Chapter 16. The colour of things. Pigments and colours in Neolithic Çatalhöyük

Schotsmans, E.M.J.; Gesualdo Busacca, G.; Lucy Bennison-Chapman, L.E.; Lingle, A.M.; Milella, M.; Tibbetts, B.W.; ... ; Hodder, I.

COMMUNITIES AT WORK

THE MAKING OF ÇATALHÖYÜK

Edited by

IAN HODDER & CHRISTINA TSORAKI

BRITISH INSTITUTE AT ANKARA
Monograph 55
Çatalhöyük Research Project Series 15
2021

Team members departing from the site (photograph by Scott D. Haddow).

'Throw some water on that taxi, until we meet again'
Sean Doyle 2020

'Su gibi git, su gibi gel'
Turkish saying

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The Çatalhöyük Research Project team in 2014 (photograph by Jason Quinlan).

The Çatalhöyük Research Project team, 2018 study season in Catania, Sicily (photograph by Jason Quinlan).

16. The colour of things. Pigments and colours in Neolithic Çatalhöyük

Eline M.J. Schotsmans, Gesualdo Busacca, Lucy E. Bennison-Chapman, Ashley M. Lingle, Marco Milella, Belinda W. Tibbetts, Christina Tsoraki, Milena Vasić and Rena Veropoulidou

'Humans and things, humans and humans, things and things' Ian Hodder (2011b)

Introduction

In the past, colours and pigments have been used variably in different social and ritual activities, as well as in the expression of symbolism through material culture. Documented from the Middle Palaeolithic onwards (D'Errico 2008; Brooks et al. 2018), the use of pigments became increasingly common in a range of contexts.

Research on the use of colours and pigments in past cultures has changed throughout time in parallel with important transitions in archaeological theory. During the 1980s, archaeology began to embrace approaches based on a variety of post-structuralist perspectives, not only studying objects but also the systems of knowledge that produced an object (e.g., Hodder 1982). This led to a surging interest in the experiential character of material culture in the 1990s, with an emphasis on the embodiment of past materialities (e.g., Meskell 1996; Gilchrist 2000) and the importance of perception and senses in archaeological research (e.g., Watson, Keating 1999; Houston, Taube 2000; Jones 2001). In the study of pigments, these changing approaches led to an increased focus on the functional uses of pigments through systematic microscopic analysis and experimental studies. As such, the dichotomy between functional or symbolic interpretations was broken, and researchers started to integrate both in their studies (D'Errico 2008). This approach was further supported by ethnographic data demonstrating the absence of a distinction between symbolic and utilitarian functions of pigments (Lydall 1978; Rosso 2017).

The terms 'pigments' and 'colours' cannot be used as synonyms. Pigments are the *material* colour or the actual colourant substance, while 'colour' is a broader concept referring to chromatic properties that are inherent to a certain material and the way light is absorbed or reflected. Colour refers to the spectral composition of visible light and the way it is processed in our brain. In this sense, it is important to remark that colour is not only about hue, but encompasses other properties such as brightness, lustre, transparency, contrast and more. While pigments and colours are inextricably linked to each other and both central to the aesthetic appreciation of things, their investigation from an archaeological perspective is necessarily different. Pigments are easier to single out and analyse archaeologically. In contrast, the appreciation and use of the chromatic properties inherent to materials is more difficult to assess archaeologically, leading to more discursive hypotheses on issues such as value and aesthetics within past societies.

The Neolithic settlement of Çatalhöyük offers an exceptional dataset for studying pigments and colour usage over 1,000 years of the existence of the settlement. Scholars from different disciplines have studied pigments, paintings and art at Çatalhöyük (e.g., Matthews 2005a; Matthews et al. 2013; Anderson et al. 2014b; Çamurcuoğlu 2015), but linking this research together in a broader and systematic way has not been attempted before. The aim of this chapter, therefore, is to analyse evidence of pigments and colours from Neolithic Çatalhöyük based on data collected during the 25 years of research under the directorship of Ian Hodder (1993–2017) (Çatalhöyük Research Project). More specifically, in order to discuss the possible social relevance of colour within the society of Neolithic Çatalhöyük, this chapter looks into possible associations between pigments and colours, and their links with different tools, production techniques, artefacts and human remains. Pigments encountered during the Mellaart excavations (1961–1965) are excluded from this text.

Characterisation of pigments at Çatalhöyük

The Çatalhöyük society produced one of the richest colour palettes currently known in the Neolithic. Colours and shades of white, red, pink, yellow, orange, blue, green, brown and black have been identified at the site, with pigments including ochres, cinnabar, copper colourants, carbon black and calcium carbonate.*

* For colour versions of all figures in this chapter, please visit https://doi.org/10.18866/BIAA/e-15.

The most common pigments on site are ochres: stable metal oxides which are non-fugitive and inert. Their shades include red, orange, brown and yellow. Ochres are derived from variably coloured rocks and soils primarily composed of oxides and hydroxides of iron. They are mainly secondary deposits, occurring as soils from weathered, highly oxidised surface outcrops of ore deposits enriched in the colour-bearing constituent, usually iron oxides or iron hydroxides (Eastaugh et al. 2008; Triat 2010). Red ochres contain hematite, iron (III) oxide (Fe_2O_3) and typically other minerals such as quartz, clays, gypsum, micas or feldspars (Eastaugh et al. 2008; Triat 2010). Ochre used at Çatalhöyük may have been collected from a variety of sources, including the limestone hills forming the northern boundary of the Konya Plain and the Erenler-Alacadağ volcanic outcrops located ca 60 to 70km to the southwest of the site (Erdoğu, Ulubey 2011; Doherty 2017). The orange and brown variations of ochre at the site are due to inclusions of either goethite (FeO(OH)) or lepidocrocite (hydrohematite (γ-FeO(OH)), which were likely linked to different sources in the landscape or could have been achieved by different preparation processes such as deliberate mixing (Çamurcuoğlu 2015). Red ochre was found in different forms: as nodules (fig. 16.1a), as loose powder or on the surface of objects. It was particularly common on wall paintings and in burials (see below) and was encountered in different depositional contexts across the site, including middens, room fills, floor deposits and construction/make-up layers.

Yellow ochre from Çatalhöyük is primarily composed of goethite (FeO(OH)) and mainly used on wall paintings during the earlier occupation levels (Çamurcuoğlu 2015). While yellow ochre is occasionally mentioned in the database in association with burials, microscopic analysis has shown that several instances of recorded yellow residues in burials are in fact botanical remains (Shillito et al. 2013b).

Another tint of red at Çatalhöyük is encountered in the form of cinnabar (HgS). Cinnabar is a scarlet to brick-red form of mercury(II) sulphide, also known as vermilion. Cinnabar commonly forms in veins and small impregnations associated with volcanic activity and hot spring action, often replacing quartz and other sulphide minerals, and is often found in association with stibnite, pyrite, marcasite, gypsum, quartz and calcite (Eastaugh et al. 2008). Research conducted in and around Konya, the closest modern city to Çatalhöyük, showed that the region is rich in lead, iron, copper and mercury oxide sources (Bahar 2018). The mercury mines around Konya became well known in the Roman period (Bahar 2018). While there are a few instances of cinnabar and red ochre mixed together on wall paintings from Neolithic Çatalhöyük (Çamurcuoğlu 2015; Doherty 2017) and on objects such as shells, their presence at the site seems to be mainly concentrated on human crania from a small number of burials (see below).

At Çatalhöyük copper carbonate and copper(II) minerals occur as both green and blue pigments. Green occurs as malachite $Cu_2CO_3(OH)_2$, which forms as a secondary mineral in the upper oxidised zones of copper ore deposits (Eastaugh et al. 2008). Blue pigment consists of azurite $Cu_3(CO_3)_2(OH)_2$, which is deep blue in colour and is always found with malachite in nature (Eastaugh et al. 2008) (fig. 16.1b). Both pigments are quite stable when reacting with light and normal atmosphere, but they darken when exposed to sulphuric fumes and binding agents (Çamurcuoğlu 2015). Azurite encountered at Çatalhöyük was collected from at least

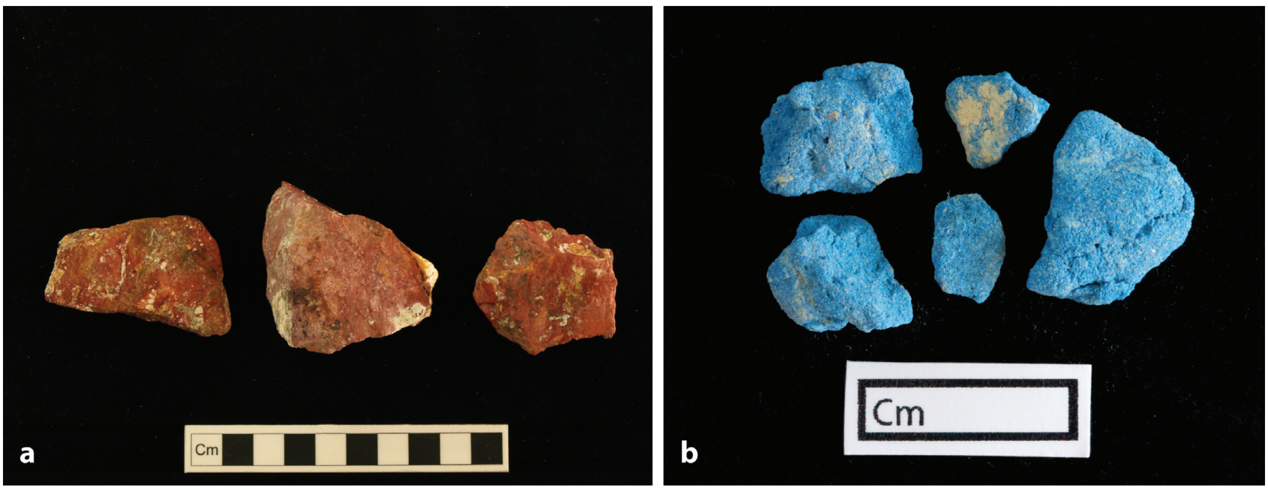

Figure 16.1. (a) Red ochre nodules (Fe_2O_3) from Çatalhöyük (photograph by Christina Tsoraki); (b) blue azurite $Cu_3(CO_3)_2(OH)_2$ from Çatalhöyük (photograph by Jason Quinlan).

two different sources. For example, dark blue azurite (30039.s9) associated with the burial of an adolescent (23126) in B.131 contained arsenic, antimony, lead and zinc, attributed to the Middle period (6700–6500 cal BC) (Level North G). These elements were not present in light blue azurite found in B.150 (31888.s8) from the Late period (6500–6300 cal BC) (for details about the elemental analyses of both blue pigments see Haddow et al. 2017: 107–08, 133–34). Additional analysis with powder X-ray diffraction (PXRD) indicated that both samples consisted of azurite, but (30039.s9) contained different minerals derived from an arsenic-rich geology such as the area around Niğde, close to the Black Sea or in the Kutahya region of western Anatolia (e.g., Doğan, Doğan 2007). At Çatalhöyük, blue or green pigments were mostly identified in burial contexts. However, possible malachite was found in association with figurine (32806.x2) and was also observed on a clay stamp (23993.D1), both found in infill layers of B.150 from the Late period (Meskell, Nakamura 2017). In addition, Mellaart (1967: 132) mentions the occurrence of a single wall painting with blue colour but does not detail where it was. The latter could not be confirmed during the Hodder excavations. A blue-looking wall painting (17645) analysed with portable X-ray fluorescence (PXRF) in 2017 did not contain a copper component and was likely carbon black (Schotsmans, personal observation).

Black pigments at the site derive from carbon black, representing shades from black to blue and brown in colour. This pigment was obtained by burning animal bones, fat and woody plant material (Çamurcuoğlu 2015). Black was intentionally used on the wall paintings at Çatalhöyük. Charred inclusions were also commonly found in the burial fills, but the pigment's intentional inclusion in these deposits is debateable.

Finally, white pigments derive from calcium carbonate in various forms. The most common natural form of calcium carbonate is calcite. It is ubiquitous in the mineral, animal and vegetable kingdoms and occurs mainly in sedimentary rocks like chalk and limestone, in metamorphic rocks like marble and occasionally in igneous rocks (Gettens et al. 1974). The white plasters of Çatalhöyük are a significant aspect of the colour palette of the site (see below). Microchemical analyses of ochre from Çatalhöyük showed that hematite was found to be mixed with low concentrations of clay and calcite, suggesting that the iron oxide might have been deliberately diluted (Mortimore et al. 2004; Anderson et al. 2014b). In any case, if a calcium carbonate-based white pigment had been used at Çatalhöyük, it would have been difficult to detect because of the overall presence of white plasters.

Pigment processing, containers and applicators

At Çatalhöyük evidence for pigment processing, pigment containers and application tools was found in the form of schist palettes, shell containers, a wooden bowl and animal bone pigment applicators.

