fragments with the clay side on top obviously remained in their original position in the burial, and formed a semicircle of a minimum of 8cm in diameter

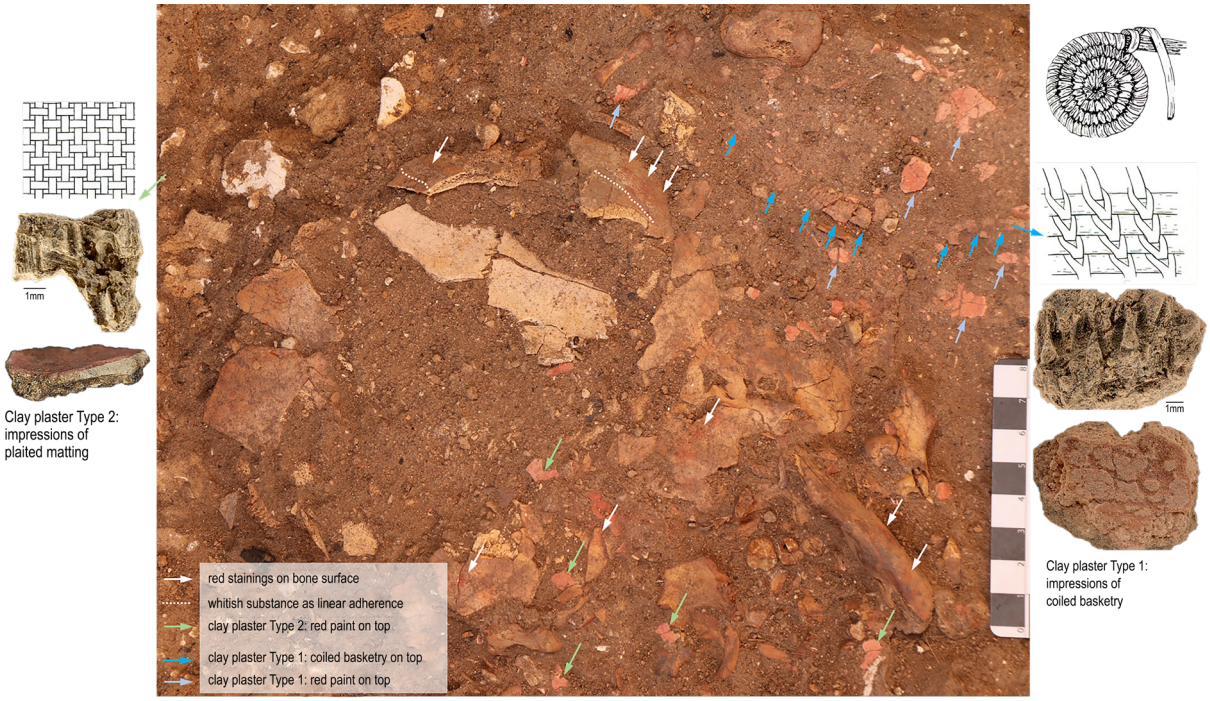

Fig. 1 Burial CG5, Loc. CR6:23a/ b with Individuals I-II. Position of clay plaster fragments *in situ* with associated impressions of basketry and matting. (Photos: M. Benz, N. Reifarth, drawings: L. Froitzheim, N. Reifarth)

(Fig. 1, white dotted line). Impressions of basketry on the fragments' clay surface indicate a small coiled basket in this area.

Both the red paint and the clay plaster show a significantly high content of protein together with calcium phosphate, which could originate from degradation products of body tissue, or maybe – in the case of the red paint – from adding blood as a binder (Table 1, Fig. 3).

Impressions of Coiled Basketry

Most of the fragments exhibit rows of very fine V-shaped impressions on the clay surface, which most probably belonged to a coiled basket (Fig. 4). This technique (Type 1a) can be used to create a wide scale of baskets with different properties and shapes, ranging from large and rigid storage vessels to very flexible, fine plaited, and even watertight containers. A bundle of (often grass) material is coiled from the centre to the rim and fastened with a wrapping strand, *i.e.*, the winder, which stitches each coil to the previous row.

The V-shaped negative pattern on the plaster fragments from Burial CG5 originates from the winder, which was slightly split in the upper half through stitching. The width of the winder is remarkably fine and less than 1mm. The coiled bundle is not visible on the impressions, but its width can be inferred from the size of the winder's rows as approximately 2.5-3mm. According to the position of the plaster fragments *in situ* (Fig. 1) the basket had a minimum size of about 10cm in base diameter, though it could have been bigger (see discussion below). No conclusions can be drawn about the original height of the basket.

Impressions of Tabby Pattern

Some plaster fragments of similar structure and composition show impressions of a second

Fig. 2 Plaster fragment Type 1, Burial CG5: *A* top view of painted side, *B* profile with three layers, *C* polished cross-section in polarised and UV light. (Photos: N. Reifarth, U. Drewello)

