

The Use of Red Pigments: Colour-Coded Territories

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Introduction

The Early Neolithic people of Ba`ja were part of a colourful landscape in which red-dominated ontologies existed. The colour red was a seemingly omnipresent colour in the village culture of Ba`ja of the Late-Final Pre-Pottery Neolithic B (Late-Final PPNB), too; it is found in the domestic as well as the sepulchral milieus of the inhabitants. This raises the question of whether the etho-ontological forces of red in Ba`ja played a special role, different from what is known from red preferences in many other prehistoric cultures. Or, to put it another way: Is the omnipresence and possible omnipotence of red in Ba`ja a culture-specific characteristic, or can its use and preservation be better – and quite pragmatically – explained by the geological abundance of the mineral in the locality and its favourable preservation conditions in the cultural sediments? This question resulted in one of the questions of this study: To what extent do the etho-ontological forces of the red of the surrounding rocky landscape interact with the contexts of the culturally used red in Ba`ja?

Bo Dahl Hermansen's unpublished essay *Red in Ba`ja* (Hermansen n.d.) permanently reminded the impetus to revisit the topic he had already raised in 2002. But only now is it possible to use the new and more substantial evidence of red in Ba`ja and the etho-ontological and emic approaches frameworks that came up with the latest project development (DFG project *Household and Death in Ba`ja*; <https://www.bajahouseholdanddeath.de>). While in 2002, the topic offered more yet unsubstantiated questions than answers and would have been approachable mainly through Tilley's phenomenological approaches,¹ the more

¹ In several of his works, Christopher Tilley has discussed the possibilities of phenomenological approaches allowing

recent colour-psychological and colour-symbolic investigations and the improved findings allow for extended approaches to red in Ba`ja. The questions about the particular cognitive, cultural, and symbolic consequences of the ubiquitously available pigment in Ba`ja remained.

In General

The red ochre, respectively, the anhydrous ferric/iron oxide red with silica and clay (Rapp 2009), appears to be humankind's oldest colour, with achromatic manganese and white. In Europe, the oldest use of (even non-local) red (hematite) is reported from early Neandertals inhabiting the Maastricht-Belvédère area at 200,000-250,000 years ago (Roebroek *et al.* 2012); the African Olduvai evidence dates *c.* 500,000 years ago (Wreschner 1985).²

Regarding the red colour research in Ba`ja: In our questions and interpretations, we must always be aware that we do not know the entire

statements on the role of colours in prehistoric ethos (Tilley 1994, 1999, 2010). Attempts to understand the role of red in Ba`ja emically need to analyse his approaches – especially for the interaction postulated here between the red of the landscape and the applied red in the settlement.

² The Zhoukoudian cave complex near Beijing is said to have sepulchral hematite utilisation as early as 700,000 years ago (Chunling 2008). In the context of the Ba`ja infant burials, it might be interesting to mention that the earliest use of powdered red ochre is attested “as far as” the Americas on a male infant's corpse of the Clovis culture (11,000-10,850 BCE: site of Anzick-1 in Montana; Lahren and Bonnicksen 1974). A favoured use of red in children's burials is documented for Europe by the geometrically/schematically decorated “ochrated”/Azilian pebbles in the late Gravettian cemetery of the Ligurian Caverna delle Arene Candide (Mussi *et al.* 2023).

colour spectrum. Our current³ empirical bases can neither consider the transient colours from organic raw materials nor know which colour minerals decomposed in the sedimentary environments; the same applies to colour mixtures. Even for the red, we have apparently only preserved mineral red.⁴

The dimensions that colours can be charged with symbolic and ritual and with dominant magical meanings (see the “Conclusions” on such evidence from today’s Beidha: Bille 2019) show the narrow limits for processing cultural-ontological colour questions in prehistory.

Like the perception of the ‘real’ chromatic colours of the visible light spectrum (e.g., red, orange, yellow, green, blue), the human processing of the achromatic ‘colours’ black, white and their shades of grey is a complex process that is essentially determined by light and the eye when processed in the brain becoming subject to ontological cognitive processes. Intersubjectively shared cultural dispositions and attributions modulate neuropsychological colour perceptions. We call these levels of colour processing the ethological and ontological receptions of colour. Since we will never fully know the colour spectrum used in Ba`ja, extensive emic results on colours and colour symbolism in Ba`ja are out of the question. However, this contribution tries to do so for the known red contexts in Ba`ja.

Overall, it must be said that colour research in archaeology, especially in the Near Eastern Neolithic, still needs to be developed. The general potential of archaeological colour research has been promoted by works such as those of Jones and MacGregor (2002) or Eastaugh *et al.* (2013), and specifically for

³ Reifarth *et al.* this volume report about new non-destructive analyses by multispectral imaging or Comprehensive Two-Dimensional Gas Chromatography Coupled to Time-Of-Flight Mass Spectrometry (GC×GC-TOFMS) able to “trace and map hitherto invisible colourants, binders, and scarcely considered volatile organic components associated with human remains or sediments”.

⁴ On the use of organic red, see Davin *et al.* 2023 (“oldest reliable” organic red pigment staining Early Natufian shell beads, using a colourant made from Rubiaceae plant roots by “sedentary” hunter/ gatherers of the Kebara Cave). We must assume that mineral red was also used to dye organic materials through the appropriate use of a mordant (see below).

the Near Eastern Neolithic by Çamurcuoğlu (2015),⁵ Schotmans *et al.* (2020, 2021, 2022), and Dermech (2021). These approaches are still far from being epistemically transparent and an emically oriented etho-ontological colour research; perhaps detailed studies with findings such as those of Ba`ja for the colour red may one day make such approaches possible.

This study understands the colour red as a commodity (*sensu* Gebel 2010) that is subject to commodification processes and develops and serves tangible and intangible territories (Gebel 2014) and their cognitive backgrounds in their contexts, and *vice versa*. This fundamental concept, applied to all Neolithic manifestations, ensures that the contexts of the colour red can always be woven into this – project-specific – holistic approach.⁶

Ethological and Ontological Dimensions of Colours

It is assumed here that red, like all colours but more powerfully, can take on different meanings and trigger reactions that are primarily context-dependent and, therefore, culture-dependent. Most likely, the etho-ontological and ontological diversity of colours can be approached best by a transdisciplinary socio-neurosciences, psychological, and cognitive targeting of the colours’ contexts (Table 1), all reflecting the multi-layered and multiplex powers of colour and colour combinations. For prehistoric contexts, a first access for the time-being might be a Tilley-type of phenomenological evaluation (Tilley 1994, 1999, 2010) to the empiric colour evidence in Ba`ja. This statement represents a tentative research outlook since such approaches also need a sound epistemic transdisciplinary framework (e.g., Gebel *et al.* 2022 for the Late PPNB thanatology), which is the most challenging enterprise.

⁵ Advanced material analyses are available for Çatalhöyük (especially by Çamurcuoğlu 2015), which examined the various yellow, blue, green and black pigments in addition to red ochre/ hematite and cinnabar. The results and their questions could not be considered in this contribution because our material analyses have not yet progressed that far.

⁶ In line with our project approach, we also distinguish between an ethology and an ontology of red (Gebel *et al.* 2022). Many findings do not allow a clear separation of ethological dispositions and ontological norms; in these cases we refer to etho-ontological frameworks (see the “Conclusions”).

Brain anatomically, the perception of and reaction to colours seems to be mainly determined by a network consisting of the superior parietal lobule and precuneus (BA 7) bilaterally, the right hippocampus and the right fusiform gyrus (V4) (Bramão *et al.* 2010). The question of which individual colours and colour combinations trigger neuronal activities should be posed separately for the ethological and ontological contexts since it must be assumed that ontological conditions always influence human colour ethology. For example, we expect that in ‘monochromatic environments’, the brain has other colour perceptions and reactions than in landscapes full of colours (see also the comment below on Ba`ja’s red landscape in contrast with a *hamad/* desert landscape).