Schist palettes were used extensively for pigment processing activities throughout the occupation sequence at Çatalhöyük (fig. 16.2). This is confirmed by microwear analysis that showed wear traces consistent with mineral contact material and the frequent presence of light red-coloured ochre on the use-faces of these tools. Their morphometric characteristics, raw material choice and wear patterns strongly indicate that palettes were employed for small-scale processing of pigments that had already been reduced to small particles, producing a fine-grained powder as the final product (Tsoraki, Volume 14, Chapter 13; forthcoming). This finding is in agreement with Camurcuoglu's suggestion that pigments used for the creation of wall paintings were finely ground, ensuring their smooth application while achieving a brighter colour (Çamurcuoğlu 2013).

The shell assemblage at Neolithic Çatalhöyük includes a very small group of shells with traces of pigments (n=19 which is 1.4% of the shell artefact assemblage (n=1,300) and 0.06% of the studied shells (n=29,395)) (table 16.1), of which ten were found during 2010–2017 excavations, and nine were previously reported by Bar-Yosef Mayer (2013) but re-examined for use-wear and closer examination of pigments. When considering the different species, the assemblage consists of freshwater species, namely *Unio* sp., *Viviparus* sp. and *Lymnaea* or *Stagnicola* sp., as well as two marine species (*Ostrea edulis*, *Ranellidae*, in all likelihood *Ranella olearium*). Out of these 19 shells, 15 shells were categorised as 'palettes' and four as painted shells (also see section on painted shells below) (table 16.1). The vast majority belong to the *Unio* species,

Figure 16.2. Schist palette used for processing red-coloured ochre (photograph by Christina Tsoraki).

Occupation period	*Level*	*Unit*	*Find*	*Building/ Space*	*Context*	*Skeleton details*	*Species*	*Type*	*Use wear*	*PXRF results*
Late (6500–6300 cal BC)	North H	10326	x2	B.55	Room fill		*Unio (mancus)*	Container/palette		Ochre
	South S	11644	x3	B.44	Room fill		*Viviparus sp.*	Bead-pendant/painted	Perforation	Ochre
	South S	11644	x19	B.44	Room fill		*Unio (mancus)*	Container/palette		NA
	South S	11617	x1	B.44	Pit or post hole		*Lymnaea/Stagnicola* sp.	Pendant/painted	Areas of polishing, slight incision (lip of perforation), rubbing (external surface)	Ochre
	South S	11617	x1	B.44	Pit or post hole		*Lymnaea/Stagnicola* sp.	Pendant/painted	Areas of polishing, slight incision (lip of perforation), rubbing (external surface)	Ochre
	TP M	23765	x40	B.150	Cluster		*O. edulis*	Palette	Scratches, furrows (internal surface); perforation	NA
	TP M	32863	x1	B.150	Platform		*R. olearium*	Painted ('figurine')		NA
	TP M	31884	x41	B.150	Burial	Adult male (32818)	*Unio (mancus)*	Container/palette		Cinnabar
Middle (6700–6500 cal BC)	North G	20965		Sp.489	Midden		*Unio (mancus)*	Container/palette		Ochre
	North G	20965		Sp.489	Midden		*Unio (mancus)*	Container/palette		Ochre
	North G	30038	x1	B.131	Multiple burial		*Unio (mancus)*	Container/palette		NA
	North G	21622	S3	Sp.602	Room fill		*Unio (mancus)*	Palette/bead-pendant?	Scratches, concentric striations due to drilling (internal surface); perfo-ration	Cinnabar
	North G	22065	x3	B.77	Burial	Infant (30199)	*Unio (mancus)*	Container/palette		Cinnabar
	North G	17457	x4	B.49	Burial	Infant (17457)	*Unio (mancus)*	Container/palette	Brushing (internal, above pallial line)	Cinnabar
	North G	17457	x6	B.49	Burial	Infant (17457)	*Unio (mancus)*	Container/palette		Ochre
	North G	17939	x1	B.49	Burial	Infant (17939)	*Unio (mancus)*	Palette	Scratches, furrows, concentric striations due to drilling (internal surface); perforation	Cinnabar
	North F	31585		B.132	Cluster		*Unio (mancus)*	Container/palette	Brushing (internal surface)	Cinnabar
	North F	22194	x6	B.5	Burial	Adult male (22196)	*Unio (mancus)*	Container/palette		Cinnabar
	South ?M	2841	x2	B.50	Burial	Infant (2842)	*Unio (mancus)*	Container/palette		Cinnabar

Table 16.1. Overview of studied shells with pigment staining recovered during the Hodder excavations.

one of the most commonly encountered mollusc species at Çatalhöyük, which was collected from a clean water body with slow moving water not far from the settlement. Shell analyses suggest that this shell species served different needs: its flesh was consumed as food, and its shell was used as raw material for the production of various artefacts (beads, 'serrated' objects, pendants) and, after heat alteration, possibly also as temper (Reese 2005; Bar-Yosef Mayer 2013; Veropoulidou 2017; Volume 13, Chapter 3; Volume 14, Chapter 9).

Fourteen *Unio* specimens were categorised as containers for pigments or as 'palettes'. The term 'palette' refers to a tool used to lay, mix and hold pigments. Of these, one (21622) bears a perforation to furnish a handle to facilitate the use of the palette, to strap it from the belt or the wrist, or to suspend it as a bead/pendant. One additional palette is an *Ostrea edulis* (oyster) valve (23765), which also bears a perforation (fig. 16.3). Neither perforation bore any use-wear traces. The nacreous and nonporous surface of the *Unio* shell and its shallow concave shape make it a perfect container and suitable surface to lay and hold the pigments. One of the most common *Unio* species in the world was named *Unio pictorum* (genitive plural of *pictor* = painter), the 'painter's mussel', because it was historically used as a conveniently sized and shaped receptacle for holding artists' paint (*Encyclopedia of Life*). The use of shells as palettes is testified from as early as 100,000 years ago in Blombos Cave, South Africa (Henshilwood et al. 2011), and on the basis of miniature paintings on manuscripts, it seems to continue into the medieval period in Europe (Emily Carr University).

At Çatalhöyük, the inner sides of these palettes (concave for *Unio*, flat for *O. edulis*) bear traces (stains, coating, lumps) of different pigments of orange and red to vibrant vivid red hues (figs 16.4 and 16.5). PXRF analysis indicated that four palettes contained ochre (fig. 16.4) and eight palettes had cinnabar (fig. 16.5). The remaining three were not analysed or did not provide clear spectra. The staining traces are usually lighter and thinner at the central part of the valve, but thicker and more substantial near the concave part, while in some examples lumps of pigment are present under the cavity of the umbo. Those traces and the occurrence of brush strokes can be interpreted as an indication of the use of pigment mixed with a binder. Two of the palettes ((17939) and (21622)) show deep

Figure 16.3. O. edulis *(oyster) palette. The black discolouration is caused by the burned building (photograph by Jason Quinlan).*

Figure 16.4. Unio *shell palette with ochre (photograph by Eline Schotsmans).*

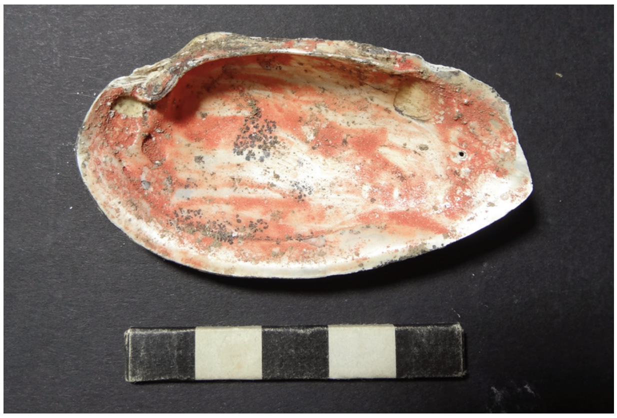

Figure 16.5. Unio *shell palette with cinnabar (photograph by Rena Veropoulidou).*

furrows and scratches on the inner side, traces that possibly resulted from a tool used to prepare or mix the pigment. Another two examples ((31585) and (17457)) bear flat brush strokes of pigment.

Placement of *Unio* shell in burials has been noted in burial features of Early and Middle periods but not in the Late period (Vasić et al., Volume 13, Chapter 17). However, when looking at shells with pigment traces, there were no shell 'palettes' recovered from the Early period (7100–6700 cal BC). The earliest indication for the use of shell palettes comes from a burial fill (2841) of an infant (2842) from the Middle period (6700–6500 cal BC) (Level South M). The inner concave side of the shell had a 0.1mm thick layer of cinnabar, confirmed by PXRF analysis. Another ten palettes were from the Middle occupation period (two from Level North F and eight from North G), and the remaining four palettes were from the Late period (one from Level North H, one from South S and two from TP M).

The majority of 'palettes' (n=8) was associated with human skeletal remains and burial fills. Five shell palettes were found in four different infant burials ((2841), (17457), (17939), (22065)), two were excavated in the burial fill of adult male skeletons ((22194), (31884)), who both had cinnabar on the cranium, and one was found in a multiple burial (30038). The remaining palettes (n=7) were found in other contexts, in particular two in clusters ((31585), (23765)), two in the same midden in (20965) and three in room fill ((10326), (11644), (21622)) (table 16.1).

The employment of shells as palettes is confirmed by the context of finds, as, for instance, in a burial in B.150, where a shell coated with cinnabar was placed at the right shoulder of an adult male (32818). The individual's frontal bone had a stripe of cinnabar (see section below) (fig. 16.6). Another example was found placed on the feet of a two-year-old infant (17939) in a basket in B.49. This *Unio* shell had been ground to a triangular (pointed) shape. It

Figure 16.6. (a) In situ photograph of skeleton (32818) with cinnabar shell (31884.x41) at the right shoulder (photograph by Jason Quinlan); (b) cinnabar shell (31884.x41) (photograph by Eline Schotsmans); (c) detail of the cinnabar stripe (photograph by Marco Milella).

had intense traces of cinnabar on the inner side and scratches on the inner surface from processing the pigment. A perforation was drilled near the corner of the triangle. Taking into account its location in the burial, it is likely that this was a palette that was secondarily used as a bead/pendant for the ankles of the infant. The infant itself did not show any traces of cinnabar. In the same building and same space, another infant (17457) was found deposited on matting or in a basket, preserved as phytoliths, with three shells, blue pigment with a bone spatula, a round copper tubular collar with preserved twisted threads and a shell bead necklace (Hager, Boz 2008). Two of the three shells bore traces of pigment, characterised as cinnabar in shell (17457.x4) and ochre in shell (17457.x6). The preserved phytoliths that surrounded the ochre shell were also analysed with PXRF, indicating the presence of cinnabar. The infant itself did not show any pigment staining. The fact that the container of the infant surrounding the ochre shell had a high cinnabar content, together with the presence of the cinnabar shell, could indicate that it had been coloured with cinnabar. This could also be a possible interpretation of the other infant (17939) mentioned earlier with a perforated palette, but the phytoliths of the basket surrounding this infant were never analysed for a possible presence of pigment.

Another possible pigment container is a wooden bowl (22678.x2) with evidence of blue pigment (fig. 16.7) from a primary deposition of an adolescent female (31705), surrounded by multiple disarticulated subadults in B.131 (C. Kabukcu, personal communication). The pigment was likely azurite, based on the element copper detected with PXRF in 2017 (Schotsmans personal observation). Within the burial fill, several other heat-affected grave associations were recovered, such as shells, fragments of clay objects, chipped stone and shell beads (Haddow et al. 2015b; 2016). Although interpreted as a container, it cannot be excluded that this object was just a blue-stained bowl. More in-depth analysis of the bowl is currently ongoing.