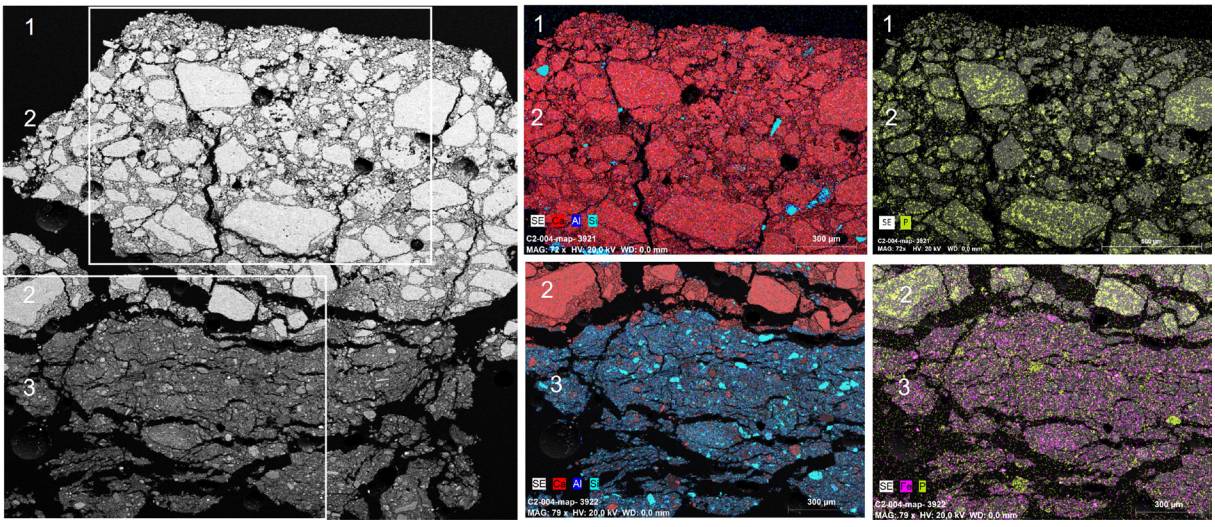

Fig. 3 Scanning electron microscopy (SEM) image of clay plaster fragment Type 1, Burial CG5. SEM/ EDS elemental mapping of: calcium (Ca), aluminium (Al), silicon (Si) (middle), iron (Fe) and phosphate (P) (right). (Photos: U. Drewello, M. Pristl, Centre for Heritage Conservation Studies and Technologies [KDWT])

Table 1 Structure and composition of painted clay plaster Type 1, Burial CG5, Loc. CR6:30. (Analyses: U. and R. Drewello)

Micro-Stratigraphy (layer thickness)	**Features: Clay Plaster Type 1 (description top-down)**
1 – Red pigment layer (0.03-0.1mm)	Thin red painting, lime-based with natural red ochre pigment: - red, fine-grained matrix with embedded micro-particles (≤10µm) - main components: calcite, apatite, red ochre (iron aluminosilicate) - exceptionally high content of proteins together with other organic residues (possible sources: degradation of body tissue or blood as a binder?) - distinction to Layer 2 only by different grain sizes
2 – Light red sandy layer (≤1.4mm)	Thick light red layer, lime-based with natural ochre pigment, together with remains of body tissue (bone): - embedded particles (≤60mm) of calcite and apatite, UV active - main components: calcite, apatite, red ochre (iron aluminosilicate) - secondary components: sand particles, protein, and organic residues
3 – Brown clayey layer (>1.50mm)	Clay mixed with particles of calcium phosphate (probably degradation products of the body)

plaiting technique (Type 1b). It is a simple tabby pattern made by fine, regular plant strips of approximately 1.2-1.5mm in width (Fig. 5). They constitute either an additional plaited object in the burial (*e.g.*, a mat) or they were part of the coiled basket. It is not possible to reconstruct the exact position of these fragments within the round-shaped area north of Individual I (Fig. 1). However, considering the same material composition of paint and clay, it is most likely that they did belong to the basket, and maybe constitute its centre part or an ornamental pattern. Coiled basketry can be made with a separate "starting system", *e.g.*, by a small plaited centre (Wendrich 1991: 123-126, Pl. 19, 1999: 304-306, Fig. 15.9f, Pl. 4-5). Also, decorative elements, such as additionally incorporated strips running parallel to the

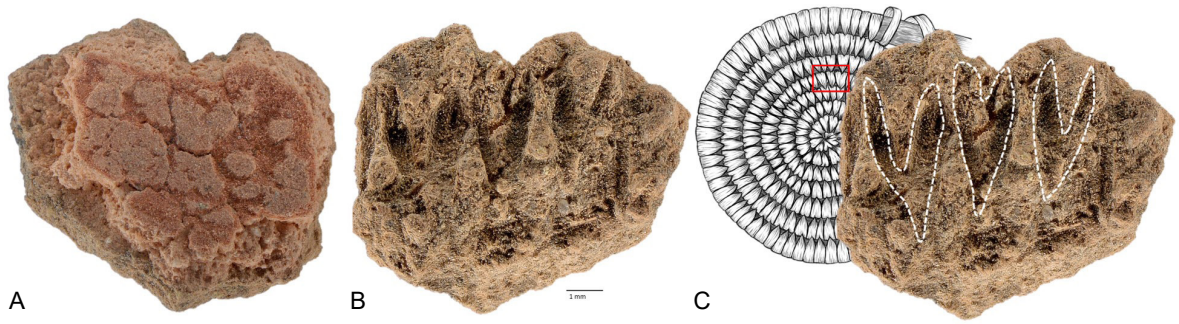

Fig. 4 Clay plaster fragment Type 1a, Burial CG5: *A* painted side, *B* facing side with plant impressions, *C* identification of coiled basketry. (Photos/ drawing: N. Reifarth, L. Froitzheim)

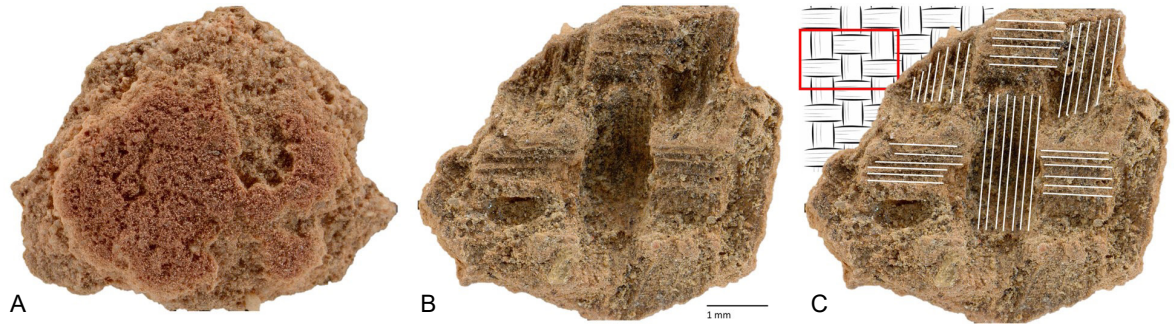

Fig. 5 Clay plaster fragment Type 1b, Burial CG5: *A* painted side, *B* facing side with plant impressions, *C* identification of tabby pattern. (Photos/ drawing: N. Reifarth, L. Froitzheim)

Table 2 Structure and composition of painted clay plaster Type 2, Burial CG5, Loc. CR6:23a/ b. (Analyses: U. and R. Drewello)