Regarding emic explanations of colour effects, social neurosciences can open up fundamental approaches to Neolithic use and agency: The socio-neuroscientific approach could help reconstruct the cultural or culturally specific influences on the perception of colours and comment on their symbolic implementations. Social neurosciences would investigate how these symbolic meanings are processed and interpreted in the brain with their social references; this includes the influence of colours on social interaction and the associated interpersonal and external attachment and rejection behaviour. Again, research limits are set by the restricted empirical colour evidence and related ontological properties that are unreachable by research.

A cursory review of the extensive literature on the psychological effects of colours reveals relatively uniform human emotional perceptions and reactions at the neurological and ethological levels. Red’s primary (universal) properties can be characterised as alarming, alerting, warning, triggering attention, energy/ activity, and behaviour countering depression. On the ontological levels, *i.e.*, the levels on which the perceptions of/ reactions to red are culturally modified, the meaning and effect of red can differ significantly in transcultural comparisons (Table 1).⁷

Elliot and Maier (2014) presented an introductory work for colour psychological studies. While research into the ontological-cognitive processing and effect of colours is very advanced,

⁷ Information from the literature was only interpreted/ “translated” for the Early Neolithic in the shape of keywords inserted in Table 1 to observe the space restrictions of this contribution.

basic research on the different colour types from the perspective of evolutionary predispositions is relatively rare. A few of the numerous colour-psychological studies on red should be mentioned here, *e.g.*, that red triggers emotional, physiological and psychological perceptions of dominance (Mentzel *et al.* 2017). The effects measured by Stroop tasks show strong evidence (with modern western test persons) of an “implicit red-dominance association and a partial red-rest disassociation”, encountering that red triggers a dominant emotional and behavioural response; males and females are alerted by red differently. Other studies have shown in animal experiments that red may be a general signal of intimidation (Pryke 2007) or have an aposematic (warning) effect. Red also seems to have a generally strong signalling effect in appealing and aversive contexts and is therefore used to mark oneself, others and things, *e.g.*, red lipsticks, red life rings, red traffic signs, the red pileolus cap, the Ferarri Red, and many other reds (see *e.g.*, Berthold *et al.* 2017 or Kuhbandner and Pekrun 2013). Red also appears responsible for a high recall rate of at least objects in human memory (Kuhbandner *et al.* 2015). However, all colour psychology studies have in common that red can take on very different meanings depending on the context – just like any other colour, but to a greater extent – and it is only sometimes clear whether these have exclusively ethological backgrounds.

The cognitive science study of Neolithic colours and colour perception would focus on the sensory perception and cognitive processes associated with colour interpretation, categorisation and meaning of colours based on social neurosciences and psychological theories. It is important to emphasise that colour perception and interpretation in the case of the Late PPNB are also co-determined by robust ontological frameworks, *i.e.*, precisely the relational social forms and/ or individual identities. Since colours trigger emotional and cognitive associations and moods, cognitive science findings on using colour in funerals are highly relevant.

Regarding linguistics and sentiments, we have to expect that names given to colours in Ba`ja reflect detailed colour sensitivities related to physical and cultural environments, meaning that red and its hues may have received a lot of names according to the contexts they come from or were used in – and that hardly or non-present colours received less linguistic attention (see also Petru 2006). In addition, the

different wavelengths and thus different energies of colours influence or determine different emotions and moods, like calming, alarming, warm/cold, freshness, purity, earthiness and others (see also Petru 2006). The evidence from the southern Sotho and the San (Lewis-Williams 2001) that a certain quality of red pigment has a supernatural influence on weather phenomena shows that we must also consider such magical cognitions.

Table 1 is a preliminary attempt to assemble the probable determining and sentiment-manipulating properties of red in Ba`ja; it mentions only the primary (*i.e.*, safer) potentials involved in the interplay of red-related neurobiological, psychological, cognitive, and behavioural features in the ethological and ontological emic contexts.⁸

⁸ Of course, only those assumptions are included here that are potentially valid and would support the recognition of the relative etho-ontologies and their cognitive and behavioural systems of the Early Neolithic village, *i.e.*, are emically oriented. Insofar as a cultural relativist approach even denies the legitimacy of such assumptions, this would be considered problematic; however, this topic cannot be included in this contribution.

Transculturality of Red

The fundamental questions raised here about *Red in Ba`ja* should always be placed in the context of a fundamental transculturality of the colour red. As complex and different as the interacting contexts of cultural significances and symbolism of red and the other colours are, their ontological expressions in past and present cultures and societies can be just as coherent. Red and its cultural signage milieus were, are, and will be deeply embedded in everyday practices and rituals of humankind. However, a cultural history of red only seems possible if it takes a culturally relativistic approach, ensuring that colour uses are only ever understood in their own right in the context of the associated social forms and commodification regimes before an intercultural comparison is possible. These emic approaches also include those areas of social neurobiology that may already be ontologically influenced (Gebel *et al.* 2022).

The work of Petru (2006) offers an excellent introduction to the diversity of the symbolic significance of red since the Palaeolithic and in the ethnographic evidence. The worldwide availability of iron oxide made red ochre a dominant

Table 1 Red's etho-ontological frameworks and disciplinary fields: potential/ expected properties of red in Ba`ja. (presumed properties in grey)

	Fields of Social Neurobiology	Fields of Colour Psychology	Fields of Cognition	Behavioural Fields
Ethological frameworks	Alerting/ alarming/ warning Triggering energy/ activity Combatting depression	According to contexts: raising/ inducing/ displaying: Attractivity/ attention Vitality Danger Banning Restlessness	Red-related cognitive processes influence/ regulate: The tangible/ intangible commodification and territoriality of the colour, especially issues of Threat/ fear/ alertness Rule settings (boundaries, sanctions)	Potential types of energetic emotions and moods:
Etho-ontological frameworks		Anxiety Appetency/ desire Vitality/ passion Heightened motivation	Power, stressors and stimuli establishment and control Ascriptions Identity affirmations	Arousal behaviour Boisterous/ bold/ spontaneous behaviour Passionate behaviour Display/ postural behaviour
Ontological frameworks (chiefly household and sepulchral/ symbolic and ritual contexts)		Power/ strength/ courage Banning/ confining Attractivity signals Discrimination (differentness) Reproduction/ fertility?	Antiseptic properties Hidden super-/supranatural meanings related to the otherness Healing properties, blood (with hematite)	

colour of human rituals, symbols, displays, and magical thinking of human ethological dimensions. This always raises the question posed in the introduction to this contribution: What does the ubiquitous availability of the mineral have to do with the etho- and ontological imprinting on and by the mineral?

A typical transcultural characteristic of red is its use in many prehistoric funeral contexts, traditions which disappeared at the latest in proto-historic times. Just as it would be impossible in Western cultures to use a dominant red in today's burial ceremonies, would it have been equally impossible for prehistoric people to use other dominant colours than red in their burials? Red remains highly important in contemporary indigenous cultures; examples are the Himba in Namibia, the Massai in Kenya/ Tanzania and the Hamar in Ethiopia, where red is used culture-confined and in most diverse meanings and purposes.

From the Neolithic of the Near East, we know specific gender and age assignments of colour and coloured objects in graves. On the other hand, this phenomenon is supported by the absence of particular colours in burials, also in Ba`ja (see Benz *et al.* this volume, Part 1).

Below is another type of the expected spectrum of red meanings that must be assumed for the Neolithic use of red ochre: Powdered iron oxide (*mogher*, imported from Syria) is used today by traditional Bedouins of southern Jordan not only for property markings on sheep but also for withholding milk for human consumption: the coloured powder is applied to the anus area of lambs to prevent the ewe from recognising her offspring and allowing it to suckle. More on today's magic and allure of colours and things, especially on colourful beads, amulets and stones in the Bedouin environment of Beidha, can be found in the great work by Mikkel Bille (2019). For example, in today's social environments near Ba`ja, red is understood as a guarantor of fertility and love, blue protects against the evil eye, and white enhances breast lactation.