Pigments could have been applied with perishable materials, such as a brush with animal hair, or with less perishable materials, such as pigment applicators made from animal bone. A number of rounded and/or blunted bone points could tentatively be interpreted as hair or clothing pins and/or pigment applicators (Russell 2005; 2016; Russell, Griffitts 2013; Vasić 2018; Vasić et al., Volume 13, Chapter 17). However, it is difficult to discern their exact use with certainty. Only a few bone artefacts demonstrate a possible association with pigment use at Çatalhöyük. At least six potential bone applicators were interpreted as related to pigment use, based on their discovery ‘dipped into’ a pigment lump ((16308.x2) and (8184.x4)) (fig. 16.8) or because they were recovered next to pigment lumps, such as in a pouch ((13147.x1), (17457.x8), (21634.x13) and (21634.f1)). All were associated with blue or green pigment and are only present in female and infant burials, not in male burials. Males were also treated with pigment (see burials section below), so it should be borne in mind that this could be the result of a rather small sample. On the other hand, the burial assemblage shows patterns regarding the use of pigments in funerary practices, such as a similar lack of green and blue pigment in male burials (see below) (Vasić 2018; Vasić et al., Volume 13, Chapter 17). Given that these burials were allocated to different levels, it is not possible to relate them to any specific period of occupation. The

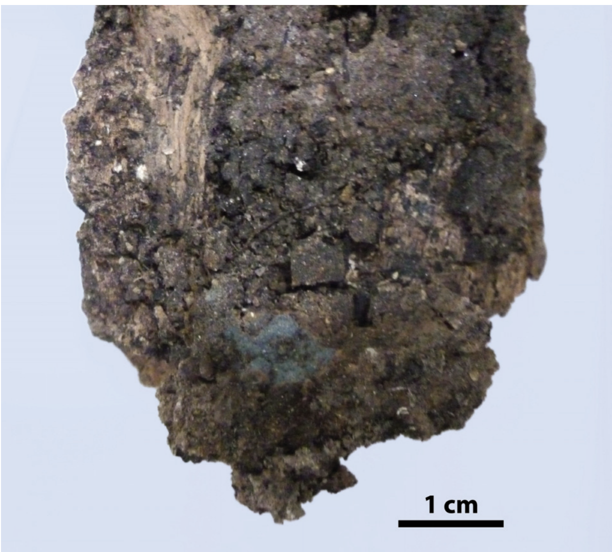

Figure 16.7. Blue pigment on wooden bowl (photograph by Eline Schotsmans).

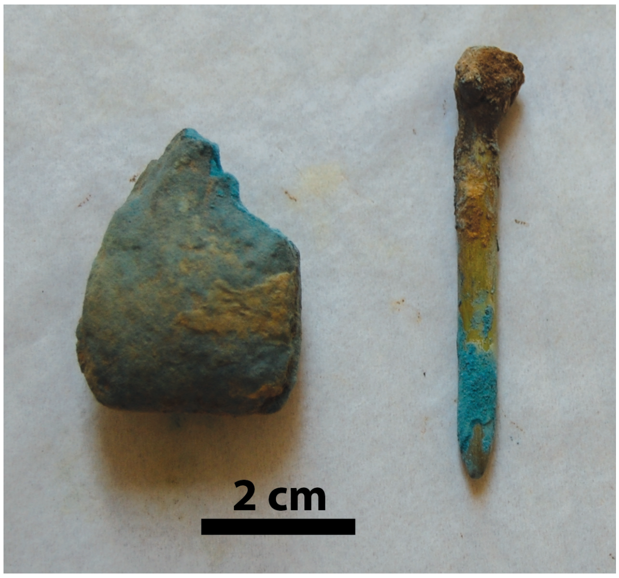

Figure 16.8. Bone ‘applicator’ with lump of blue pigment (16308.x2) (photograph by Jason Quinlan).

majority of the potential bone applicators (n=4) were retrieved from burials belonging to Level North G, but given that the highest number of inhumations were allocated to this level, it cannot be determined how widespread their use was in either burial or non-burial contexts at any point in the occupation of the settlement, other than they were not very common (Vasić 2018). The precise identification of the animal species could not be carried out for all potential applicators, but evidence gathered so far suggests that different animals were used in the production of these artefacts. For example, a worked fox metatarsal (13147.x1) was found next to the green pigment in a burial of a young adult female in B.60, whereas a blunted point (16308.x2) made from a large mammal (cow-sized) long bone, stuck in a lump of blue pigment, was found in a pouch together with an old adult female in B.102 (fig. 16.8) (Russell, Griffitts 2013).

The houses and their colours

'White soil', plastering and replastering at Çatalhöyük

The exploitation of lime for plastering floors and walls is one of the most common features of the PPNB villages of the Levant and southeastern Anatolia (Garfinkel 1987). What makes Çatalhöyük unique in the context of Neolithic Anatolia and the Near East is the use of 'marl' as a plastering material to cover house surfaces such as walls and platforms. Marl is a natural sediment, composed of very fine-grained calcium carbonate and is rich in clay. Marl utilised at Çatalhöyük derives from the Konya Basin, which geologically is dominated by white, carbonate mudstones (marl), and the alluvial plains associated with the river systems (Roberts et al. 1979; Fontugne et al. 1999; Kuzucuoğlu et al. 1999; Boyer et al. 2006). Research showed that there were differences between the sources and preparation of marl and its exploitation within the houses (Tung 2008). Different parts of the houses have been previously defined as 'dirty' and 'clean' areas. The 'dirty' areas, used for cooking and for production activities, were generally plastered with thicker and coarser mud plaster (Tung 2008). A better quality of marl was used for the 'clean' areas, such as burial platforms, benches and installations (Matthews 2005a; Doherty 2006). This indicates that marl utilised at the site was obtained from different locations (Matthews 2005a; Doherty 2006; Tung 2008).

Research by Çamurcuoğlu (2015) suggested that the Çatalhöyük paintings were generally applied onto clay/carbonate-based marls of different colours, and onto white, burnished surfaces made of a material traditionally referred to as 'soft-lime', which is derived from dolomitic carbonate sediments obtained 5km north of the settlement. Soft-lime is very white in colour and contains 95% pure carbonates of calcium and magnesium (Matthews et al. 1997; Roberts et al. 1999; Doherty 2011). It is important to note that soft-limes are not burnt lime plasters, despite the name. Nowadays, the inhabitants of the surroundings of Çatalhöyük still whitewash the houses with marl or soft-lime, calling it 'Ak Toprak' or 'white soil' (Çamurcuoğlu 2015).

Plastering toolkits at Neolithic Çatalhöyük were made from different materials and include stone tools (Wright 2013; Tsoraki forthcoming), bone scapulae (Russell, Griffitts 2013) and shells (Bar-Yosef Mayer 2013). Based on detailed technological and microwear analysis of the ground stone assemblage, hand-sized tools with different textural characteristics can be associated with different stages of the plastering sequence. This includes mainly schist and limestone tools with a relatively rough texture that were probably used during the earlier stages of plaster application (applicators). Intentionally modified metamorphosed limestone/marble cobbles were employed for the final burnishing of the plastered surfaces (burnishers). The homogenous texture of the raw materials and the intentionally polished surfaces would have enabled the creation of plastered surfaces with a shiny and smooth finish (Tsoraki, Volume 14, Chapter 13; forthcoming).

There is debate about whether the practice of plastering interior building surfaces changed through time or not. According to Matthews (2005a) and Doherty (2017: 70) single-layered thick 'plaster' was applied in earlier periods (7100–6700 cal BC), while during the later occupation phases (6700–5950 cal BC) a multi-layered soft-lime/marl combination was adopted, in some cases up to 450 layers. This could not be confirmed by Busacca (Volume 14, Chapter 12), who analysed multi-layered early plasters, microscopically separated by soot (fig. 16.9). The practice of plastering in multi-layered form might have been based on seasonal or annual cycles (Matthews 2005b). This could indicate that replastering houses might have been motivated by both practical and ritual reasons. From a practical point of view, plastering is hygienic and antibacterial because of its alkaline properties. It helps to keep the insects out, to remove scuff marks and to make the walls white again. Indeed, its mild antiseptic properties would prevent mould, vermin and insect infestation (Irwin of Taunton 1808; Matthews 2005a). However, while it initially reduces the number of bacteria, it does not eliminate them, so that they reflourish over time (Schotsmans et al. 2014). This could be a reason for re-plastering or limewashing annually, a practice that continues nowadays on the Konya Plain in spring. Another important practical factor for white plastered walls is light reflection. The houses only had one small entrance via the roof. Light that came in via

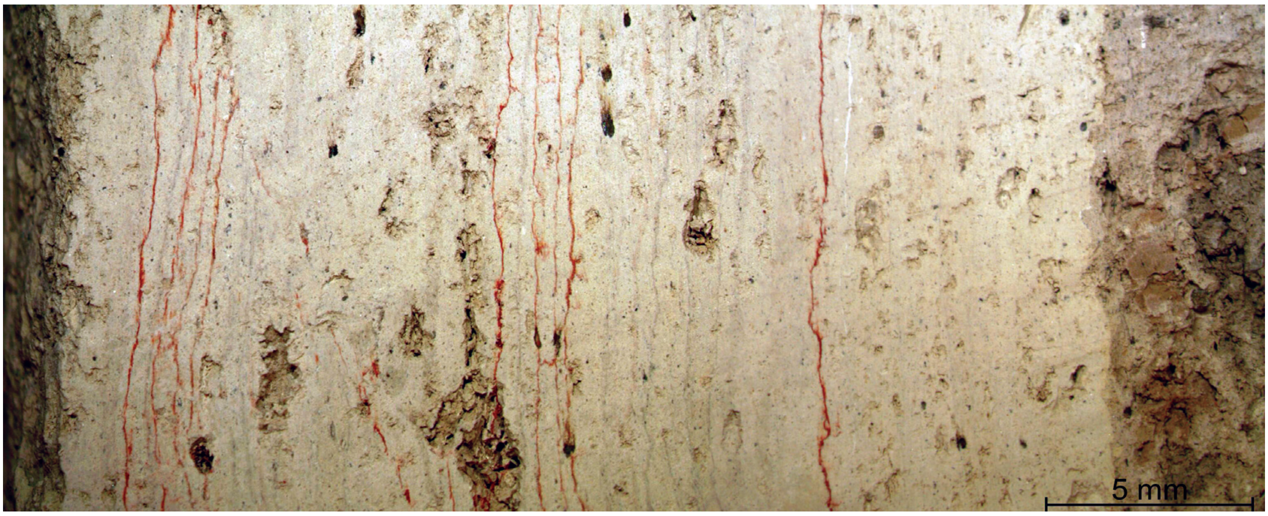

Figure 16.9. Microscopic image of a multi-layered plaster from B.17; the consecutive marl layers are observable separated by red pigment or by soot (photograph by Gesualdo Busacca).

the ladder entry was reflected by the white, burnished walls. This luminosity played a role in the ritual reasons for plastering and replastering, together with the use of plaster in mortuary practices (see burial section below). In addition, Clarke (2012: 177) argues that 'plaster and the act of coating the floors and walls with plaster, played a key role in the creation and maintenance of community cohesion and social well-being'.

Architectural paintings and installations

Within the domestic context of the plastered houses at Çatalhöyük, red pigment was used for the decoration of wooden posts. Mellaart (1967: 58) describes the wooden posts as plastered and frequently painted red. Kabukcu and Asouti (2014) observed red pigment, likely iron oxide, on wood charcoals (17519) from B.77 (Sp.336), indicating that wooden implements were painted red before their exposure to fire.

Most of the buildings excavated to date have yielded evidence of some form of paintings, although with a great variability in density (Çamurcuoğlu 2015; Busacca 2020). Paintings (n=178) occur on a variety of plaster-lined house interior features, such as walls (42.3%), platforms (24.7%), niches, benches, post/pillars (each 6.6%), floors (4.9%) and others (Busacca 2020). Experimental studies have shown that pigments were likely mixed with water and applied with brushes onto leather-hard or dry burnished plaster (St. George 2012). This procedure most closely reproduces the striated patterning that is visible in some particularly well-preserved paintings at Çatalhöyük (Çamurcuoğlu 2015; Busacca 2020). Microchemical analyses of some of the paintings showed that the red paint consisted of a fine-grained sediment of clay, calcite and hematite, together with embedded grains of red and colourless obsidian which may have had an effect on the optical properties of the artwork (Anderson et al. 2014b).

With regard to painted designs, the vast majority of the 178 studied architectural paintings from Çatalhöyük were composed of monochromatic red layers (58.6%), followed by a significant portion of paintings whose motifs cannot be identified due to poor state of preservation or insufficient exposure (23.1%). Geometric motifs make up about 15% of the painting corpus, while hand motifs (2.1%) and combinations of geometric and hand motifs (0.6%) are less frequent. When comparing the corpus of architectural paintings from the Hodder excavations with Mellaart's corpus, one of the most surprising observations is the almost total lack of anthropomorphic or zoomorphic motifs, with the only exception being a painting representing a human, found in a burial chamber in B.72 (17645) dated to the Final period (6300–5950 cal BC) (Czeszewska 2014; Marciniak et al. 2015a). Conversely, geometric and hand motifs uncovered during the Hodder excavations show parallels with some of the paintings excavated by Mellaart in the 1960s. These geometric motifs include a wide range of patterns including linear motifs (sometimes incised), bands, circles, spirals (sometimes incised), zigzag lines, crosses, quatrefoils, rosettes and others (Czeszewska 2014; Busacca, Volume 14, Chapter 12: figs 12.5–12.8).