Micro-Stratigraphy (layer thickness)	**Features: Clay Plaster Type 2 (description top-down)**
1 – Light red layer (*c.* 0.1mm)	Lime-based red painting with natural red ochre pigment: - microparticles (≤50µm) embedded in a red matrix - main components: red ochre (iron aluminosilicate) mixed with calcite and siliceous aggregates (quartz, feldspar, iron titanate) - application of red paint in *secco* technique
2 – Light brown layer (≤1mm)	Homogeneous, silty calcite-clay layer: - light brown layer composed of chalk (calcite) and clay soil - isolated particles of yellow-brown soil components and calcium phosphate - only minor amounts of organic components - fibre inclusions probably belong to the matting of the subsequent layer (see Layer 3)
3 – Dark brown material	Remains of highly degraded plant fibres together with loamy components

Fig. 6 Clay plaster fragment Type 2, Burial CG5: *A* top view of painted side, *B* profile with three layers, *C* polished cross-section in UV and polarised light. (Photos: N. Reifarth, U. Drewello)

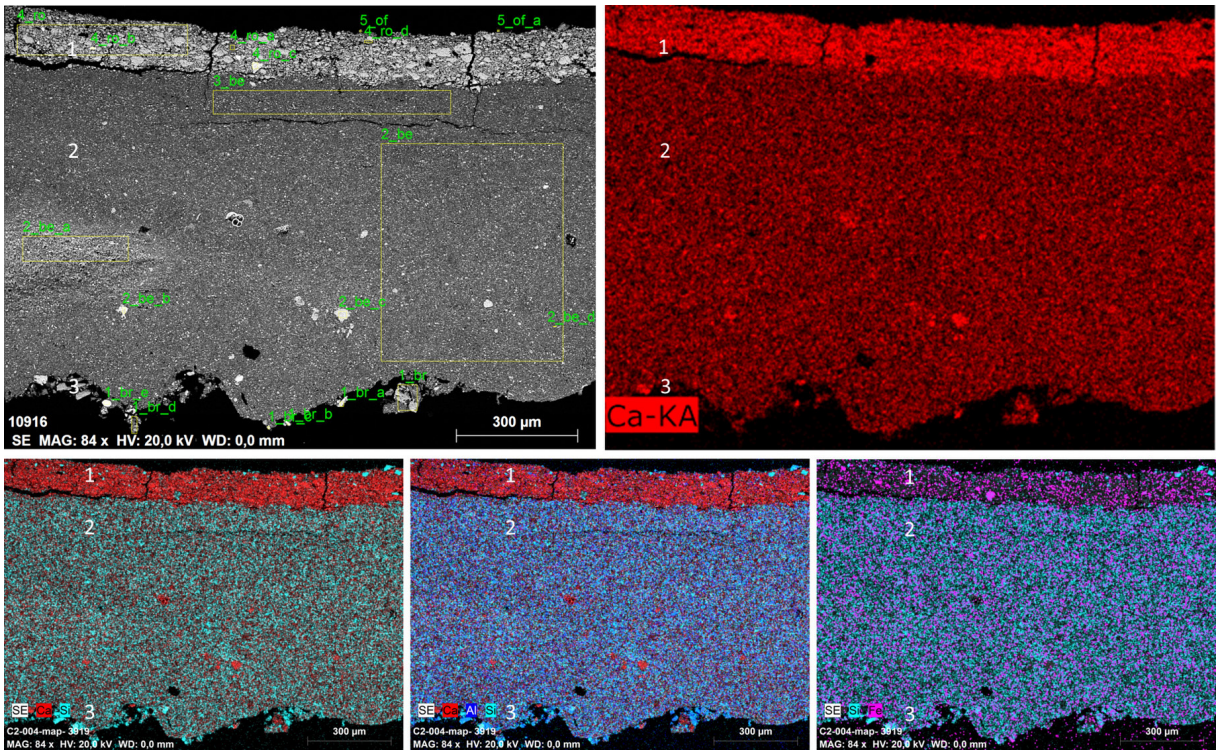

Fig. 7 SEM image of clay plaster fragment Type 2, Burial CG5. SEM/ EDS elemental mapping of calcium (red), aluminium (blue), silicon (light blue), and iron (purple). (Photos: U. Drewello, M. Pristl, KDWT)

coiled bundle and fastened with the winder, can produce a tabby pattern (Wendrich 1999: 245, Figs. 11-30).

Clay Plaster Type 2

The second type of red painted clay plaster fragments was mainly concentrated in the skull and chest area of Individual I (Fig. 1). According to photos taken during the excavation, most of these fragments were orientated with the red paint on top. In contrast to the clay plaster Type 1, both the lime-based red painting and the silty calcite-clay show a remarkably homogeneous composition, with only a few fine-grained fillers (Figs. 6-7, Table 2).

The clay side of these fragments exhibits very detailed impressions of plant material, sometimes together with remains of a highly degraded, dark brown material (see Layer 3 in Fig. 6 and Table 2). Most of these impressions show fine, 1-1.2mm wide plant strips in parallel alignment. Due to the small fragment size, it was just a matter of luck to find at least two fragments (out of more than 50) which exhibited crossing points of two systems, most likely from a twill plaiting and which could originate from a very filigree mat (Figs. 1, 8).

Lime Plaster Type 1

The sample material contained only a few isolated fragments of red painted lime plaster. The first type is a compact lime mortar mixed with loamy silica sands and components of unslaked lime (Figs. 9-10, Table 3). The lime-based red ochre paint was applied in two stages: a first paint in *fresco* technique, whereby pigments, suspended in water, are painted onto a damp lime plaster surface. Then, a second layer was applied onto the dry first paint in the *secco* technique. This plaster either belongs to the final sealing of the burial or to a former red-painted plaster floor. Remains of red-painted plaster have been observed at the edges of the burial pit (for the analyses of plaster in domestic contexts see al Sababha Vol. I).

Lime Plaster Type 2

The second lime plaster has a very homogeneous matrix without any fillers (Figs. 11-12, Table 4). The topmost light red sandy paint is very similar to the red paint (Layer 2) of the clay plaster Type 1 (Figs. 2-3) with a *fresco-secco* bonding to the calcite layer. Considering the micro-stratigraphy of these fragments, the calcite layer (Layer 3, Table 4) possibly constitutes a subsequent layer on top of the red paint from clay plaster Type 1.

The Skeletal Material: Red Pigmentation and Other Features

The skeletal remains of both subadults from Burial CG5 were examined to find further hints that their bodies were prepared post-mortem, associated with the different plasters and basketry. However the preserved features on the bone surfaces do not reveal any direct connection between the bodies and the plasters.