Colours in Ba`ja: the Research Questions

The forces of colours in Ba`ja are unknown. As in all cultures, colours in Ba`ja may have been a means of consciously and unconsciously transferring social messages and manipulating feelings and moods such as power and

emotionality; unlike language, smells and sounds, they may have been an extended means of communication and possibilities through their permanent presence (visibility). The nuanced possibilities of colour tones through pigment proportion-controlled mixtures are suitable for expressing and influencing feelings and moods and giving colours specific forces. Even the production of colours in Ba`ja may have been both a technical and a ritual/ symbolic or magic process; the role of linguistic differentiation was already addressed.

In addition to the above-mentioned topics/ questions, the following main questions are currently associated with research into Ba`ja's red pigments and colours:

- What is the variety of primary technologies involved in producing red pigment and red colour? Which additives were used for which purposes and in which proportions, and/ or did binders/ fillers naturally find their way into the paint from the pigment-containing rock? Were organic binders used in addition to mineral binders? What role does kaolinite play in particular?
- Which questions make it worthwhile to identify the geological fingerprint (provenance) of the red pigment resources in the rock?
- Is pure liquidised red pigment used in burial contexts, or were also red paint products used for sprinkling across corpses?
- What questions should be asked of taphonomic chains to clarify the different uses of red in the eventological processes of burials (see also Reifarth *et al.* this volume)?
- Does the use of red in conjunction with other colours indicate social and other differentiations?
- Can functional and social differentiations and symbolic references be derived from using red and its hues of red in flooring?
- Does the use of colours in Ba`ja indicate a dissolving of the living and dead spheres, or do patterns of colour use suggest a separation?
- To what extent was red pigment/ paint produced in Ba`ja (for personal use or as a medium of exchange)?
- Are the pigment pellets (balls) indicating standards in dosing red?
- Is it possible to create an epistemically valid model of the commodification of this colour, given the current state of red evidence in Ba`ja?

Presumably, the choice of the colour red was always substantiated and never accidental in Ba`ja. At least for the ornament industry, it can be stated that ornaments appear to have had a specific “deliberately chosen composition of colour patterns” (see Benz *et al.* this volume, Part 1). The ornament colours of Burials CG5 and CG9, in particular, underline the richness of colours and their impact as composed patterns were intended.

Red in Ba`ja: the Material Evidence and its Archaeometry⁹

Regarding the archaeological evidence, the red pigment occurs as a raw material in Ba`ja in two forms: as iron oxide extractable in various concentrations from the lithostratigraphic units of the Umm Ishrin formations in the sandstone rock landscape and as an – in the cultural layers – rare pure iron ore in the form of hematite pieces.

The yellow ochre (hydrous iron oxide with silica and clay, see Rapp 2009), also used in Ba`ja (Fig. 11), is a natural earth pigment colour with warm yellowish-ochre hues. It consists mainly of iron oxide and is found in various grain sizes, but its sources are not identified in the Ba`ja region.

The following chapters deal with the archaeological contexts of red with the corresponding archaeometric results known to date.

Geological Evidence

Ba`ja’s location is embedded in the layers of the Umm Ishrin sandstone formations (Middle-Late Cambrium) underlying the soft whitish Disi sandstone formations (Lower Ordovician), chiefly southeast of the site. The Umm Ishrin formations provided all qualities of the layered sandstone raw material (Andresen 2007: SRMG 1-4; Heinrichs 2008), which was extracted explicitly by the Early Neolithic inhabitants of Ba`ja for the manufacture of the famous Ba`ja sandstone rings (Gebel *et al.* 1997, 2010;

⁹ Benz *et al.* 2023 refer to another (bright) red, cinnabar: The use of this mercury sulphide originating from the Central Anatolian Taurus Region is attested for colouring bones, mainly skulls, from the Early Neolithic layers of Kfar HaHoresh, Abu Hureyra and Çatalhöyük (Goring-Morris 2005: 95-96; Haddow *et al.* 2015). So far, we have no evidence for the use of this exotic colour in Ba`ja, which might result from missing systematic analysis.

Michiels *et al.* 2012). To the east of the Ba`ja area (along the limestone escarpment of the western Arabian Plateau) and geostatigraphically above the Ordovician, the Lower Cretaceous Karnub Sandstone extends (Barjous 2003).

The red pigment obtainable from a dehydrated mineral form of iron oxide, hematite, is locally available. It is found rounded during our surveys in the area without an apparent source context; most probable, this archaeologically rarely attested raw material (in Madamagh/Nebekian Madamagh, Middle PPNB Beidha, Late PPNB Basta and Ba`ja) was just collected in the landscape and obviously never mined from a bedrock.¹⁰

Regarding the sandstone qualities selected for the sandstone ring production at Ba`ja and most likely its waste being a source for pigments used in Ba`ja (see below), limited petrographic research was carried out (Andresen 2007: SRMG 2; Michiels *et al.* 2012).¹¹ The most suitable raw material for the ring production was the clayish-silty Umm Ishrin sandstone qualities containing high amounts of quartz and clay, Al₂O₃, Fe₂O₃, and MgO (XRD-analysis; Michiels *et al.* 2012: Fig. 3).

Procurement Contexts

A home-based procurement of the iron oxide-containing sandstone varieties providing the red pigment is obvious. The closest and easiest accessible area of suitable layered, clayish-silty qualities of the Umm Ishrin raw materials, including for the sandstone ring production, is Siq al-Ba`ja (the Ba`ja Joint), the gorge leading up to Ba`ja from the Jabu Plain (Gebel 2023: Fig. 3). Depending on the amounts of red pigment needed in Ba`ja (including potentially satisfying outside demands by exporting red pigment), we assume that both mining pigment stones and collecting production residue from the industrial ring production at

¹⁰ An illustration of the local hematite minerals can be found in Byrd 2014: Fig. 8. The geological contexts of hematite in the Ba`ja region are unclear yet: Normally, they are related to copper deposits like Abu Khusheiba (Hauptmann 2000); Bar-Yosef Mayer 2019 reports hematite also developed between Upper Cretaceous and Lower Tertiary formations.

¹¹ Substantial research relates to the Nabatean use of minerals and pigments in the Petra-Area, to be found in *e.g.*, Shaer 2005 and Heinrichs 2008.

the site were the primary sources of Ba`ja's red ochre. Thus, we may state that the home-based and immediate-vicinity-related procurement of the red pigment by Ba`ja's households was not a complex enterprise; it may have occurred in quarries where the wall stones of Ba`ja's houses were also procured.

Each season, one to four pieces of hematite were found in Ba`ja; these iron ores appear amorphous elongated or as amorphous polyhedral cones, rest heavily in hand and may have a bladed/ laminated structure. They are 3-6cm long and sometimes show faceting due to abrasion. They leave a red trace when dragged over a denser sandstone. Some are more rounded as if they had spent part of their biography in clothing or bags.¹²

Production Contexts (Primary Pigment Processing)

Red ochre was obtained by extracting pigment-rich grades from medium-hard layers of Umm Ishrin sandstone in the Ba`ja area and subsequent crushing, pounding and dissolving or by pulverisation by grinding (Figs. 2-3).