For other architectural features, red pigment was often used on plastered animal heads set into the walls and platform, known as installations, such as two plastered animal heads from B.139 ((23165.s1) and (23165.s3)) or the plastered animal skull of a goat or calf from B.77 (19285) (Busacca, Lingle 2017). A unique example of a painted plaster head installation was found within B.132 as part of a larger wall feature (21666.x1). The face could be interpreted as either human or animal. It was painted red and contained two obsidian flakes in place of the eyes (fig. 16.10). Earlier layers of red ochre paint were also identified, together with black paint directly under the obsidian eyes, suggesting the eyes were painted before the final obsidian flakes were put in place (Lingle et al. 2015). Other cases of black-painted traits were discovered in a post-retrieval pit in B.160 (22334) and on a plastered cattle cranium embedded in the main floor sequence of B.89 (Busacca, Lingle 2017).

The colour of things

Stone axes and 'maceheads'

More than 30 types of rocks and minerals with distinct colour and textural properties were employed for stone technologies by the Neolithic community at Çatalhöyük (Tsoraki, Volume 14, Chapter 13). Patterns in raw material use suggest selectivity. While in some cases the selection and use of raw materials may relate to the mechanical properties of rocks (for example, durability), other factors seem to have guided the preferential use of raw materials. This is particularly evident in the case of edge tools (axes, adzes and chisels) and 'maceheads'. In the case of edge tools, there was a clear preference for

Figure 16.10. Plaster head installation with obsidian eyes and ochre paint from B.132 (21666) (photograph by Jason Quinlan).

metamorphic rocks and in particular greenstone and serpentinite, followed by igneous diabase, all colourful rocks with greenish hues and distinctive textures (Tsoraki, Volume 14, Chapter 13). The preference for green-coloured stones for polished axes is also reported throughout the sequence at Cafer Höyük (Cauvin et al. 2011). When considering production processes an interest in creating smooth and nicely polished surfaces is evident across different rocks (Tsoraki, Volume 14, Chapter 13). Through polishing the colour of stones is amplified, variations in colour hues are emphasised and textural features become more prominent (Edmonds 1995; Cooney 2002; Tsoraki 2011). In the case of 'maceheads', there was a preference for raw materials with a striking colour and textural patterning, such as hard limestone/marble with a veined texture or red-coloured hard limestone with white veins. Like edge tools, the finishing techniques of grinding and polishing further enhanced the colour and textural properties of the rocks and resulted in the creation of visually distinctive and potent objects (Tsoraki, Volume 14, Chapter 13).

Beads

Beads and pendants, as the main forms of bodily adornment at Çatalhöyük, played an important part in both life and death there (Bains 2012; Bains et al. 2013; Vasić et al. 2014; Vasić 2018; Vasić et al., Volume 13, Chapter 17). The colour of the vast majority of beads was directly dependent on the raw material selected for their production; given that they were made of a large variety of raw materials, beads display a wide range of colours. Sedimentary rocks, especially limestone and tufa, were the materials predominantly used for bead manufacture; consequently, a significant portion of the bead assemblage has off white, pink and red colours. White marble was also relatively common in bead production and so were various shells of different hues of white colour, as well as beads made of animal bone and teeth, with animal teeth and *Unio* shell pendants being more lustrous (iridescent). Metamorphic rocks other than marble were used as well, most commonly schist and phyllite, producing beads of colours ranging from light green to dark green/black and grey. Igneous diabase, occasionally used in bead manufacture, has grey and greenish hues. The type of clay, and to some extent finishing techniques, directly dictated the colour of clay beads, the majority of which range from light grey to dark grey/black. Dark colours are also seen in serpentinite beads (dark green/black with a veined appearance) and beads made from materials that are likely to be galena and hematite (grey/black with metallic lustre), as well as in the rare occurrences of obsidian beads. Amongst minerals, carnelian ranges from light to dark orange, turquoise occurs in variants ranging from light to bright blue, and fluorapatite has green and blue colours. These minerals clearly stand out in the bead assemblage and significantly contribute to its diversity, and it is likely that they were chosen precisely because of their bright colours (Vasić et al., Volume 13, Chapter 17).

Although the selected material to a great extent determined the colour of the final product, manufacturing methods, such as abrasive and polishing techniques, were also of importance in obtaining different colours (Vasić et al., Volume 13, Chapter 17). In addition, a small number of beads made of bone, clay and shell provide evidence of pigments being used to alter the original colour. The best example is a *Lymnaea* pendant (11617.x1) that was decorated with black and red stripes (Veropoulidou, Volume 13, Chapter 3: fig. 3.1c).

Another way to alter the colour properties of materials was through deliberate exposure to fire under controlled conditions with the purpose of obtaining a black colour, as seen on a small number of bone, shell, wooden and stone beads. Similarly, despite the occurrence of blue materials (fluorapatite and turquoise), the Final period at Çatalhöyük produced evidence of bead materials being altered through the use of heat with the purpose of obtaining blue colour. Nevertheless, given its relative rarity (in comparison to the large part of the assemblage that was left unaltered), colour alteration was not a common practice at Çatalhöyük (Vasić et al., Volume 13, Chapter 17).

Despite the diversity of the bead assemblage in terms of colours, materials and types, clear preferences have been noted (Vasić et al., Volume 13, Chapter 17). That is, materials of particular colours were chosen for the manufacture of certain bead types. For example, cylindrical and axe head beads (types T.2 and T.4 respectively) are typically of white and black colours, whereas most flattened barrel-shaped beads (T.5) were blue. Disc/ring beads, which represent the vast majority of the bead assemblage, were made of a large variety of materials and colours, yet a very small number of green and blue discs exist.

Colour definitely played a major role in the selection of material for bead production, but it was also of importance for the creation of bead strings. Evidence from burials suggests that uniform strings, especially necklaces, composed of single bead types were frequently diversified by using different materials, thus achieving more heterogeneous and colourful looks. An example of this inclusion of colour can be seen in the burial of a young individual (23805) of about 1–2 years at death who was buried with an anklet of alternating black and white ovoid stone beads, a small beaten copper band (worn as a ring) and multiple white and pink shell beads located around the upper thorax and head. All these objects were placed on the body, probably as they would have been worn by a living child. In addition, cinnabar was observed on the frontal bone of the cranium of this individual (Vasić et al., Volume 13, Chapter 17).

Painted shells

Three painted freshwater gastropod specimens of large size, two *Lymnaea* (or *Stagnicola*) and one *Viviparus*, were recovered during the Hodder excavations. In addition, a fragment of a gastropod of the family *Ranellidae* (in all likelihood *Ranella olearium*, Linnaeus 1758, known as 'little trumpet') also appeared to be painted (32863) (table 16.1).

The three freshwater shells were all found in B.44 and all painted with ochre, identified by PXRF. The *Viviparus* painted bead/pendant was recovered from room fill (11644) (fig. 16.11a), while the *Lymnaea* were found in a small pit or backfilled posthole (11617) that also contained obsidian fragments (fig. 16.11b). Their colour is partially preserved, especially in the *Viviparus* shell, but close examination showed that their external surface had been decorated with a striped pattern: a narrow black line and a wider red stripe following the incremental growth of whorls. In other words, stripes are thinner in the short upper whorls and gradually widen in analogy to the width of the lower and last whorl. The last whorl of both *Viviparus* and *Lymnaea* had been pierced with a pointed tool (gouging). Perforations are not neat, but examination under the stereoscope by Veropoulidou and following Guzzo Falci and colleagues (2019) indicates that at least the *Lymnaea* was used as a bead, as it bears wear (areas of polishing, slight incision) from suspension in the lip of the perforation. Similar patterns and coloured decorations are common in nature (seen on many species of marine gastropods from the Mediterranean and, especially, the Red Sea). In this context, it would be tempting to suggest that the people from Çatalhöyük imitated the natural design of marine shells that were more difficult to acquire in comparison to the local ubiquitous species.

The fourth painted shell, *R. olearium* was found in the make-up layer of platform F.8689 (32863) in B.150 (fig. 16.12). It had been cut from the last whorl of the shell, which bears spherical projections as part of its natural decoration. The natural decoration has been enhanced by slight grinding and smoothing. The peak of the right projection bears scratches, possibly done with a pointed tool, and partially preserved spots of a light red pigment, while orange, light brown spots can be observed around the projections. Vertical and horizontal thin black lines (0.1mm) seem to have decorated the surface but also enhanced the natural axial lines of the shell. It is unclear if this shell was meant to resemble a female torso, but in the same building two female figurines were recovered, one of which had small traces of red stain (see below) (Meskell et al. 2016).

Figurines

The Çatalhöyük figurines range from elaborated human bodies with emphasised features (anthropomorphic) to pared-down torsos with simple heads and bases. Unlike other materials that were cached (for example, obsidian, clay balls) or placed in burials, figurines were not placed in 'special deposits' but dispersed through midden, house fill, and external areas much like refuse (Nakamura, Meskell 2009). Mellaart (1964b) describes finding a

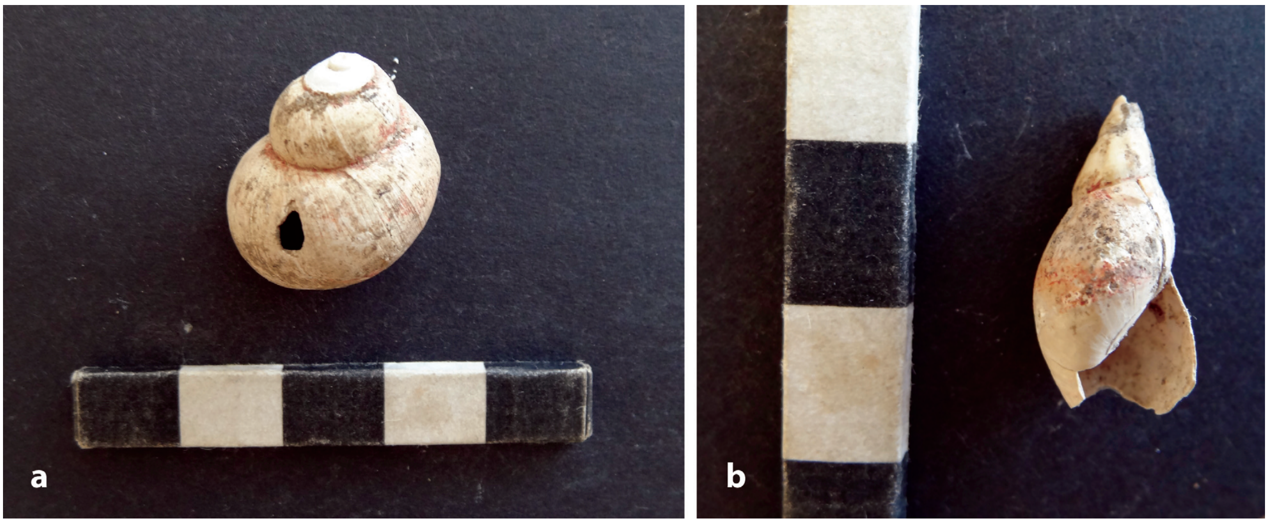

Figure 16.11. (a) Viviparus *painted bead/pendant; (b)* Lymnaea *(or* Stagnicola*) sp. painted bead/pendant (photograph by Rena Veropoulidou).*

*Figure 16.12. Shell (*Ranellidae*) painted artefact or 'figurine' (photograph by Rena Veropoulidou).*

'goddess figurine' painted red. During the Hodder excavations, the use of colourants on clay and stone figurines was also attested, although the authors were not able to compile a complete and verified list for this chapter. Examples of 'coloured' clay specimens are an abbreviated figurine with red traces (12524.H4) (Meskell et al. 2016), a potentially 'young' individual (13129.x1) without a head that bears traces of red pigment and was found in a midden (Nakamura, Meskell 2009), and another human clay figurine without a head (12401.x7) that depicts a robust female on the front and a skeleton on the back, with red paint around the neck and between the breasts in four concentric chains and on the lower areas (Meskell, Nakamura 2005). In addition, a limestone figurine (20736.x3) was found in the make-up layer of the platform of B.150. Limited traces of possible red-coloured pigment were identified on the head of the figurine, around the ear, where the surface is rougher, and on the bottom of the right foot (Meskell et al. 2016).

Clay balls and clay objects

Clay balls and clay objects are two further commonly recovered artefact classes at Çatalhöyük (Bennison-Chapman 2017). 'Clay balls' are large and spherically shaped. They average 6.32cm in diameter, are made from a fine, tightly compacted clay, and have an extremely smooth, almost burnished exterior surface. They are baked or fired at low temperatures and are very heavy for their size. As an artefact class they are extremely homogenous and easily recognisable (Atalay 2003; 2005; 2012b; 2013; Atalay, Hastorf 2005; 2006b; Bennison-Chapman, Volume 14, Chapter 7). There is also the category of 'clay objects'. These potential 'tokens' are far smaller (<5.00cm maximum dimension) and represented by a wide range of intentionally crafted geometric shapes (for example, spheres, cones, discs). Clay objects are also diverse in clay type and finish (Bennison-Chapman 2013; 2014; 2019; 2020; Volume 14, Chapter 8).