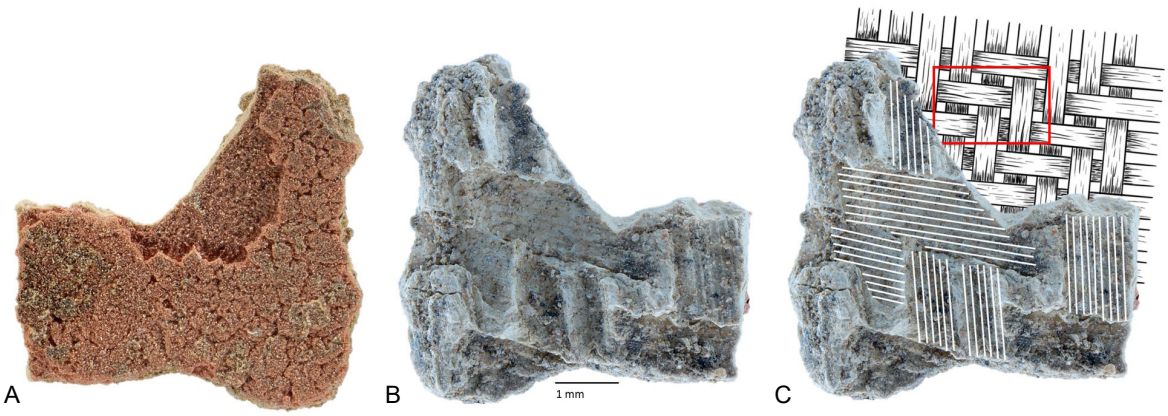

Fig. 8 Clay plaster fragment Type 2, Burial CG5: *A* painted side, *B* facing side with plant impressions, *C* identification of twill plaiting. (Photos, drawing: N. Reifarth, L. Froitzheim)

Table 3 Structure and composition of painted lime plaster Type 1, Burial CG5, Loc. CR6:23a/ b. (Analyses: U. and R. Drewello)

Micro-Stratigraphy (layer thickness)	**Features: Lime Plaster Type 1 (description top-down)**
1 – Red pigment layer (0.03-0.1mm)	Lime-based red painting with natural red ochre pigment: - microparticles (≤50µm) embedded in a red matrix - main components: red ochre (iron aluminosilicate) mixed with calcite and siliceous aggregates (quartz, feldspar, iron titanate) - application of red paint in two stages: the first paint in fresco technique, a second in secco technique
2a – Light brown layer (≤0.6mm)	Lime mortar mixed with loamy silica sands: - main components: yellowish-brown potassium-based iron aluminosilicate, dolomite, calcium inclusions, clay particles and silica sand (quartz, iron titanate, zirconate, phosphate) - particle size: 10-80µm, coarser fractions with particles up to 400µm - binder: calcite with remains of Mg-Si-CaO-phases
Fibre inclusions	Embedded plant fibres between Layers 2a and 2b
2b – Light brown layer (>1.5mm)	Lime mortar mixed with loamy silica sands; composition similar to Layer 2a, but more coarse-grained inclusions

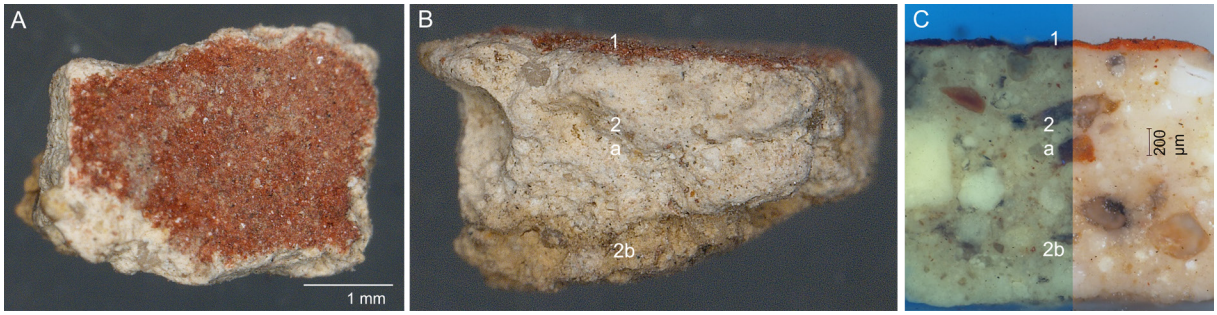

Fig. 9 Lime plaster fragment Type 1, Burial CG5: *A* top view of the painted side, *B* profile with three layers, *C* polished cross-section in UV and polarised light. (Photos: N. Reifarth, U. Drewello)

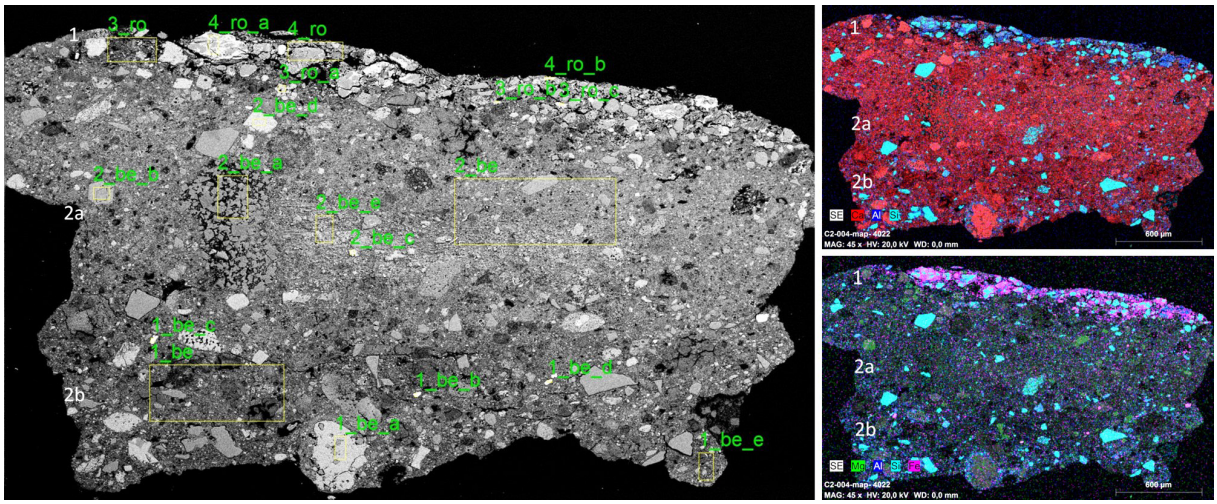

Fig. 10 SEM image of lime plaster fragment Type 1, Burial CG5. SEM/ EDS elemental mapping of calcium (red), aluminium (blue), silicon (light blue), and iron (purple). (Photos: U. Drewello, M. Pristl, KDWT)