Another primary source of the powdered red must have been the chipping, carving, and grinding waste, mentioned above, resulting from the manufacture (see the production stages in Gebel *et al.* 1997) of the sandstone rings of Ba`ja, which were produced in almost every (?) household in Ba`ja. The workability (carving and grinding) of the clayish-silty raw materials (Andresen 2007: SRMG 2) becomes especially easy during the rings' *chaîne opératoire* when their pre-products were soaked in water for less than 10-20 minutes (otherwise an increasing risk of breakage during manufacture occurs), while the hard ferruginous SRMG 1 qualities hardly release pigment when soaked (Gebel *et al.* 1997; Gebel 2010; Michiels *et al.* 2012): The waste and ground pigment dust from the sandstone workshops were likely recycled for being one of the sources of red ochre in Ba`ja; in fact,

¹² Hematite is regarded and used as an important healing and protective stone in various cultures; it is often attributed to its blood-related healing properties. Among the indigenous peoples of North America, for example, the hematite confers strength, protection, spiritual clarity and grounding and is a preferred colour in war painting (Cleggs' Adventures 2023); in Western esoteric practice, the mineral is often used for personal grounding, stabilisation of life force, and energetic harmonisation (*e.g.*, Hall 2015).

the waste amounts found in Ba`ja's cultural layers do not reflect the amounts to be expected from the attested ring production. However, this may also relate to waste disposal management, which we observed with at least one significant finding in Ba`ja (disposal of workshop debris in a rock cleft).

In the next step, lumps or pellets (balls) must have been formed from a paste made from the pigment powder, binders and/ or fillers, providing a dosed, ready-for-use pigment that was storable for the coming diverse needs. The small and neat pellets (Fig. 1) appear normed in size and pigment content (?) as if their weight and quality were meaningful: A surplus red pigment production in Ba`ja for exchange should not be excluded.

In addition to the colour red produced in stock, it could be that the mixing of the red (example Fig. 9) or even the grinding of the pigment stone (example Fig. 10) was part of the burial ritual (see below). Our experiments have shown that pre-soaked pigment-rich sandstone pieces quickly release their pigment when rubbed on any sand- or limestone support when water is added.

The potential other and possibly less available source of red pigments was the dark reddish-brown hematite ores found in very small quantities in Ba`ja. So far, there is no evidence that powdered hematite played a significant role in the everyday use of red pigment in Ba`ja. It might have served specific needs for a pure pigment without accompanying ingredients and had different context-related cognitive significances. Some of the hematite pieces, which are very difficult to crush, show abraded facets, testifying to the removal of pure pigment.

Little is known about the production of mineral red with binders, fillers, and red dyes in Ba`ja; nothing is known about organic red colour and dye. Pigments may have been mixed with other components to obtain hues, and extenders could have been added to economise consumption. Depending on the purpose, these additives may also have served to modify colours' (mixture) properties like increasing adhesion or other aspects of workability and durability.

All available analyses show that additives (fillers/ mineral temper and binders) were used (Mutke and Rudert 2000; Reifarh *et al.* this volume; pers. comm. Dalibor Všíanský, Masaryk



Fig. 1 Red pigment pellets/ balls (F.no. 107918, related to F.no. 107818 from Locus DR26:112) found in DR26:106, most probably re-deposited from an activity zone related to the collective Grave DG1 in Room DR26.2. (Photo: H.G.K. Gebel, Ba'ja N.P.)

University Brno) but that it cannot always be ruled out that the kaolinite/ kaolin, a clay mineral, was not also naturally associated with iron oxide in the same resource. D. Všíanský's preliminary XRD analyses of prepared Late PPNB pigment and a comparative rock sample obtained from the local Umm Ishrin formation show similar ratios for the main components (kaolinite, quartz, hematite/ iron oxide). Still, both samples differ in their quartz contents and hematite/ iron oxide-kaolinite ratio. The

crystallite size of hematite/ iron oxide in both samples is nearly the same; an analysis of crystallinities of hematite/ iron oxide and kaolinite might help provenance research.

Preliminary XRD analysis of the red pigment pellets (balls; Fig. 1), deriving most probably from an activity zone of the collective Grave DG1 in Room DR26.2, shows similar compositions as for the red plaster paints in Burial CR5 (Reifarth *et al.* this volume).

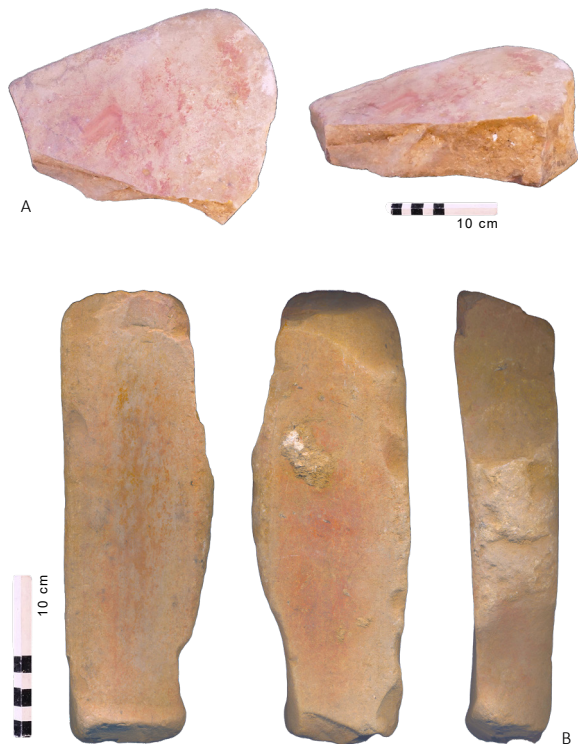


Fig. 2 A sandstone slab/ plate (?) fragment (F.no. 115810) and B elongated sandstone slab (F.no. 106110.2) used for grinding pigment stones (artefacts not cleaned). (Photos: H.G.K. Gebel, Ba`ja N.P.)



Fig. 3 Intentionally shaped and ground pounder/ small pestle (F.no. 5814.1) for production/ processing pigments, with traces of red pigments at its pointed end. (Photo: H.G.K. Gebel, Ba`ja N.P.)

We must assume that organic and mineral red was also used to dye organic fabrics (textiles, leather, wickerwork, human skin) using a mordant.¹³

¹³ Organic binders/ mordants/ thinners of red and other colours in Ba`ja could have been blood, urine, vegetable juice, fat/ oil; organic colourants could have been plant extracts (berries, roots or leaves), soot/ charcoal, and other. See also the conjecture of Reifarth *et al.* this volume on blood as a binder in the painted sealing of the wickerwork of Individual I from Burial CG5. Iron oxide red dye can

No special pigment-processing tool kits for red have yet been identified in Ba`ja; many morphologically very different grinding slabs, manos, pestles and their fragments (Figs. 2-3) show the processing of pigment stones so that it cannot be ruled out that all suitable devices were subject of use for pigment processing. Occasionally, spherical flint hammerstones were used to pound red pigment stones.

Processing Contexts (Secondary Pigment Processing/ Colouring)

In this following chapter, the limited evidence of colouring activities in households and crafts is presented, apart from building and funeral-related activities (see below). Red was used to add value to objects in terms of colour and to charge them with meanings; these commodifications of various kinds triggered other and further acts of giving value to tangible and intangible things (subjects, objects, ideas) (see the “Conclusions”).

After the colours had been produced or were already available ready-to-use, they were applied. So far, no applicators have been identified. However, some formal palette-like items have been identified with remains of red pigments (Figs. 4-5; Gebel 1999). They are often made from suitable natural flint pieces from the former eastern steppes by creating a perimeter around a natural concavity (*e.g.*, of heat pops) by flaking.¹⁴ The small size of the supposed palettes (5-8cm in diameter) and the matter that they show only red evidence may question their general function as a palette rather than implying a very special item related to a specific use of red. However, Schotsmans *et al.* 2021 mention similar-sized shells (oyster, Unio) and schist items with red pigments, also interpreted as palettes.

Red is also commonly attested in Ba`ja with beads, either by their raw material (red limestone, red calcite, carnelian, stained molluscs), intentionally red-painted or secondarily coloured in the graves (Alarashi b this volume). These beads dipped in red are probably part of

be produced by boiling the pigment with a mordant, which we don't know yet in the southern Late PPNB (traditional mordants in later times were alum or tannin).