Pigments are rarely found on clay balls or clay objects excavated by the Çatalhöyük Research Project. Only one clay object (32606.co1) out of all clay objects excavated (N=2786) had evidence of pigment. In addition, just two clay balls ((22301.m153) and (32606.m101)) (from all excavated clay balls/clay ball fragments 2009–2017 seasons, n=11,190) showed traces of pigment (fig. 16.13). Both clay balls were fragmentary: one, 50% of a clay ball weighing 263g (typical size/weight) and the other, just 13g, a small fragment of <25% of the original object. The clay object was a complete sphere of 1.8cm diameter and 4.9g (typical) weight. In all three cases, the entire exterior surface was painted using a red coloured pigment. The red colour appeared to be very faint and difficult to analyse with PXRF. However, based on the absence of mercury (Hg) and sulphur (S) on both clay balls, it is assumed they had been covered with ochre. Contextually, all three examples came from room infill, from buildings in Level South K, the Early period. One clay ball fragment (22301.m153) was recovered from B.160 (22301) and the other two (one ball, one object) from B.161 from within the same unit (32606).

Pigment and plaster treatment in funerary practices

The use of pigments in burials has been mentioned in other publications on Neolithic Çatalhöyük (e.g., Boz, Hager 2013; Haddow et al. 2020; Haddow et al., Volume 13, Chapter 15; Vasić et al., Volume 13,

Figure 16.13. Clay ball with evidence of red pigment (photograph by Lucy Bennison-Chapman).

Chapter 17), but a detailed analysis of the dataset of burials with pigments from the Hodder excavations has not been discussed before. In order to assist with interpretations of funerary practices at Çatalhöyük, each burial was assigned to one of several deposition categories that reflect the different contexts from which skeletal remains have been recovered. A detailed description of these depositional categories and the whole stratified assemblage can be found elsewhere (e.g., Boz, Hager 2013; Haddow et al. 2020; Haddow et al., Volume 13, Chapter 15). In brief, the main categories are as follows: *primary undisturbed* depositions are articulated skeletons found in their original interment location that have not been disturbed by subsequent Neolithic activity (n=286). *Primary disturbed* depositions stand for in situ remains of articulated skeletons found in their original location but disturbed by subsequent Neolithic activity (n=185). *Secondary burials* are disarticulated or partially disarticulated skeletons, intentionally moved by Neolithic people from a previous location to a subsequent interment location (n=96). The *tertiary deposition* category is reserved for isolated, disarticulated or partially articulated skeletal elements found outside of typical burial contexts (n=174). Lastly, human remains in the *unknown* deposition category were typically recovered from heavily eroded surface layers, or they had been displaced by animal burrowing, such that their original deposition cannot be determined with certainty (n=75).

In total, at least 816 individuals were recovered from stratified Neolithic contexts during the Hodder excavations. Considering only primary and secondary depositions (n=567) and taking into account direct pigment traces observed on the bones, as well as grave associations with pigments, a total of 62 individuals showed pigment use as part of funerary practices (11% of the sample). This number is based on searches through the database and archive reports, and additional verification of the pigment on the actual skeleton or associated objects (Schotsmans et al. forthcoming). Below, separate analyses of the evidence of pigments on skeletal remains and on grave associations are provided.

Skeletal remains with direct pigment traces

Direct pigment traces were observed on 36 individuals (6.3% of the sample) (table 16.2). Twenty-three of those skeletons with direct pigment traces were primary depositions (64%), ten were primary disturbed depositions (28%) and three were secondary burials (8%).

When looking at age distribution, adults dominate the sample with 56%, which includes all young adults (20–34 years old at death) (n=6), middle adults (35–49 years old at death) (n=6), old adults (50+ years old at death) (n=7) and non-specific adults (20+ years old at death) (n=1). Direct pigment treatment was slightly smaller for the young individuals (44%). Pigment was found on one adolescent (3%), five children (14%), eight infants (22%) and two prenatal individuals (5%). Four children were between 2 and 3 years old at death and one between 8

	Skeletal remains with direct pigment traces	*Pigments as burial associations*
Late occupation period (6500–6300 cal BC)	32818 (C), 23972 (R), 11330 (O), 17533 (C)	32818 (C), 31888 (A&R), 13162 (G), 19460 (R&B)
Middle occupation period (6700–6500 cal BC)	1912 (R), 22196 (C), 10840 (R), 30523 (C), 20685 (C), 30007 (C), 30010 (C), 8598 (O), 32330 (C), 32741 (O), 32762 (O), 32045 (O), 32770 (R), 23805 (C)	2105 (B), 8184 (R&G), 8115 (B), 22196 (C), 17939 (C), 17457 (C&B), 2842 (C), 20655 (R), 30514 (R), 19500 (R), 30199 (C), 19224 (R), 23126 (O&A), 31705 (B), 21685 (R), 23075 (R), 16309 (G), 16308 (B), 21672 (G)
Early occupation period (7100–6700 cal BC)	4406 (R), 4615 (R), 4424 (C), 4458 (R), 21884 (O), 23238 (O), 21817 (O), 21855 (O), 22522 (C&O), 5177 (C), 23236 (R), 4853 (R), 4861 (R), 22335 (C&O), 32437 (C&O), 32645 (O), 32646 (O), 23237 (O)	22516 (C), 4853 (R), 10529 (R)

Table 16.2. Overview of all skeleton unit numbers with direct pigment traces and with pigments as burial associations, ordered per Hodder level for each occupation period. For reasons of clarity, the table shows only the unit numbers of the skeletons, while the stained burial association might have been given the number of the fill. The unit number of the fill is only mentioned in one case, because it was unclear to which skeleton the stained burial association belonged in this multiple burial (31888). Pigments analysed by PXRF are abbreviated as C (cinnabar), O (ochre: iron-oxide) and A (azurite). Non-analysed pigments are mentioned by colour: R = red, B = blue, G = green.

and 12 years old. Five of the eight infants were between 1 and 2 years old at death and three were between 6 months and 18 months. The two foetuses contained red pigment on the cranium, one at 30–32 weeks' gestation and the other one at 36–38 weeks' gestation. The bodies of perinates and neonates were usually placed within woven lidded baskets prior to burial, while infants appear to have been covered or wrapped in textile or matting (as previously observed by Boz, Hager 2013; Nakamura, Meskell 2013), with less evidence for application of red pigment to the remains (Schotsmans et al. forthcoming).

Sex could be determined in 19 out of 36 cases (39% male, 14% female, 42% too young to determine and 5% not determined), including ten males, four possible males, two females and three possible females. There were two skeletons of indeterminate age-at-death (5%) and 15 individuals who were too young to determine their age-at-death (42%) (Schotsmans et al. 2018; Schotsmans et al. 2020; Schotsmans et al. forthcoming).

The distribution between adults and subadults is similar when compared to results presented by Boz and Hager (2013) and Nakamura and Meskell (2013) based on Çatalhöyük burial data compiled between 1995 and 2008, resulting in a 47% (adults) to 53% (subadults) distribution and a slightly higher representation of pigments in infant burials. On the other hand, sex distribution appeared to be different in those publications. Their findings indicated that females were more frequently buried with pigment (Boz, Hager 2013; Nakamura, Meskell 2013), while in the current analysis male individuals dominate. It is, however, difficult to make comparisons with previously compiled datasets. Not only are they less complete (1995–2008), with lower numbers; they also included 'yellow' pigment which has not been taken up in the current database because of the likelihood of it being organic.

The pigment traces observed on the skeletons from this dataset were always red in colour, consisting of either iron-oxide or cinnabar. Physicochemical analysis of the pigments from the site is still ongoing. Table 16.2 defines non-analysed pigments as 'red pigment' and confirmed pigments as iron-oxide or cinnabar, based on the presence or absence of mercury by PXRF. From the analyses it is clear that cinnabar was uniquely found on the cranium (n=14), while iron oxide was observed on the cranium and/or on the postcranial skeleton (Schotsmans et al. 2018; Schotsmans et al. 2020; Schotsmans et al. forthcoming).

In some cases, the dead appear to have been prepared for interment by binding them in flexed positions with cordage. Preserved remnants of basketry, matting and animal hide were also found in some burials (e.g., Boz, Hager 2013; Nakamura, Meskell 2013; Haddow et al., Volume 13, Chapter 15; Vasić et al., Volume 13, Chapter 17; Bender Jørgensen et al., Volume 14, Chapter 11). Phytoliths and carbonised remains interpreted as remnants of baskets and organic material which were wrapped around bodies were observed in just over 5% of all primary, primary disturbed and secondary burials (Vasić et al., Volume 13, Chapter 17). But when observing the subsample of 36 skeletons with pigment traces, 67% showed evidence of some sort of container based on the visible presence of phytoliths, as either cordage, matting or basketry. Note, however, that this does not mean that the remaining 33% did not have any container, as it is likely that phytoliths might have been missed, for example, if only cordage was used (Schotsmans et al. forthcoming).

The methods of pigment application to human remains have been variously questioned (e.g., Erdal 2015; Bocquentin, Garrard 2016; Richter et al. 2019). Was ochre put on the matting, on the clothes or directly on the skin? Or was it added afterwards, when the body was skeletonised? Data from the burial assemblage of Neolithic Çatalhöyük suggest the co-existence of different methods of application. In some cases, ochre was concentrated on one side of the skeleton (for example, skeleton (21884)), while sometimes only patches of ochre were observed on or around certain body parts (for example, skeleton (32762) or (32045)). When analysing the articulated skeletal remains of adult female (21884), buried on the right side, the skeletal elements from the uppermost (left) side of the skeleton were more intensely stained than the lowermost (right side), including the patellae (fig. 16.14). This suggests that ochre was applied to the deceased after being placed in the burial. The partial discolouration of the left femoral head confirms that the skeleton was flexed and fleshed when the ochre was applied, leaving the main part of the femoral head unstained. The abundant presence of phytoliths in the burial suggests the use of matting, although the archaeological evidence makes it difficult to reconstruct the specific use of the latter (that is, placed over or around the body). Therefore, it is difficult to conclude if the matting was painted with ochre, or if ochre was sprinkled on top of the deceased, before the body was placed within matting.

As mentioned above, cinnabar was only applied to the cranium of 14 individuals, often only observed on the frontal or temporal bone. This is 2.5% of the total sample or 39% of the skeletons with direct pigment traces from six primary burials, seven primary disturbed burials and one secondary burial. In terms of age distribution, cinnabar on the cranium was encountered in seven adult burials, one adolescent burial, one child burial and five infant burials. Cinnabar was not observed in burials of individuals younger than 12 months. From the seven adults, six were likely male and one possible female.

Figure 16.14. (a) Skeleton (21884) was buried on the right side with the skeletal elements on the uppermost and left side of the skeleton more intensely stained with red pigment (photograph by Jason Quinlan); (b) right patella more stained on its medial (uppermost) side (photograph by Eline Schotsmans); (c) the partial discolouration of the left femoral head confirms that the individual was flexed and fleshed when the ochre was applied, leaving the main part of the femoral head unstained (photograph by Eline Schotsmans).

These data suggest that the cranial application of cinnabar was likely reserved for males (Schotsmans et al. 2018; Schotsmans et al. 2020; Schotsmans et al. forthcoming). In some cases, a very clear stripe was observed (fig. 16.6), as previously noted by Mellaart (1967: 208) and by the Çatalhöyük Research Project (e.g., Haddow et al. 2017). Often, phytoliths appear to be present on top of the cinnabar stripes (fig. 16.15), which indicates that the deceased could have worn a headband painted with cinnabar, or a headband over a stripe of cinnabar applied to the skin (fig. 16.16). The unstained phytoliths do not necessarily exclude one of these options. If the band had

Figure 16.15. (a) Frontal bone of skeleton (22196) with remains of cinnabar and phytoliths; (b) microscopic image of cinnabar layer with phytoliths on top.

been thick enough and only stained superficially, the phytoliths might not have been stained (M. Madella personal communication). The fact that the stripe was also observed on primary depositions suggests that the cinnabar band was put on a fleshed head, which is also observed in ethnic groups in Vanuatu (Aufderheide 2009: 50). Over the years the soft tissue and organic matter of the headband degraded, leaving a coloured stripe on the cranium.

Pigments as burial associations

Pigments as burial association were clearly identified in 25 burials – 19 primary depositions (76%), four primary disturbed depositions (16%) and two secondary burials (8%) – out of all 567 primary and secondary depositions excavated during the Hodder era (4.6%). Details of all individuals with pigment traces are provided in table 16.2. An additional multiple burial (F.3868) contained blue and red pigment, but it was unclear to which individual these were associated.