Table 4 Structure and composition of painted lime plaster Type 2, Burial CG5, Loc. CR6:23a/ b. (Analyses: U. and R. Drewello)

Micro-Stratigraphy (layer thickness)	**Features: Lime Plaster Type 2 (description top-down)**
1 – Light red sandy layer (0.05-0.1mm)	Light red sandy layer with close similarities to Layer 2 of clay plaster Type 1
2 – Red layer (≤0.2mm)	Lime-based red painting with natural red ochre pigment: - red layer with embedded calcite microparticles (10-40µm) - main components: red ochre (iron aluminosilicate) mixed with calcite and siliceous aggregates (quartz, feldspar, iron titanate) - application in *fresco-secco* technique
3 – White layer (≤0.90mm))	Homogeneous lime-based material with calcite particles and residues of proteins applied in two layers.

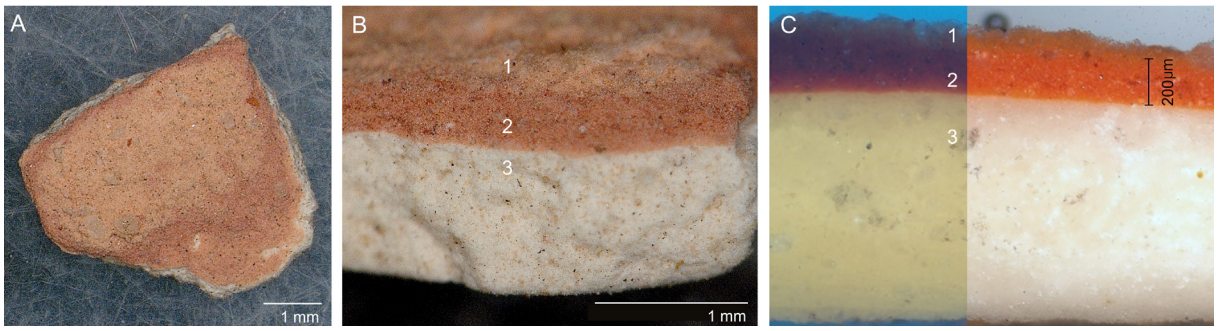

Fig. 11 Lime plaster fragment Type 2, Burial CG5: *A* top view of the painted side, *B* profile with three layers, *C* polished cross-section in UV and polarised light. (Photos: N. Reifarth, U. Drewello)

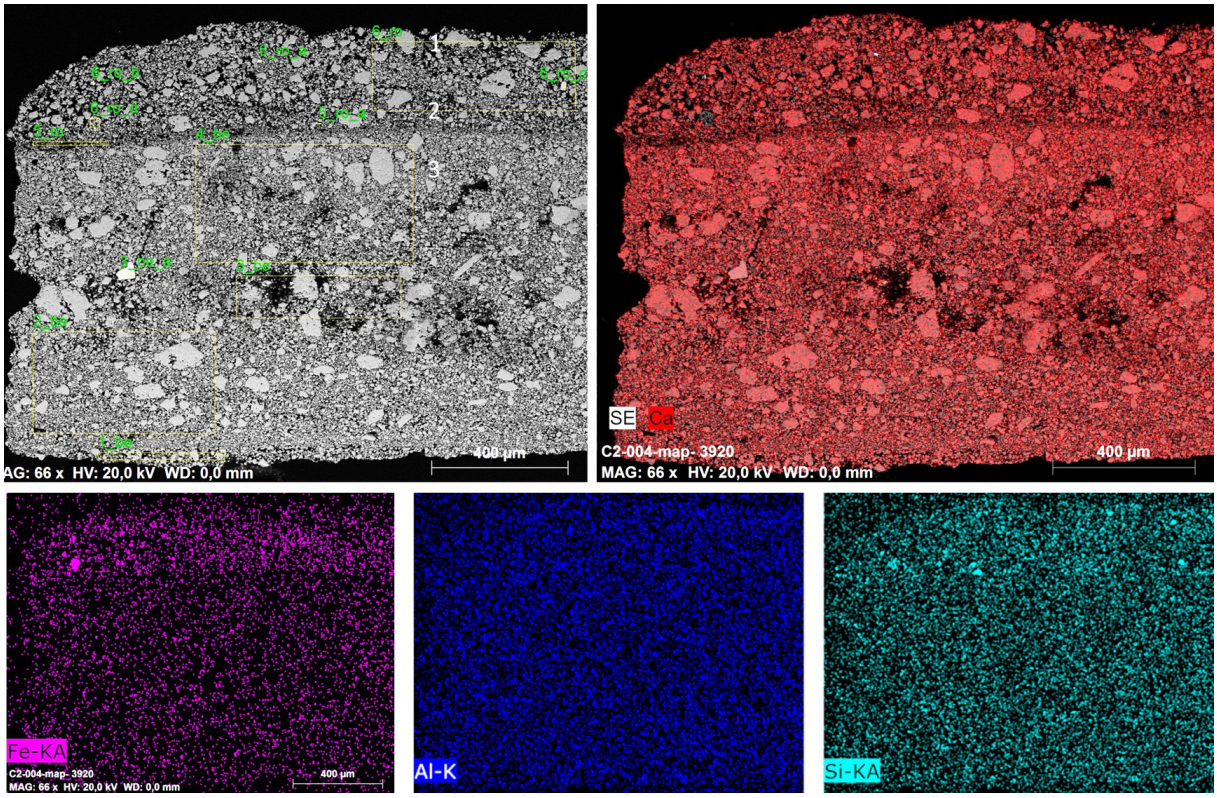

Fig. 12 SEM image of lime plaster fragment Type 2, Burial CG5. SEM/ EDS elemental mapping of calcium (red), iron (purple), aluminium (blue), and silicon (light blue). (Photos: U. Drewello, M. Pristl, KDWT)

Traces of Red Pigments

In particular, the bone fragments (from the skull and thorax of Individual I, see Gresky this volume) exhibit bright and vivid red stains. The chemical composition of the colourant is still to be determined. However most likely, it constitutes a very pure ochre pigment without any additives of calcite or quartz, as in the case of the analysed plaster paints. Tiny pigment particles of the same red hue were found among the sediment samples (F.no. 117024) collected from this area (Fig. 13). The small red stains on the bones together with the pigment particles in the sediment suggest a sprinkling of dry pigment over the body. However, the residues are too limited to provide any clear indication of the application technique (see discussion below). Very thin residues of hematite (invisible to the naked eye) on the sand in Burial CG6, which is immediately below CG5, confirm the use of red pigments in these burial contexts (written com. M. Gerlitzki; see also Scott this volume: Table 1).