¹⁴ Wilke *et al.* (2014) present another possible function of the palettes (lamps), which indeed might have been multifunctional items.

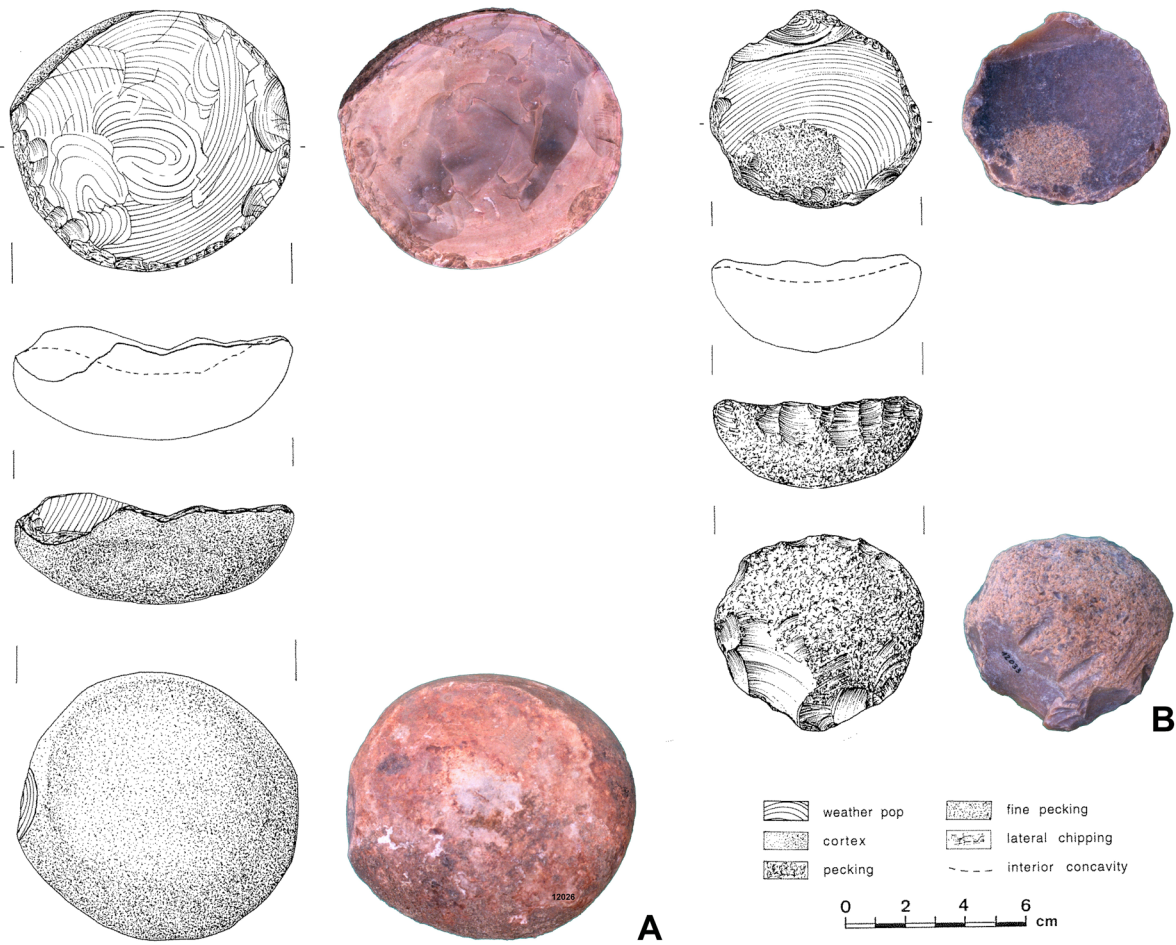


Fig. 4 Two flint bowlets (A F.no. 12033, B F.no. 12026) with pigment traces, used as palettes for mixing red paint in pigment processing. (Drawings and photos: H.G.K. Gebel, Ba`ja N.P.)

a controlled colour composition of necklaces (Benz *et al.* this volume, Part 1). Other bead colours are white, grey, green, turquoise, olive, purple, brown, and blue.¹⁵

Basketry and mats in Ba`ja are expected to have been part of the typical household production. However, to which degree this craft was common or a matter of specialised households is still being determined.

The basketry and mat presented from Burial CG5 by Reifarth *et al.* this volume (see “Sepulchral Contexts”) could have been household items (commodities by destination: things produced for material exchange) before being re-commodified into sepulchral items

(commodities by metamorphosis, see Table 2); it also cannot be excluded that they were fabricated as sepulchral items (commodities by metamorphosis). At which biographical stage they were plastered and painted red is unknown, though there might be indications that this occurred while preparing the items for the burial. This assumption is influenced by the understanding that the extensive use of red colour “belongs” to the sepulchral environments while forgetting that red is also part of the living environments in Late PPNB houses. This question offers another access to the comprehension of seeing red as a colour creating symbolic and ritualistic contexts that unite the living and sepulchral spheres (see the “Conclusions”).

The remains of Mural Loc. D11/12/21/22:32, painted in red on white plaster, indirectly relates to the collective stone cist of Grave DG1 inserted into basement Room DR26.2 (Gebel and Hermansen 2001; Gebel 2002: Figs. 7-8D). It

¹⁵ Interestingly, D.E. Bar-Yosef Mayer (2019) claims that mineral beads became common with the onset of sedentary life and that green stone beads relate to the onset of agriculture.



Fig. 5 Flint bowlet fragment (F.no. 60860) made from natural flint “capsule” with pigment traces, used as palette for mixing red pigment/ paint. (Photo: C. Purschwitz, Ba`ja N.P.)

was found in 2001 behind and above a secondary (protective) stone setting or small wall delimiting the layers of the inhumations to the east. The parts of the mural that were still visible (Fig. 8) survived the deliberate destruction of the mural, as recent studies confirmed (Gebel *et al.* 2020).

The mural initially decorated a room, which must have been special because of this feature, which later made the space the reason for choosing it as a burial place. The mural remnant, known to have been left, not hacked away, and hidden deliberately behind the secondary wall or stone setting, could have been directly connected to the collective grave and the people buried there and thus represents an act of re-commodification. However, the finding

belongs to the category of “hiding/ caching between walls” (Gebel 2002).

The motif of this intentionally preserved part of the mural could well be figurative, executed abstractly as is known from painted or pecked rock art: It shows a ladder-like feature associated with two head-like features. From the latter, streaks are leading off (and from the “shoulders”, too, with the larger “head”). A new interpretation for this depiction is provided here: Could it be, following the finding presented by J.D. Lewis-Williams (2001), that it is the depiction of the dead whose spirit leaves the body, represented by streaks or rays leaving the heads/ body?¹⁶

We must bear in mind that the mural of Ba`ja could show shifting realities beyond our Western thinking. This would be all the more the case if it is a shamanistic or shamanistically inspired representation that does not distinguish between real and visionary/ transcend (otherworldly) motifs and their spheres.

The circumstances of the retrieval, “conservation”, and display of the mural in the Jordan National Museum, Amman, have so far not allowed its scientific examination. However, repeated examinations have confirmed its execution in the *fresco* technique.

Building Contexts

Red appears in building contexts, aside from the wall stones quarried from red sandstone deposits, with red-stained floors and walls and in murals. The first microstratigraphic analysis of a red-stained standard floor construction from Square C21 in Ba`ja was presented by S. Mutke and V. Rudert (2000) from the Wilhelm-Dyckerhoff-Institut für Baustofftechnologie in Wiesbaden; their description is supplemented here by own excavation observations:

Above a layer made of fist-sized stones, a levelling layer of sand and small stones around 1cm in size blended with lime binders was applied (the plaster bed). On top of this, a low-aggregate (tempering additive is fine sand) or aggregate-free lime slurry was applied as the final coating in one or two steps (the plaster

¹⁶ In the southern African shamanistic rock art, painted lines/ streaks radiating from, *i.e.*, leaving a dead elands body, represent the *n/om*, a spiritual force or energy of the being only visible for the shaman (Lewis-Williams 2001: Fig. 2.7).