While red was the only colour observed as direct pigment traces, the colourants excavated as associated objects were red, blue and green, with the majority being red associations. Pigments were represented by either lumps or stained objects such as shells, animal bone, a wooden bowl or a mirror. Four individuals were found with both red and blue/green pigments. Two infants (estimated between 9 and 12 months old at death) from the Middle occupation period were associated with a shell with red pigment and lumps of green (skeleton (8184)) and blue (skeleton (17457)) pigments. In addition, both red and blue residues were found

Figure 16.16. Artist's rendering of a person wearing a headband over painted cinnabar (illustration by Gauthier Devilder). The deceased could have worn a headband painted with cinnabar, or a headband over a stripe of cinnabar applied to the skin (see text).

associated with one obsidian mirror in the burial of an adolescent (23126) in B.131 from the Middle period (Level North G) and two mirrors in the burial of a child (19460) in succeeding B.129 from the Late period (North H).

Concerning age distribution, there is almost an even distribution between adults (48%, n=12) and younger individuals (52%, n=13). The latter include one prenatal individual, one neonate, six infants, three children and two adolescents. Among the 13 individuals whose sex could be determined (one adolescent and 12 adults), there are nine females (36%, eight females and one possible female) and four males (16%, three males and one possible male). The subadults were too young to determine sex (Schotsmans et al., 2018; Schotsmans et al. forthcoming). Blue and green pigment were only observed in burials of adult females (n=5), adolescents (n=2), children (n=1) or infants (n=3) excavated during the Çatalhöyük Research Project, and only present as grave associations, not applied to human remains (Vasić, 2018; Vasić et al., Volume 13, Chapter 17; Schotsmans et al. forthcoming). In this regard it should be mentioned that Mellaart (1964b: 93–94) describes that 'green paint was found on three burials in Levels VI and VII. In one case, a male (?), it covered the bones; in another, female, it had been applied to the "eyebrows" on the skull'. Indeed, one cranium excavated by Mellaart (Trench F, F.V.1/61) contained green staining on the frontal bone. Radivojević et al. (2017) suggest that post-depositional firing of buildings could have changed green mineral fragments around the remains into metallic copper fragments. This could have stained skeletons green, instead of being intentionally applied to the individual. However, the context of this specific cranium is unclear. With sex-determination of the cranium being less reliable (Walrath et al. 2004; Walker 2008), and the question mark behind the word 'male' in Mellaart's text (1964b: 93), it is difficult to interpret this evidence as an exception to the interpretation of blue and green pigment being reserved for females and children. The green staining on Mellaart's skeletons should be studied further before any conclusions are drawn.

An interesting and unique example are the burials in succeeding houses Buildings 131 and 129. Both buildings contained a number of inhumations, with primary inhumations of an adolescent (23126), estimated between 16 and 20 years old at death, and a child (19460), estimated between 10 and 14 years old at death, buried in almost exactly the same place in the north-eastern platform of the building. They were both in the vicinity of secondary crania and disarticulated remains and both buried with obsidian mirrors (figs 16.17 and 16.18), red and blue pigment and beads. The cranium of female adolescent Sk.23126 was resting on a fragment of pottery, and buried with a large number of coloured beads, wooden objects, a large collection of raw ochre nodules, an obsidian mirror and a small lump of azurite from an arsenic-rich geology (Haddow et al. 2017). Child burial (19460) was associated with two obsidian mirrors with blue and red pigment, together with hundreds of very elaborate beads (Knüsel et al. 2012; Vasić et al., Volume 13, Chapter 17) (fig. 16.17).

Plaster treatment

Plastering activities at Çatalhöyük were not limited only to domestic structures. Five individuals (0.9%) exhibit evidence for plaster used as burial treatment, a practice that is common in the PPNB period of the Near East (e.g., Bonogofsky 2001; 2005; Özbek 2009; Slon et al. 2014). The deposition of an old adult female (11306) buried in B.42 holding a plastered and painted adult skull (11330) is the only evidence of skull plastering so far found on the site (Hodder 2006; Boz, Hager 2013; Nakamura, Meskell 2013). The plaster has not been analysed yet in order to confirm if it was a lime-based or a gypsum plaster, but the red paint was identified as iron-oxide (Carter 2009). In addition, a plastered and painted mandible (19829) was recovered from a post-retrieval pit in B.89 (Haddow, Knüsel 2017). Furthermore, a young adult (30040) from a multiple burial in B.131 appeared to have been treated with plaster. Within the plaster, many phytoliths were found which could indicate some sort of container (a bag?) soaked in plaster. The plaster, analysed

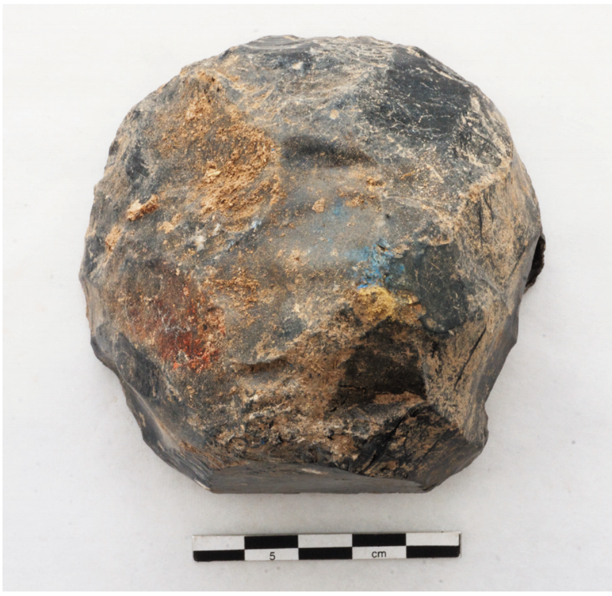

Figure 16.17. Ventral view of obsidian mirror (19447.x3) with red and blue pigment found near skeleton (19460) (photograph by Jason Quinlan).

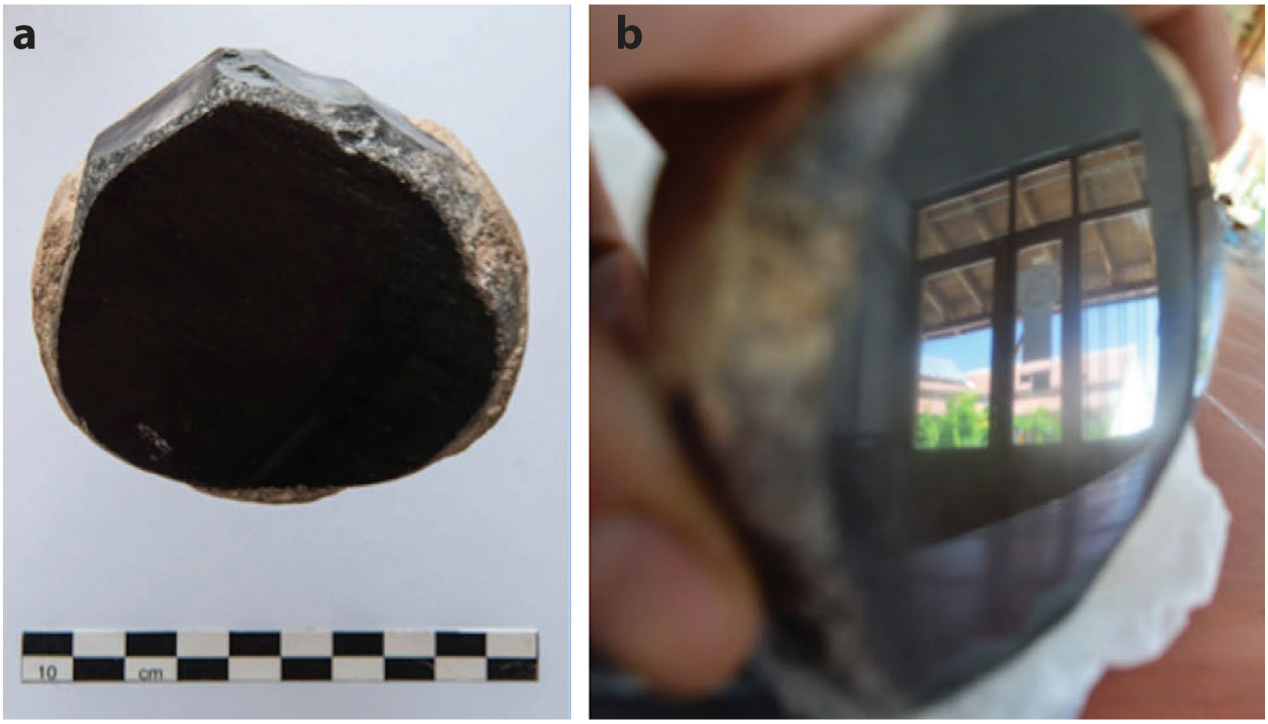

Figure 16.18. Obsidian mirror from burial fill (30039): (a) well-polished dorsal face (photograph by Jason Quinlan); (b) its reflective surface showing details and colours (photograph by Sean Doyle).

with PXRD, was characterised as calcium-carbonate based, thus different from the gypsum plaster burials from Körtik Tepe (Erdal 2015). Two individuals ((14441) and (16601)) from B.49 showed evidence of treatment of limbs with plaster. Unfortunately, no samples were taken for analysis. In the Roman period, it has been suggested that patches of lime on or near specific body parts may relate to a perception of which parts of the body had been the cause of death or were infected (Barber, Bowsher 2000). However, examples of this practice during the Neolithic Near East are scant. Nevertheless, it is important to note that in some cases the light colour of the burial fill could have hampered recognition of plastering on skeletal remains. Hence, it is likely that the current data are an underestimate of the actual frequency of such practice at Çatalhöyük.

Finally, one obsidian mirror (30039.x2) associated with skeleton (23126) was covered with a fine white plaster on the ventral face and margins. Its dorsal face was ground and well polished so that the reflective face was almost entirely blemish-free (fig. 16.18a). It only contained a few small, shallow scratches. Unlike other mirrors found at Çatalhöyük, and compared to the two mirrors associated with skeleton (19460) in B.129 directly above, this mirror had an impressive reflection. When the mirror is turned at an angle to the viewer, all details and colours become visible due to the slight convexity of the surface (fig. 16.18b) (Doyle 2017).

Contextual, spatial and diachronic associations

Pigment treatment in burials

When examining both categories, direct pigment traces and pigments as burial associations, a large difference is noted when comparing adolescents to children and adults. In total 52% of adults, 5% of adolescents and 43% of children had some sort of pigment treatment. Blue and green pigments were found with all age categories but only observed with females, adolescents, children or infants (three infants, one child, two adolescents, one young adult, one middle adult and three old adults).

Mellaart (1967: 209) stated that only female burials were treated with red pigment. Data from the Hodder excavations demonstrate that this is the case when considering pigments as grave associations including blue and green colours (36% is female). When looking at both pigment traces on the skeleton and pigments as burial associations (n=61+1), 30% are male (n=18) and 23% are female (n=14) (47% / n=29 sex could not be determined). Taking only 'red' pigments into account (direct pigment traces and associated objects) only 15% are female (n=8) and 33% are male (n=18) (Schotsmans et al. forthcoming).

Eight out of 15 stained shells were placed into burials, but only two examples were associated with a skeleton with direct pigment traces. Skeleton (32818) was a primary disturbed burial of an adult male, and skeleton (22196) was a secondary burial of a young adult male cranium only. Interestingly, the crania of both individuals displayed a cinnabar stripe. The shells ((22194.x6) and (31884.HP)) found in those burials also contained cinnabar. This confirms that the shells might have been used as containers for the cinnabar. The fact that they were both recovered from male burials contests Mellaart's (1967: 209) observations that red-stained shells were female grave associations.

Another observation by Mellaart (1967: 209) involved an association between the presence of red pigments in burials and mirrors, a suggestion further supported by Hamilton (1996). The Hodder excavations only revealed two multiple burials with pigments and mirrors (F.3630 in B.129 and F.7961 in B.131) (see above), which makes the sample too small to allow a solid test of this pattern (Vasić et al., Volume 13, Chapter 17). The function of the mirrors is still unclear, but their co-occurrence with pigments might provide information about how mirrors were used, such as for the application of facial cosmetics (Vedder 2005; Hodder 2006).

In terms of diachronic patterns, Mellaart (1966: 183) suggested that the use of (red) pigments was more common in the earlier occupation levels than in the later ones. This trend can be confirmed (fig. 16.19). Percentages of individuals with pigments from the Early, Middle, Late and Final occupation periods amount to 39.7%, 10.4%, 4.6%, and 0% respectively (fig. 16.19) (Schotsmans et al. 2018; Schotsmans et al. 2020; Schotsmans et al. forthcoming). However, it should be noted that the sample size from the Final period might not be representative, as only 20 individuals were excavated. An additional observation is that a combination of cinnabar on the cranium and ochre on the postcranial skeleton is only observed in the Early period.