Mineral Adherences

Some bone fragments are partly covered by remains of a whitish, probably calcareous substance that overlaps the red pigment stains. It probably represents a later stage of body preparation (Fig. 14). Interestingly, even fractured bone surfaces are sometimes covered by this substance (Fig. 15) and moreover, bone cavities are often filled with conglomerates of sediment and tiny particles of the red painted clay plaster Type 2 (Fig. 15). This might suggest a multi-staged treatment of the body prior to its final burial in the pit, corroborating observations made by histotaphonomic studies (see Haddow this volume and discussion below). However, it cannot be excluded that these mineral adherences were secondary depositions due to taphonomic processes.

Traces of Plant Material

So far no remains of plant material (with significant structures for their identification) have been found in the impressions of basketry and matting in the clay plaster fragments, and the organic material appears to have been completely perished. However, at least one of the bone fragments from Individual I exhibits silicified plant remains, which will be analysed by means of non-destructive SEM, but the origin of this adhering plant material is hard to determine, due to the complex taphonomic situation of the burial (see discussion below, Fig. 16).

Discussion

Technology of Basketry and Matting

The evidence from Ba`ja for finely made basketry from Burial CG5 indicates remarkably high-quality workmanship, inferring a special significance to these objects in the context of

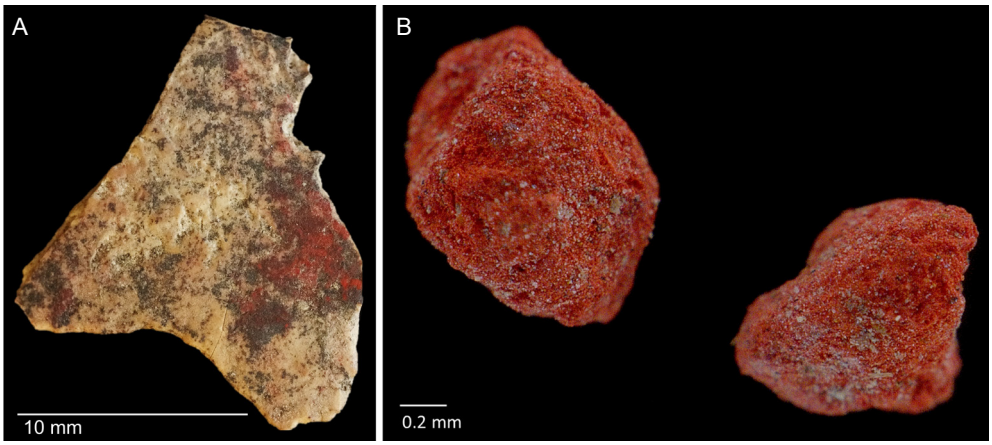

Fig. 13 *A* Red ochre on cranial vault fragment, Burial CG5, Loc. CR6:23a, Individual I, *B* particles of red ochre selected from the same location. (Photos: N. Reifarth)

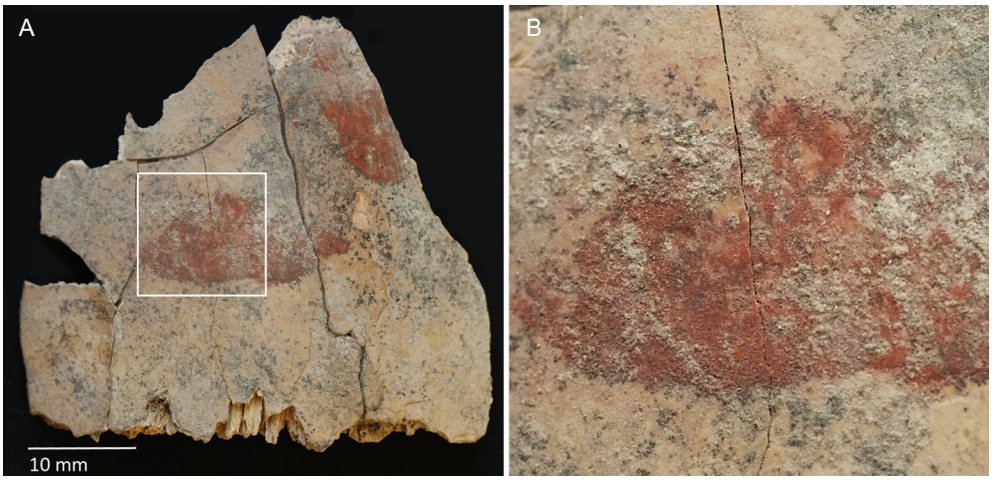

Fig. 14 *A* Red ochre and whitish calcareous substance adhering on a skull fragment, Burial CG5, Loc. CR6:23a, Individual I, *B* detail of red paint overlapped by a calcareous substance. (Photos: N. Reifarth)