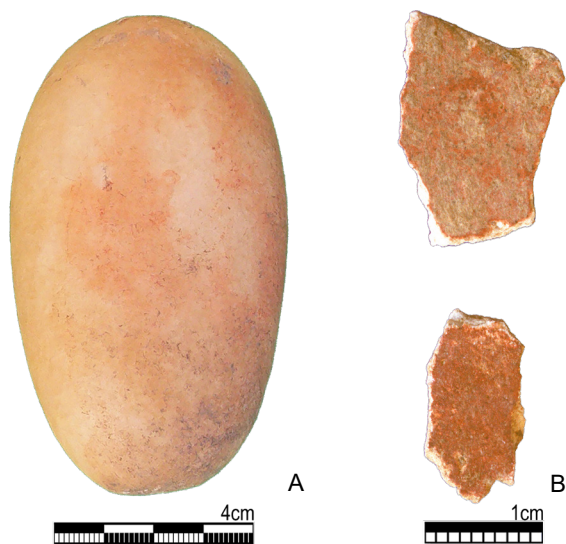


Fig. 6 A Example of a common quartz pebble polisher, most probably used for burnishing *fresco* red the plaster floors, B red-stained plaster fragments (red-stained lime coat spread, characteristic ingredients of the intra-mural fills). (Photos: H.G.K. Gebel, Ba`ja N.P.)

spread[s]). The construction of a red-stained and unstained floor is the same. On the smoothed and still-moist lime layer, the red-pigmented colour, made from iron oxide, is painted (Figs. 6B-7). The colour is obtained by grinding the local pigment- and quartz-rich rock and mixing it with a binder/ filler. The paint (mostly around 0.2mm thick) often contains small quartz grains and stands out from the rich (“fat”), primarily sand-free lime substrates. Typically, the red colour is applied to the still-wet lime layer; this technique is called *fresco*. The red colour applied to the still-wet lime plaster ensures good penetration into the substrate and, upon drying, forms a chemical bond, giving the colours a lasting freshness. The right timing is crucial for applying the paint: the lime substrate should neither be too dry nor too wet. Lime plaster allows for a certain degree of breathability, meaning moisture can escape more effectively from the substrate.

Richer archaeometric information on the use of red paint on lime plaster characteristic for building contexts is provided by the stained lime plaster Types 1 and 2 samples presented in Reifarth *et al.* this volume, both deriving from Burial CG5 contexts: The paint on the of Type 1 was applied in two steps; the first used the *fresco* technique, and the last was painted *secco*

on the dried *fresco* layer. Its lime-based paint used red ochre mixed with calcite and siliceous aggregates. The second lime-based red paint has calcite microparticles embedded; its main components are red ochre mixed with calcite and siliceous aggregates, and was also applied by *fresco-secco* technique (for detailed information on components, thickness of the colour applications, *etc.* see Reifarth *et al.* this volume).

The red paint and plaster technologies were quite diversified in Ba`ja, mostly related to lime-based plaster used in architecture; so far there is only one evidence for special-purpose red-stained clay plasters in an other context (see below the red-stained coating of basketry/ mats in a child’s burial context; Reifarth *et al.* this volume).

In general, an increase in plastered spaces is observed from the Middle PPNB to the Late PPNB. White plaster may have signalled brightness and purity and provided antiseptic qualities (Boynton 1980; Clarke 2012), representing a special but less sentiment-loaded room function compared with plastered red-stained rooms. Furnishing plastered rooms with red is expected to have been limited to rooms with more emotionalised social and/ or ritual functions in Ba`ja. The intentional destruction of red floors, walls and murals is conceivable when this function terminated. In sepulchral sphere, burials covered by white plaster are well attested (Burials CG6, CG7 and CG10), and only CG5 shows the use of red plaster (see Benz *et al.* this volume, Part 2; Reifarth *et al.* this volume).

It is evident that Late PPNB plastering used only the pure red; colour mixtures with red or other colours were omitted. There are also no deliberately applied hues of red, apart from the nuances resulting from the variable pigment proportions in the colour used or resulting from the white plasters’ wet state onto which the red was applied: This is how light to dark red floors and walls (Fig. 7) come about without us having any reliable evidence that their intensities (saturation, temperature, hue) have any significance. However, as mentioned above, a linguistically manifested red palette may have existed in Ba`ja, even if it was only technical.

Sepulchral Contexts

If one had to summarise the current knowledge on the use of red paint in Ba`ja’s burial rituals, the following would be preliminarily stated (Gebel *et al.* 2006, 2019; Benz *et al.* 2020; see

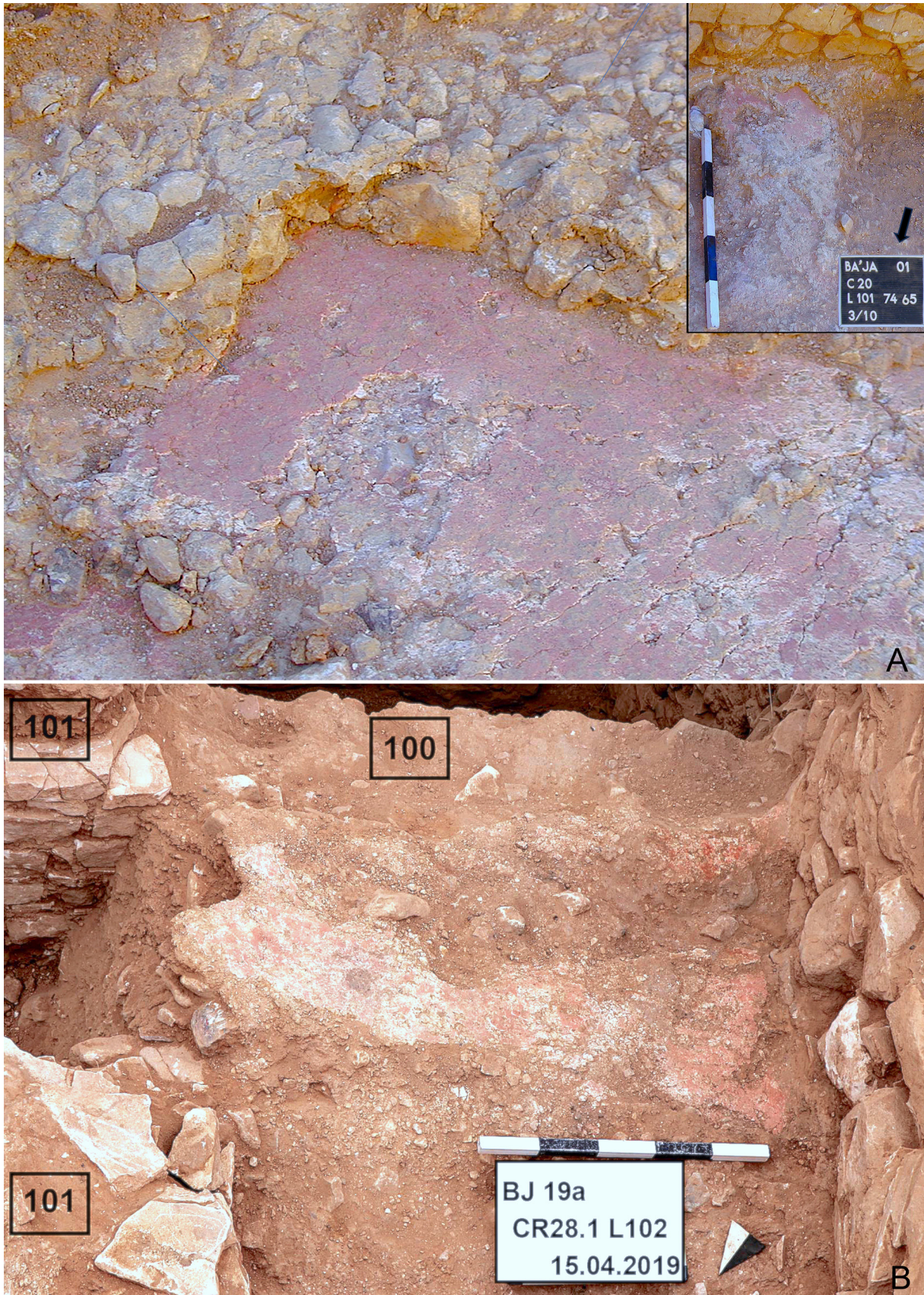


Fig. 7 Examples for red-stained plaster floors: A Floor in Square C20:101, B Floor in Room CR28:102; ex-commodified? floors. (Photos: A B. Borowski, B M. Benz, Ba'ja N.P.)