Paintings and burials

An association between paintings and burials, as observed during the early years of the Hodder excavations (Last 1998; 2005), is supported by more recent archaeological data. A comparative overview of number of buried individuals and painted plaster layers for each building (considering only buildings that have been excavated to at least 75% of their occupational sequence) helps clarify to what extent this association is widespread at Çatalhöyük (Busacca 2020: fig. 13). Although not every building shows a direct association between number of buried individuals and number of painted layers, an association between multiple paintings and multiple burials in the same buildings is present: of the nine buildings showing a number of painted layers above the average of ten (Buildings 17, 80, 1, 3, 49, 52, 77, 114, and 44), eight of them (all except B.3) also show an above-average number of buried individuals (more than 14). In these buildings, therefore, heightened painting activity is accompanied by heightened burial activity.

During the Middle period this association is strengthened by a clear intra-house spatial association between paintings and funerary activity. During this period, paintings and burials tend to be located at close distances within the house, usually along the northern and eastern walls, as revealed by a comprehensive spatial

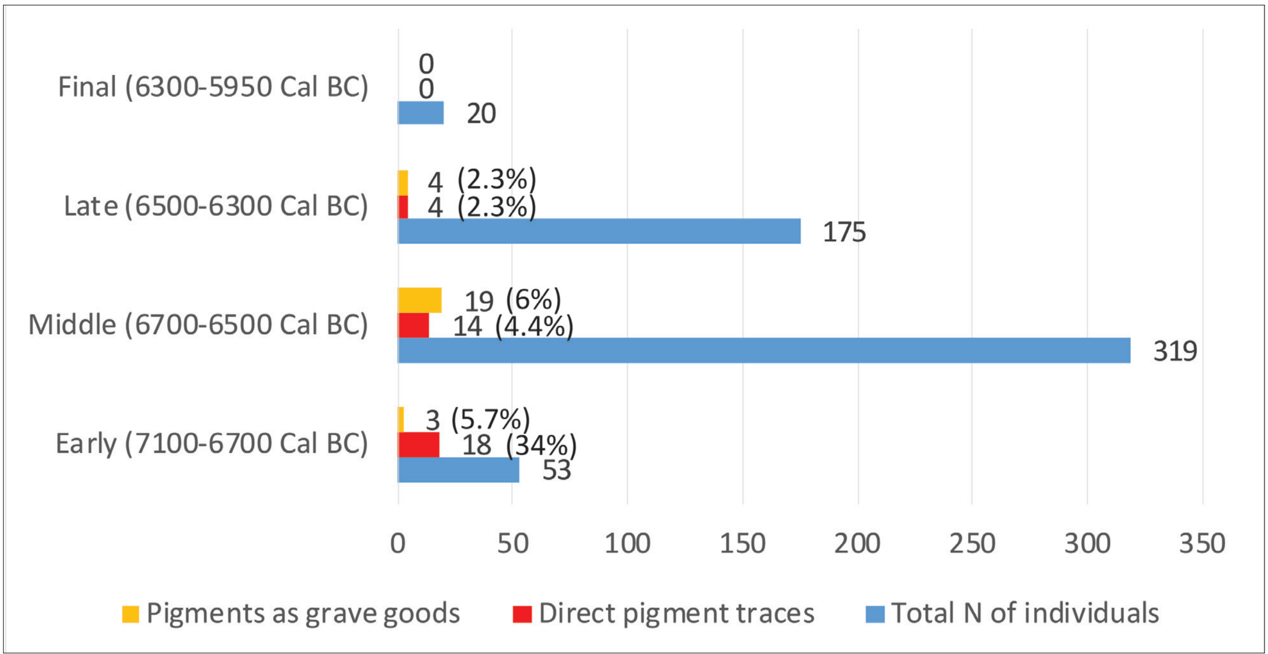

Figure 16.19. Number of individuals and relative percentages of skeletons with direct pigment traces and associated pigments per occupation period.

analysis focusing on the location of architectural paintings (Busacca 2020). This close association appears especially evident when paintings and burials are mapped together, as shown in the case of level North G in the North Area (fig. 16.20). An important role in this spatial association is played by burial platforms, which are a common location for paintings during the Middle period, such as in the cases of Buildings 131, 77, 114, 49 and especially Building 51/52, where the only paintings attested in the building occur in the close vicinity of the two platforms that contain most of the burials in the building. The same could be said for many of the Middle period buildings in the South Area, such as Buildings 89, 76, 80 and 96.

From a contextual point of view, associations between paintings and burials appear more complex and vary across buildings. As shown in the synoptic tables in figure 16.21, some buildings show a clear overlap between multiple-painting and multiple-burial occupational phases. An interesting case in this sense is B.1, where all the paintings discovered in the building are attributed to the same two subphases in which the highest number of burial events occurred (14 in subphase B1.2b, and seven in subphase B1.2c). In this case, then, it is very likely that painting and funerary activities were taking place within a relatively narrow time range, with the practice of painting likely being part of the funerary practices. The opposite seems to be true for B.80, where the phase with most burials (B80.2.4) has no paintings attributed, while the phase with most paintings (B80.2.6), in turn, has no burials. This suggests that painting events were not chronologically associated with burial events in this building. A combination of stratigraphic connection and separation of main painted phases and main burial phases seems to be the most common scenario in other buildings, including Buildings 131, 77 and 49.

A marked shift in painting locations and contextual associations occurred at the beginning of the Late occupation period (Levels North H and South P; ca 6500 cal BC). Most importantly, painting activity decreased and paintings ceased to be spatially associated with

Figure 16.20. Paintings and burials during level North G. Detail of the North Area. The map shows that areas surrounding burial platforms (see plotted skeletal remains) are usually also marked by paintings (red lines).

Building 1

phase	burials	paintings
B1.1b	5	0
B1.2a	0	0
B1.2b	**14**	**3**
B1.2c	**7**	**3**
B1.3	0	0
B1.4	3	0

Building 76

phase	burials	paintings
B76.1	0	0
B76.2.1	1	1
B76.2.2	3	2

Building 131

phase	burials	paintings
B131.1	5	0
B131.2	2	1
B131.3	1	2
B131.4	**6**	**3**

Building 77

phase	burials	paintings
B77.2	7	2
B77.3	**7**	**3**
B77.4	0	5
B77.5	0	4
B77.6	2	2
B77.7	2	6
B77.8	0	0

Building 49

phase	burials	paintings
B49.2a-b	**2**	**8**
B49.2c	0	0
B49.3-5a	3	0
B49.3-5b	3	0
B49.3-5c	1	0
B49.3-5d	0	3
B49.3-5e	0	1
B49.3-5f	0	3
B49.3-5g	1	0
B49.4	0	0
B49.5a	3	1
B49.5b	2	0
B49.5c	1	1
B49.6	0	0
B49.7	1	4

Building 80

phase	burials	paintings
B80.1/2.1	0	2
B80.2.2	2	0
B80.2.3	1	1
B80.2.4	5	0
B80.2.5	1	2
B80.2.6	0	3
B80.2.7	0	0

multiple-burial phases
multiple-painting phases
multiple-burial and multiple-painting phases

Figure 16.21. Synoptic tables showing occupational phases and relative numbers of burials and paintings of selected buildings belonging to Levels South O and North G. Multiple-burial phases, multiple-painting phases and combinations of both are highlighted; below average paintings or burials are not highlighted.

burials, showing a more dispersed distribution and even an association with features such as hearths and ovens (Busacca 2020). This trend could be linked to the important site-wide changes that occurred from the Late period onwards (Level South P) (Hodder 2014d).

Paintings and burials with pigment treatment

When only burials with pigment treatment are taken into account, there appears to be an association between numbers of painted layers per buildings and pigment treatment in burials (either as stained skeletons or pigments as burial associations). Seven out of the nine buildings (Buildings 17, 80, 1, 3, 49, 52, 77, 114 and 44) which have above-average painted plaster layers show at least one burial with pigments on human remains or as burial associations (the average is ten layers, considering all the buildings that have been excavated to at least 75%). Some of the buildings even have many more. Building 17, with 31 painted layers, contains seven inhumations with stained skeletons and one inhumation with a lump of cinnabar, and B.77, with 48 painted layers, has one stained individual and two stained objects. However, there seem to be concentrations of pigments in burials in buildings that did not yield large painting corpuses. Building 150 does not show any painted layers and has two stained individuals and two associated pigments. This shows that an interpretation based on association is not as straightforward.

An interesting case study on the association between paintings, burials and pigments is B.114, located in the North Area. Building 114 was a very small building that demonstrates a marked degree of elaboration as well as several paintings. First of all, the building was characterised by an unusual 'inversion' of the commonly observed internal arrangements (with the 'clean' area to the north and the 'dirty' one to the south), having a burial platform in its southeastern corner, a 'clean' platform in its southwestern corner and an oven encased in its northern wall. This deviation from the observed norm could possibly be related to the exceptionally small size of the building. Rather early in the occupational sequence, a bright-orange-painted geometric pattern appeared to be located in the southeastern sector of the southern wall (F.1024), right above burial platform F.638. Although the geometric painting was poorly preserved, its design could be recognised as an example of the 'ladder' design documented in other broadly contemporary buildings such as B.96 and B.77 (Busacca 2020; Volume 14, Chapter 12). The geometric painting was sealed by a poorly preserved red-painted layer. Interestingly, two burials excavated in the burial platform next to the painted wall could be linked stratigraphically to the painting (B. Tung, personal communication), both bearing evidence of pigment. Double burial F.8100 consisted of a young adult male (30007) and an infant (30010), both with cinnabar on the cranium. In the grave fill and close to the right shoulder of the adult, a 'macehead' was found (Tsoraki, Volume 14, Chapter 13). The grave fill also contained a fragment from a bone point and a human tooth with a perforation resulting from a carious lesion (Haddow et al. 2019), but no beads were found in this burial. The second burial consisted of a young adult male (8598) stained with ochre and a neonate (8596) with a lidded basket. This is one of the few examples where a stratigraphic link between a painting and a burial event could be established and could represent evidence that attests to the link between paintings and funerary practices, a link that might be reinforced by the presence of red pigment in the burials. During a later occupation phase of B.114, red-painted layers occurred on the southeastern burial platform F.638 and on a step or pedestal abutting the northern wall in its western area (F.7567). The northern wall (F.1026) was also painted red three times during its use life. In a later phase of the building, horizontal grooves similar to those encountered in Buildings 79 and 80 were decorated with red paint. Two layers of red-painted decoration on a niche located in the middle of the southern wall (F.8102) could also be tentatively attributed to this phase of the building. Three stone palettes were recovered from this building (Tsoraki, Volume 14, Chapter 13: fig. 13.31).

Paintings and stained objects

While pigments were used for different purposes at Çatalhöyük, including the treatment of the dead, architectural decoration and the colouring of objects, there is a significant correlation between buildings that have palettes and wall paintings (χ^2=0.000, df= 28). However, this is not always the case. Building 77 has a large ground stone assemblage and extensive wall paintings but lacks schist palettes (Tsoraki 2018; Volume 14, Chapter 13). The same is observed with stained shells. One cinnabar shell (22065.x3) was found in B.77, where at least 48 painted layers were observed on the wall (100% excavated). Three shell palettes with cinnabar and ochre were excavated in B.49, which had at least 31 painted layers (100% excavated) (table 16.1). In contrast, two shell palettes and one painted shell were recovered from Building 150, which did not have any painted layers but did have burials and objects with pigments. The material repertoires of B.150 also include a large number of schist palettes (Tsoraki, Volume 14, Chapter 13). Amongst the burials was a primary disturbed burial with cinnabar on the cranium (32818), an isolated red-stained cranium (23972) and lumps of blue and red pigment in a multiple burial. In addition, possible malachite was observed on a clay stamp (23993.D1) found in an infill layer of B.150 (Meskell, Nakamura 2017), and a limestone figurine (20736.x3) from the make-up layer of the platform also had limited traces of possible red-coloured pigment on the head, around the ear and on the bottom of the right foot (Meskell et al. 2016).

Diachronic summary

To summarise diachronic patterns, schist palettes were used extensively for pigment processing activities throughout the whole occupation sequence at Çatalhöyük, with an increase in the number of palettes in the Late period (Tsoraki, Volume 14, Chapter 13). Architectural paintings are also attested throughout the site's whole occupation, especially during the Early and Middle periods, with a decline in painting activity at the start of the Late period (Busacca, Volume 14, Chapter 12). Clay balls in general were mostly found in the Early and Middle periods, but clay balls with pigment were extremely rare and only recovered from the Early period. The single clay object with pigment comes from the same period (see above). Pigment treatment for funerary purposes was more common during the Early period (Schotsmans et al. 2018; Schotsmans et al. 2020; Schotsmans et al. forthcoming). Shells with pigments only belonged to the Middle and Late periods (Veropoulidou, Volume 14, Chapter 10). Considering the use of pigments in general, the results show that pigments were used throughout the whole occupation, confirmed by the schist palettes for pigment processing, but with changing functions and on different objects.