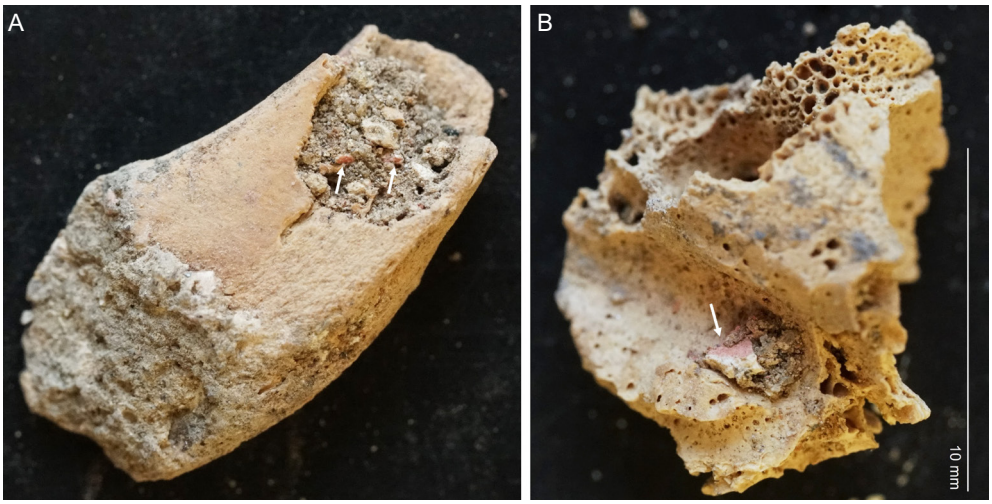

Fig. 15 Two bone fragments (*A* rib fragment, *B* left maxilla), Burial CG5, Loc. CR6:23a, Individual I. Micro-fragments of painted plaster (white arrows) and calcareous layers still adhering to fractured bone surfaces and cavities. (Photos: N. Reifarth)

Fig. 16 Silicified plant remains (arrows) on a bone fragment, Burial CG5, Loc. CR6:23a, Individual I. (Photo: N. Reifarth)

this burial. Only a few examples of such fine work are known from this period. At Ba`ja it constitutes only the second evidence of basketry at all. During the excavation in 2003 a fragment of brownish mortar with impressions of most probably coiled basketry was recovered in Area C on a plastered floor and has been interpreted as part of a ceiling construction (Gebel and Hermansen 2004: 17, Fig. 6). Even this coiling is rather fine, with a bundle diameter of about 8mm, whereas the bundles of the basket in Burial CG5 do not exceed 3mm in diameter.

Evidence from Other Sites

Exceptionally well-preserved finds of coiled baskets from middle Holocene Fayum (Egypt) show that the finely made types, with narrow bundles and wrapping strands are often lavishly decorated. Near or inside storage pits, very fine coiled grass baskets with diameters of 10-30cm were found with traces of coloured winders along the rim and triangular decorations from the rim towards the centre (Wendrich and Holdaway 2018).

The Neolithic site of Çatalhöyük provides another unique and rich database for the technology of basketry, matting, and textiles, as well as for their use in funerary contexts, although most of the finds are only preserved as remains of plant silica skeletons and impressions in the soil (Wendrich and Ryan 2012; Bender Jørgensen *et al.* 2021; Rast-Eicher *et al.* 2021). Coiled basketry was made of grass bundles 3-8mm in diameter, with wrapping strands of approximately half the width of the bundle diameter (1.5-4mm). Their shapes were probably round or oval, with base diameters of 20-30cm and rim diameters of up to 30-40cm and up to 30-40cm high. Domestic baskets may have been re-used in burial contexts and contained mainly prenatal or neonate skeletons. In particular, infant burials contained mats in simple tabby patterns and with twill plaiting made of about 5mm wide plant strips, for wrapping and covering the bodies. Phytolith analysis revealed that the coiled basketry was mostly made from wild Panicoid grasses and sedges (Cyperaceae), but were never made from reeds. In contrast, matting was never made from wild grasses but from sedges, and occasionally from common reed (*Phragmites australis*). Landscape reconstruction suggests that many of the plants used for basket and mat making were readily available around the site (Wendrich and Ryan 2012: 60).

The Pre-Pottery Neolithic site of Aşıklı Höyük provides similar results on raw materials used for baskets and matting in burial contexts (Tsartsidou 2018; Tsartsidou *et al.* forthcoming). In this context, the observation of dung as either plaster or part of a covering for the deceased is remarkable (Tsartsidou 2018: 162-163).

Pigments and Plaster Associated with Basketry and Matting in Burial Contexts

Individual I and Clay Plaster Type 2 in Burial CG5

Because of its distribution in the grave, the red painted clay plaster Type 2 most likely belongs to Individual I in Burial CG5 (Fig. 1). However, this plaster and the red staining on the skeletal remains of Individual I clearly represent different elements of a multi-staged, post-mortem treatment of the body. The red pigmentation of the bones cannot be linked with the red pigment layer of the plaster, but constitutes a colourant in its own right of a different composition. Moreover, some of the red stained bones are partly covered by a whitish, probably calcareous crust (Fig. 14), which indicates a secondary handling of Individual I. Most probably the body's pigmentation occurred at an earlier stage, prior to the final interment, *i.e.*, the wrapping or covering of the bones with a finely plaited mat was finally sealed with a homogenous clay and a coat of red paint. In this respect the results of the histotaphonomic analyses for this infant are remarkable. They suggest a post-mortem exposure to the elements, before being interred (Haddow this volume). There is no clear evidence that the skull, or parts of it, were plastered. Remains of painted plaster were not only found on the skull but also on the torso. Moreover to our knowledge, the use of mats in association with plastered skulls has not been observed so far. The position of the plaster fragments in Burial CG5 with the painted side on top, suggests that the mat was between the corpse and the plaster.

Clay Plaster Type 1 in Burial CG5

The clay plaster Type 1 in Burial CG5 differs significantly from the clay plaster associated with Individual I, and constitutes a separate item among the burial deposits, namely a coiled basket (Fig. 1). The remarkably high amount of calcium phosphate and protein identified within the plaster composition (Table 1) could originate from the basket's content (*e.g.*, food or human

remains), or possibly from an organic binder like blood. The remains of the second younger infant were not identified in the field, only after the excavation, during an anthropological examination of the skeletal material (see Gresky this volume). It would be most interesting to find further hints for the precise location of the few bones of Individual II in this burial. Most probably this child was placed close together with the older one, maybe even directly in its lap. The skeletal remains of this young infant did not exhibit red stains or any other adherences.

Lime plaster Type 2 particles seem to resemble the clay plaster Type 1. Therefore it could be possible that both particles belong to the same event, with the calcite layer being either an additional application or a secondary adherence from a much later event – *e.g.*, the sealing of the burial.