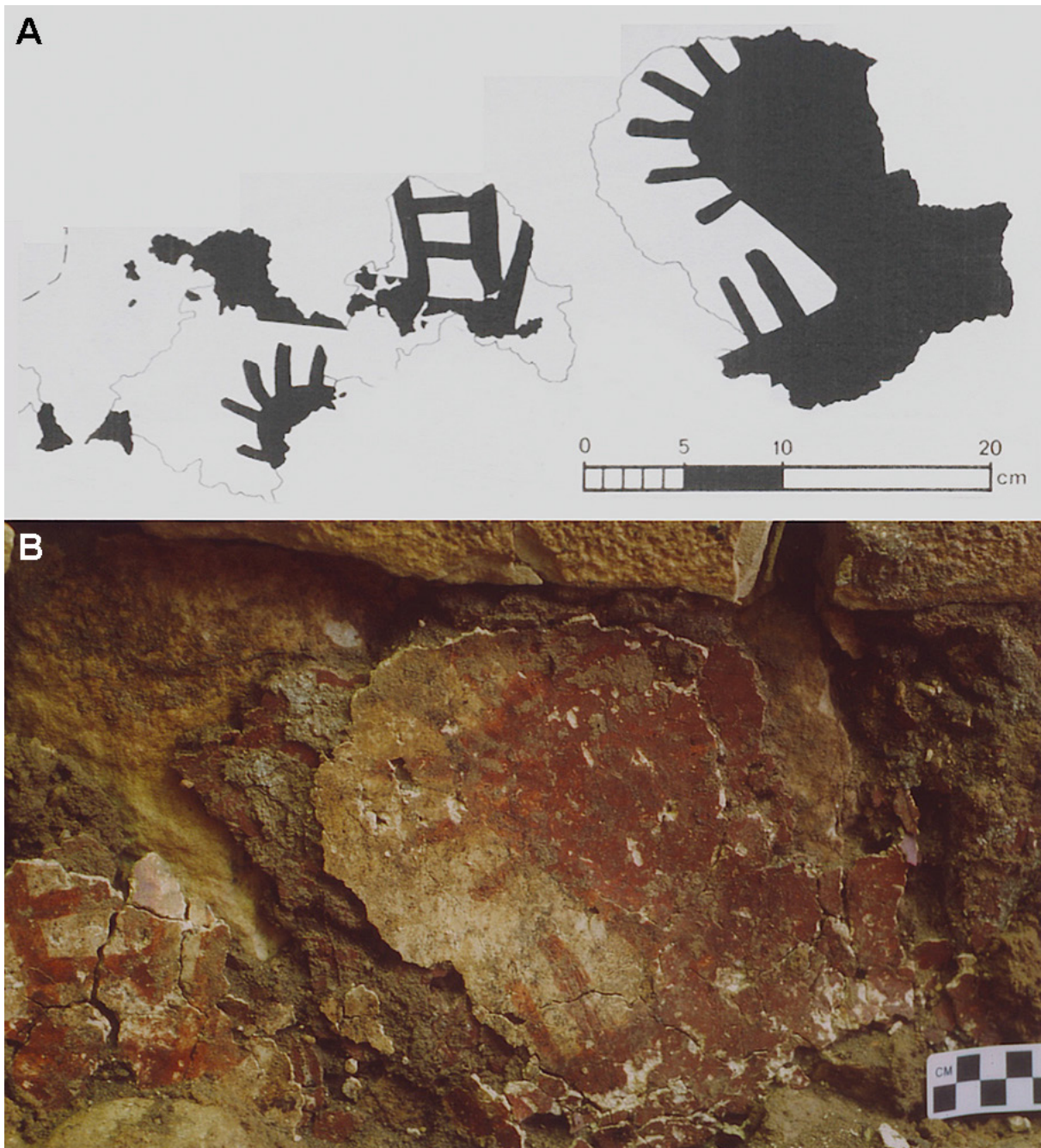


Fig. 8 Preserved part of mural DR26:32 in Room DR26.2, belonging to the pre-grave use of the room (located aside collective Grave DG1): A drawing showing preserved remains, B photo of detail; ex-commodified and re-commodified as commodity by metamorphosis (?). (Drawing and photo: H.G.K. Gebel, Ba'ja N.P.)

also the contributions Benz *et al.* this volume, Parts 1 and 2; Gresky this volume; Reifarth *et al.* this volume): Funerary rituals may or may not involve the sprinkling and/ or spilling of liquid red over the burial (occurred in Graves DG1, CG1, and CG11 and possibly CG12). In cases where the dead were receiving the red colour ritual, the grinding and liquidising of the colour in a shallow container (palette)

likely was part of the mortuary practice. Left-over pigment, grinding tools/ palettes could be placed in the grave; examples are collective Burial CG1 (Fig. 9) and CG7 “Jamila” (Fig. 12). The sprinkling/ spilling of paint not only stained the corpses and clothes or parts of it but also – to varying degrees – areas in the grave sediments and burial goods. In the case of the collective grave of DG1, paint splashes and limited stained



Fig. 9 Cristalline limestone plate/ bowl (?) fragment with pigment remains (F.no. 47825; C10:148) on its concave side, representing a palette for pigment mixing most likely during the burial: found related to the last inhumation of the collective Burial CG1 in Room CR35 (artefact not cleaned; scars in the depression are from the workman's pick scraping the pigment surface); re-commodified item. (Photo: H.G.K. Gebel, Ba`ja N.P.)

areas could be detected on layers in the burial (Fig. 10). So far, there is no recognisable pattern of who was entitled to receive the red colour ritual beyond a possible child preference in this. The main reasons for this are disturbances by following inhumations and/ or the observational limits during excavation, hindering the reliability of assignments of the red to specific individuals in collective graves.

The potentially antiseptic effect of the pigment (Knüsel 2021) may well have been both a practical and symbolic reason for its use in burials (see the “Conclusions”). Yellow ochre has been found in Graves DG1 (Fig. 11), DG2, CG5/6, and CG9 but gives even fewer clues about its meaning and function.

When human bones show red colouration, this is most likely due to the subsequent deposition of pigments on the bones after decomposition in the grave (-cavity) (see *e.g.*, the case of CG7 “Jamila”, where either the clothing or the skin of the corpse was coloured red).

We must assume that not every use of colour in burial rituals was discovered during excavation, mainly if a limited quantity of red ochre or if yellow ochre was used, which are difficult to identify during excavation in the overall red sedimentary environments (especially when burials are placed into the iron oxide-rich

paleosol underneath Ba`ja's earliest architecture; see Benz *et al.* this volume, Part 1).

The range of red and other colours' ascriptions to dead, summarised by Benz *et al.* this volume, Part 1 and Reifarth *et al.* this volume for the Epipaleolithic and Early Neolithic (‘Uyun al-Hammam, Azraq, Shubayqa 1, Kfar Hahoreh, Aswad, Abu Hureyra, Çatalhöyük and Körtik Tepe), provides evidence that gender- and age-related patterns in colour selection and burial types are becoming detectable especially when supported by taphonomic research. For Ba`ja, only isolated and preliminary but breath-taking results are available for Burial CG5 in Room CR6 (see Reifarth *et al.* this volume).