Discussion and conclusions

Pigments and colours played an important role during almost 1,000 years of habitation at Çatalhöyük. Clearly, the inhabitants were well aware of their natural environment. The operational sequence for pigments includes raw material acquisition, heating rock fragments, the production of a binder, pigment processing (fracturing, crushing and pulverising) and mixing pigment and binder (Rosso 2017). While not every pigment goes through exactly the same phases, these steps show that thorough knowledge of the transformation and physicochemical properties, together with the use of appropriate tools, is required. In addition, the inhabitants were selective, such as in their choice and acquisition of raw materials to create visually distinctive objects or in their choice of certain pigments for certain applications. Jones (2002) suggests that such artefacts have complex biographies and are directly linked with the community. 'The use of substances from spatially distant sources and the deployment of these substances to create pigments and coloured artefacts, means that many artefacts metaphorically speak of temporally extensive relationships among the living' (Jones 2002: 166). Similarly, Clarke (2012: 177) states that 'the plaster production process and the act of coating the floors and the walls with plaster played a key role in the creation and maintenance of community cohesion and social order'. According to Chapman (2000: 17–42) 'the operational sequence and the actual coloured artefacts offer the potential for enchained social relations, being the locus for expression and constitution of relational orders of personhood'. Following these arguments, pigments and coloured objects at Çatalhöyük could have played a role in building identities and social structure, but also in social differentiation. A question to consider is whether the observed associations between pigments and burials can inform us about social relationships between the inhabitants of Çatalhöyük, and about the existence of selective practices possibly driven by social differentiation in this community.

Preliminarily, the fact that only a small portion of the buried population displays evidence of treatment with colourants suggests that this was not a treatment accorded to all members of the community. This raises the question of the factors motivating such selection (for example, vertical vs horizontal social differentiation). On the basis of the available data, however, we can only exclude that sex and/or age-at-death were relevant variables in this case. While it is often thought that the arrangement of the corpse and the associated objects are indicators of the identity and the social role of the deceased, it should not be forgotten that funerary behaviours might act as a social representation of the survivors, rather than of the deceased and their social standing (Parker Pearson 1999; 2016). The majority of the inhabitants of Çatalhöyük did not receive a special treatment. That means that only some individuals seem to have been important in tracing ancestry. In this context, instead of burying to conceal, burial might have been meant to preserve and commemorate the dead. Following Young (2006), who suggests that colours have relational effects, this might explain a possible association between painted walls and burials, or, even more so, between painted walls and burials with pigment. Along the same lines, Last (1998) argues that the paintings were not simply decoration and that 'the images participated in mediating the relationship between the living and the dead... [creating] an overlap between domestic and ritual practice' (Last 1998: 367). For Çatalhöyük, the connections between daily practice, social rules and social memory have been discussed previously (e.g., Hodder, Cessford 2004). The pigments on the walls, the pigments on objects and the pigments in burials tie in to that. Last (1998) suggests that the paintings become part of the building, creating a link between the household and the physical structure of the house. The idea of the house as a container of both people and memories is known from anthropological research in Botswana (Morton 2007). Buildings, with their current occupational activity, often retain a 'genealogical' dimension with activities of past occupants, and changes to the building itself are materially linked in memory (Morton 2007). The burials were part of processes of memory selection, with each interment creating a 'memory community' (McAnany 2011). But, as Hendon (2010) describes, this memory does not take place in the mind, it is a constant presence through engagement with places, things, sounds, odours and tactile sensations. At Çatalhöyük, the wall paintings strengthen visual memory. The use of similar colours on the walls and in burials might have triggered this visual memory and created a connection between images, objects and people. From a sensorial perspective, the odour of decaying bodies under the platforms might have generated emotional memory. Tactile memory might have taken place through handling, re-handling and circulation of human remains. This all indicates that the inhabitants of Çatalhöyük were surrounded by memory. By living with the dead, by embodiment of the dead, they kept their ancestors alive.

What was the significance of these different colours? The meanings associated with colour are culturally constructed, so that an interpretation cannot be based on a universal perception of colour (Erdoğu, Ulubey 2011). There is an increasing use of ochre in burials from the Epipalaeolithic onwards in the Levant and Anatolia (e.g., Erdal 2015; Bocquentin, Garrard 2016; Richter et al. 2019). Based on ethnographic evidence, red has been interpreted as symbolically indicating life, blood or power (Scarre 2002). Other ethnographic studies show that red ochre is used in house floors for various celebrations such as marriage and death (Boivin 2000). Mellaart (1967) suggests that red paint has a protective function. He writes that 'it wards off evil spirits and protects the object so decorated, be it the body of the dead, the wall of the house, the bench or the platform, ….' (Mellaart 1967: 150). On the other hand, it might have been functional, as an insect repellent, for UV protection, for its anti-bacterial properties or as a hide preservative (Watts 2002; Wadley 2010; Hodgkiss 2014; Rifkin et al. 2015). Both interpretations, of symbolic and utilitarian functions, might be correct and difficult to separate. But whether symbolic or functional, it is clear that ochre treatment was not reserved for all inhabitants of Çatalhöyük, and cinnabar treatment even less so.

Why was a distinction made between cinnabar and ochre? And why was cinnabar uniquely applied to the cranium? What was the symbolic meaning of cinnabar? As mentioned above, cinnabar was only applied to the heads of 14 individuals, which equals 2.5% of the total excavated skeletons or 39% of the skeletal remains with direct pigment traces. This could indicate that the 14 individuals with cinnabar in Çatalhöyük were given a special status – not to say an 'elite' status, but a status that differentiated them from the others. Interestingly, age-at-death did not seem to play a role in obtaining this status, as cinnabar was recovered on seven adults, one adolescent, one child and five infants. Cinnabar vapours are hypnotic and act as a sedative when the mineral is heated (Ho et al. 2003; Liu et al. 2008). This could have changed the state of consciousness of the people handling cinnabar. If it was inhaled by the living while applied to the dead, maybe a communication was triggered between the living and the deceased? In addition, cinnabar's bright colour could have expressed power. The headband could suggest that this was not only a treatment for the deceased but also worn by certain living individuals. This would trigger communication between the dead and the living, reserved for only a minority of the community: those selected for ancestorhood. The few instances of cinnabar presence in wall paintings in Çatalhöyük (Çamurcuoğlu 2015; Doherty 2017) could strengthen this relationship and communication between the living and the dead. For example, the wall paintings in B.49, described by Çamurcuoğlu (2015), show a mix of cinnabar and ochre. The burials did not contain any skeletal remains with directly applied cinnabar, but there were burial associations with cinnabar present. Space 100 of B.49 showed a geometric painting consisting of mixed ochre and cinnabar (Çamurcuoğlu 2015). The burial space contained an infant (17939) in a basket with a cinnabar shell that was used as bead/pendant, and another infant (17457) in a cinnabar-stained basket and with several grave associations, including two cinnabar shells and an ochre shell. The presence of cinnabar in wall paintings with a link to burials should be studied further before any conclusions can be drawn. The material properties and long-term instability might have turned cinnabar paintings black when exposed to light (McCormack 2000; Nöller 2015). But maybe cinnabar's toxicological effects were known or experienced by the Neolithic inhabitants too (e.g., Liu et al. 2006; Huang et al. 2012), hence its limited use or its use for special occasions.

The colour white was omnipresent. The application of white plaster on wall and floor surfaces probably had symbolic but also practical reasons. Clarke (2012) suggests that plastering played a key role in the creation and maintenance of community cohesion, but also in expressing a differential status. She described how the whiteness and purity of plaster would have increased luminosity. The act of colouring the plaster would have linked different materials together, so that plaster also became part of ritual practices (Clarke 2012). As described above, these acts not only link different materials together; they also connect the living world to the world of the dead. Adding plaster to skeletal remains or burials, as described previously, is another way to link the living with the ancestors. It is unclear how long the plastered head circulated in the world of the living, but whether it was for a short or a long period, it kept the deceased present in the secular world.

What did the few instances of blue and green pigments in burials stand for? And why were the colours blue and green not used in wall paintings? According to Çamurcuoğlu (2015), there could have been different reasons. Malachite and azurite are known to be ephemeral when applied on wet plasters, and in a dark, closed room, they might have darkened. Or they might have had a prestigious status, only used for ritual or symbolic purposes (Çamurcuoğlu 2015). Blue and green are thought to refer to growth, fertility and ripeness, a suggestion put forward for the Neolithic and Chalcolithic of the Levant (Bar-Yosef Mayer 2019). The abovementioned data from Çatalhöyük show that blue and green pigments were only observed in burials of adult females, adolescents, children and infants. This could indicate that it was a cosmetic treatment reserved for females and children. However, it is important to treat this interpretation with caution. It could be the result of a small sample, and the green stains on Mellaart's excavated skeletons should be studied further.

This chapter has attempted to combine analyses from different disciplines regarding 'colourful things' at the Neolithic settlement of Çatalhöyük during the Hodder excavations. The inorganic pigments uncovered at Çatalhöyük can largely be described as stable, being both lightfast and robust. In principle, they would be able to survive multiple millennia of degradation after deposition. Yet, in several cases only specks or very faint colours were noticed, such as on a limestone figurine (20736.x3), two clay balls, one *Viviparus* sp. and two *Lymnaea* sp. shells. Is the faint colour caused by a different pigment composition and binder or by the different material properties of the object? Clay objects show different colour preservation. On some clay figurines (for example, 12524.H4), the red colour was intense and well preserved, while on the clay balls the colour was faint. Is the difference in colour intensity caused by burial taphonomy or by the object's life cycle, losing its original colour during its lifetime and use? This could be the case for the painted shells, as the faintest are the ones used as pendants. Finally, the colour could have been erased intentionally, but this should be able to be observed by use-wear analysis.

These questions indicate that we likely overlooked some of the coloured objects, and that the current data are an underestimate of the actual frequency of colouring practices at Çatalhöyük. As mentioned in the case of plastered burials or plastered limbs, it was not always easy to observe the difference between the light-coloured burial fill and the white intentional plaster. When minimal amounts of red ochre were present, confusion sometimes arose when trying to distinguish ochre from the iron-rich soil. Other evidence is derived from the infant (17457) buried with an ochre and cinnabar shell. The infant itself did not show any pigment staining. Unexpectedly, the phytoliths of the basket around the ochre shell showed a high presence of cinnabar, indicating that the container might have been coloured with cinnabar. Similarly, a preserved burned wooden bowl (22678.x2) showed small traces of blue pigment (fig. 16.7), which is again very easy to miss, certainly if the wood had totally decayed. Undoubtedly, other colourful materials of organic nature were also part of the Çatalhöyük colour palette (e.g., Russell 2019a; 2019b). Contrary to inorganic pigments, organic colourants generated from plants and animals are typically not as robust; consequently it would be improbable for them to survive. The same applies to organic objects such as colourful leaves or feathers. Their absence, however, does not necessarily mean that they were not used, but rather that they did not leave archaeological traces. By extension, there is clear evidence for how different pigments were employed on wall paintings and in burials, but there is no archaeological evidence of some of the other facets of Neolithic life where colour may have been applied – such as on clothes and textiles, or as cosmetic applications.

Other limitations are pragmatic ones. Only a small percentage of the site has been excavated (<6%). This strongly hampers generalising from the results of this study. In addition, there are methodological limitations. The use of 'possible male' and 'possible female' categories should be interpreted with caution. Every possible male can be a female and the other way around. Reliability of sex determination based on the cranium is even more debatable (Walrath et al. 2004; Walker 2008). For example, Hodder (2006) referred to the plastered skull found in 2004 in B.42 as male, while other reports refer to it as female (Boz, Hager 2013). When the skull is crushed and plastered such as with Çatalhöyük's plastered skull, sex determination is even more limited. The question is, when only isolated crania are recovered, as often seen in the PPNB, is it worth attempting a sex determination or would one rather not determine sex at all? The only other way for sex determinations is DNA analysis, but that comes with a cost.

Many questions remain regarding pigment and colour use at Çatalhöyük. In the future, a consistent and systematic analysis of all pigments from Çatalhöyük, by the same person, with the same recording system and the same instruments, might be useful, including possible sourcing of the pigment and research on the binders that might have been used.

In conclusion, pigments and colours held a symbolic importance for the people at Neolithic Çatalhöyük. The inhabitants had knowledge about the environment, resources, material properties and technologies. The colours were not just aesthetic, but possibly also a way to communicate with the ancestors and to remember the dead. They can be seen as a bridge between the secular world and the ritual world, but they also acted as a means of social distinction. Colours were clearly associated with practices and traditions and can be viewed as mediators of complex, entangled biographical encounters, all being part of 'human-thing entanglement' (Hodder 2011b).

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Supplementary material
For supplementary material related to this chapter, please visit https://doi.org/10.18866/BIAA/e-15. It comprises colour versions of all figures.

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