Red Pigments in Burials at Ba`ja

Several further burials from Ba`ja contained red stained skeletal remains (Fig. 17; Benz *et al*. this volume, for the use of red pigments see also Gebel b this volume; Hermansen this volume), as well as lumps of red and yellow pigments that had been deposited with the dead (CG1, CG6, CG7, CG9, CG11, CG12[?], DG2). Preliminary XRD-analysis (2018) of tiny pigment balls found in Room DR26.2 of the collective burial DG1 (Gebel *et al*. 2019: 30-31, Fig. 23) and pieces of pigments from Burial CG11 (Loc. CR17:117) show similar compositions – compared to the current results for the red plaster paint in Burial CR5. However a still open question remains concerning the various processing of the pigments and their possible relation to the different items to be painted. The few samples analysed so far reveal that a rather pure ochre pigment was applied to the bones, whereas the plaster was painted with well-prepared mixtures of ochre and different fillers. However the red pigmentation on bones of Burial CG5 exhibit sandy inclusions (Fig. 17). Future research is needed to distinguish taphonomic and intentional processes concerning both the composition and application of the paint.

Taphonomic Aspects of Wrapping, Staining, and Plastering

Neolithic burial contexts indicate a close relationship between human remains, the wrapping or enclosing of bodies, and the application of plasters and colourants. However, usually, only parts of these elements survive the taphonomic processes and alterations. Recovered patterns of red staining and lines on skeletons

Fig. 17 Differently processed red pigment on a fragment of the right zygomatic bone, CR17. (Photo: N. Reifarth)

constantly raise questions about the methods of pigment application to human remains. Was ochre sprinkled directly on the body, or did painted matting or textiles transfer their patterns to the bones due to soil pressure? Or was ochre added afterwards when the body was skeletonised in the context of secondary burial practices? Recent comprehensive analyses of pigments in burial contexts at Çatalhöyük suggest the co-existence of different methods of application (Haddow *et al*. 2021; Schotsmans *et al.* 2021, 2022).

Red pigmentation on skeletal remains from infant burials at the Natufian site of Shubayqa in Jordan, suggest that containers or materials used for wrapping or binding the bodies may have been painted or treated with ochre. As body decomposition occurred, the ochre remained and stained the bones (Richter *et al*. 2019). In a collective Early Natufian grave from Azraq (Jordan) two crania show a remarkable series of treatments that involved several steps, including removal, displacement, application of pigments, re-application of pigments, and re-burial (Bocquentin and Garrard 2016).

Skeletons from the early Holocene site of Körtik Tepe (southeastern Anatolia, second half of the 10th millennium BCE) show a wide range of coloured patterns, and it is argued that at least some of them must have been painted directly on the bone as part of a post-depositional treatment (Erdal 2015). However there is also clear evidence for impressions of painted ropes, matting, and basketry in which the bodies had been wrapped (Reifarth, personal observations). These mattings were not only used for wrapping the deceased but also for grave goods, and they were additionally treated with gypsum (Özkaya and Coşkun 2011; Erdal 2015).

At Abu Hureyra (Syria, Trench B, Phase 8, 7200-7000 BCE) a single skull had been wrapped in a twill plaited mat coated with bitumen before it was deposited (Moore and Molleson 2000: 280, Fig. 10.3-4). In another burial at this site the body of an adolescent had been tightly flexed, then coated in red painted gypsum plaster, and finally wrapped in a mat (Moore and Molleson 2000: 284, Fig. 10.5).

Despite the high abundance of basketry and pigments at Çatalhöyük only a few burials suggest the application of pigments or plaster on plaited containers or wrappings. A burial basket for an infant might have been coloured with cinnabar (Schotsmans *et al.* 2021: 287-288, Burial 17457). Another young adult appeared to have been buried in a plaster-soaked basket or mat (Schotsmans *et al.* 2021: 280-281, Burial B.131). However approximately 67% of the skeletons with direct pigment traces show evidence of funerary containment based on the presence of phytoliths in the form of rope, matting, or basketry (Schotsmans *et al.* 2022).

Several plastered baskets, probably made of rushes (*Juncus* sp.), were part of a complex burial deposit – the so-called "Death Pit" – found at the mid-6th millennium BCE settlement at Domuztepe (Carter *et al*. 2003: 128, Fig. 16; Gearey *et al*. 2011: 476). Thus, there is increasing evidence that plastered baskets and matting were used in burial contexts, and without micromorphological analyses these observations would have been probably missed.

Future Perspectives

Systematic and multi-staged analyses of plasters, pigments, basketry, and other associated materials relating to both household and funeral contexts will likely broaden our current knowledge about complex burial practices and everyday life at the Late PPNB site of Ba`ja. This includes such diverse aspects as the sourcing, availability, processing, meaning, and value of rather inconspicuous raw materials (also in comparison with other Neolithic sites).

For tracing hitherto invisible colourants on various surfaces, like bones, grave goods, plasters, or other construction elements, analyses by means of non-destructive imaging techniques such as multispectral imaging are most promising and can enable the identification and mapping of pigments and dyes at the same time (Dyer and Sotiropoulou 2017). Another promising methodical approach that has not yet been extensively applied in archaeological science is the identification of volatile compounds in graves by two-dimensional gas chromatography (Perrault *et al*. 2016). Compared to other organic residue analyses this method is non-destructive and is characterised by enhanced sensitivity. A pilot study on volatile organic components of anthropogenic deposits from the Royal Tomb of Qatna (Syria, 2nd millennium BCE) provided evidence of indigoid dyestuffs, grass plants, and probably heating procedures – without any alteration of the sample material (Dubois *et al.* forthcoming).

Conclusion

The microanalyses on fragments of painted plaster from Burial CG5 at the Late PPNB site of Ba`ja offer new perspectives on the original treatment of basketry with mineral compounds and on the use of baskets and mats in burial rituals. Four types of plasters were identified which most probably reflect different activities in this burial context. Impressions of finely coiled basketry and matting illuminate hitherto invisible crafts and burial practices at Ba`ja. Both types of basketry were coated with two different fine, red painted clay plasters. The high concentration of calcium phosphates and protein in the coiled basket's plaster attest most probably to processes of the degradation of body tissue, or perhaps to blood as being a binder for the red pigment layer of this object. The admixture of apatite to the plaster of the basket is intriguing and requires further investigation.

Additional analyses of red stains on the skeletal remains revealed that the application of red colour on the plaster differed from the red pigments on the bones, confirming that the corps was treated in various stages (see Haddow this volume: ###). The results of the micromorphological study require a review of former discoveries of "plaster" in burial contexts, and strengthen the idea that wrapping, covering, and containing were significantly more prevalent in prehistoric funerary practices than has previously been recognised.

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