The antiseptic effect of the iron salts in red ochre already mentioned by Benz *et al.* this volume, Part 1, could also stand for its use as a somewhat symbolic antiseptic in burials (Knüsel 2021); it would not be the first case of practical and ritual-symbolic reasons acting together in rituals, see, for example, the incense used in cultic/ liturgical contexts from antiquity to the present day.

Referring to plastered and painted mats and baskets in burial contexts (Reifarth *et al.* this volume): Wickerworks must have been made within Ba`ja's household craft spheres (as it is expected for building and plastering works and pigment processing). Since – in terms of commodification – the basketry and mat items were produced to become commodities by metamorphosis, representing meaning in exchange, being (re-?) used or made for Burial CG5, the matter is treated with the “Sepulchral Contexts”. We also elaborate on their archaeometric results as they provide essential information on the use of red in Ba`ja. Thanks to careful observations during the excavation by Benz and the subsequent archaeometric-taphonomic investigations (Reifarth *et al.* this volume; see also Haddow this volume), this child's particular burial practice of CG5 could be reconstructed for the first time and in greater depth for Ba`ja. The guiding understanding of Burial CG5 is that Individual I's bones' red pigmentation results from the red-stained corpse or its red-stained clothing depositing on the bones of the decomposed corpse during a pre-interment treatment/ desiccation and storage before the bones were placed in a “finely plaited mat that was finally sealed with a homogeneous clay and coat of red paint”.

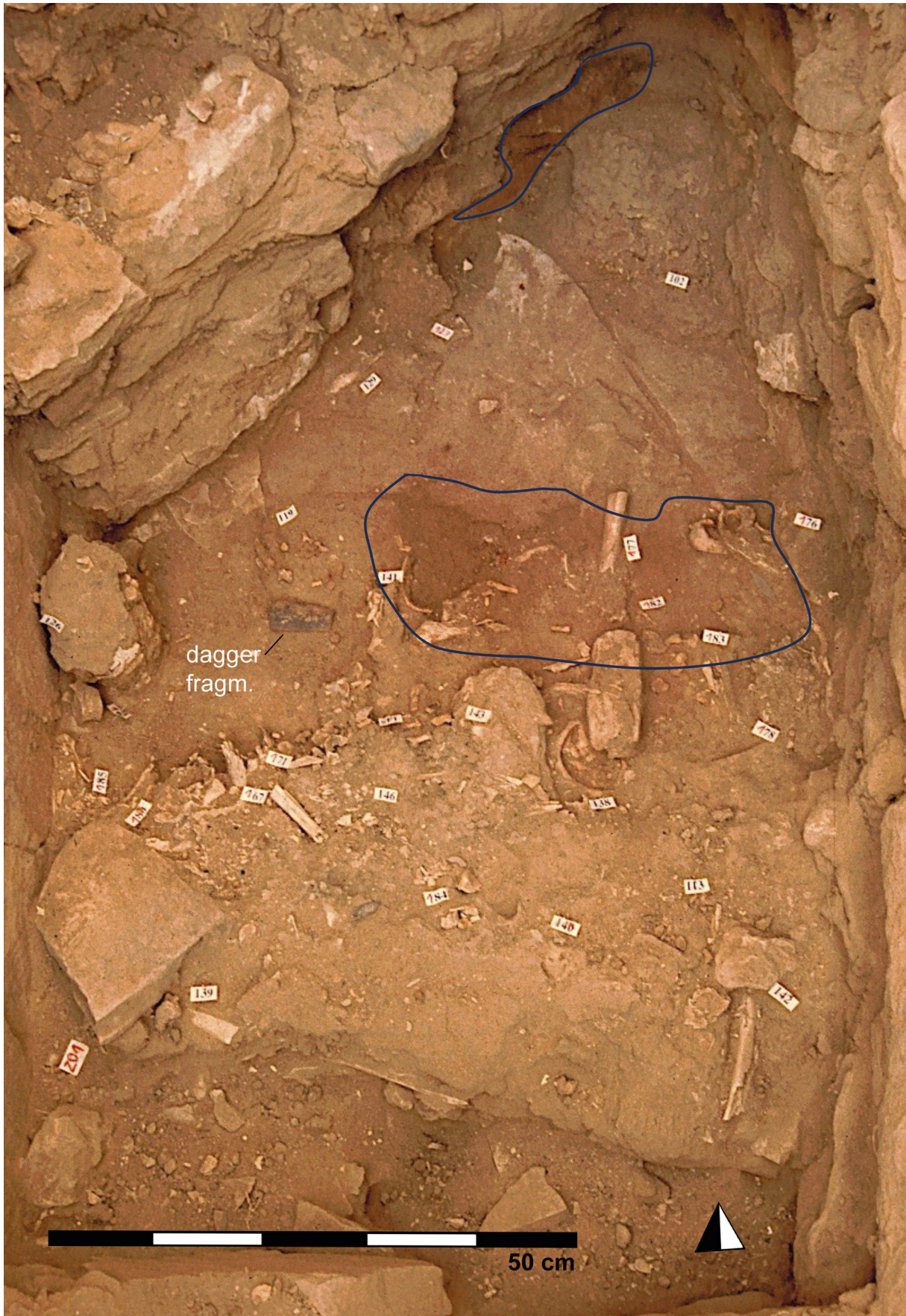


Fig. 10 Intense red pigmentations in the grave fill of collective Burial DG1 of Room DR26.2 (at this level of excavation: the two areas marked blue). (Photo: H.G.K. Gebel, Ba'ja N.P.)



Fig. 11 Small pieces of dark red (F.no. 37828:110, 122, 135) and yellow ochre (F.no. 37828:217) from the fill of collective Burial DG1 in Room DR26.2. (Photo: H.G.K. Gebel, Ba'ja N.P.)

Red paint occurs on each of the two types of clay and lime (calcite) plaster found with the taphonomically complex finding of Burial CG5, representing evidence – among others – for the use of a red-stained plastered basket and mat for Individual I (2-4 years; Loc. CR6:23a) in a double child burial (Individual II: 1,5-2 years; Loc CR6:23b; Gresky this volume).

Two concentrations of painted clay-based plaster with basketry/ matt impressions were found in the skull/ chest area and north of the skull of Individual I (Loc. CR6:30: clay plaster

Type 1). The red paint used consists of red ochre mixed with calcite, performing lighter hues of red, including pink. The *in situ* fragments of clay plaster Type 1 most likely belonged to the coating of a small coiled basket and showed “a significantly high content of proteins together with calcium phosphate”: These can result from the decaying corpse, food and/ or blood (used as a binder in the red colour).¹⁷ The impressions in the small pieces of the second concentration of painted clay-based plaster (Type 2 in skull-chest area of Individual I: Loc. CR6: 23a/b) indicate a delicate matt. The lime-based red painting and its silty calcite-clay bed had a more “homogeneous composition with only a few fine-grained fillers” than Type 1; the paint was applied in the *secco* technique (see Reifarth *et al.* this volume, providing all the technological and related mineralogical details).

For the “eventological” understanding of neighbouring Burials CG5 and CG6 see Benz *et al.* this volume, Part 2: Table 20. It offers clues for understanding the Type 2 clay plaster remains, most likely representing a later stage of the post-mortal treatment of Individual I (final deposition of the bones). The pigmentation of the child’s bones must be associated with previous processes involving the decomposition of the corpse and the deposition of pigments on the bones through wrappings (containers, clothing) and/ or painting the corpse (see also Haddow this volume).

¹⁷ It is conceivable that mineral red was also mixed with fresh blood in ritual contexts (see *e.g.*, Lewis-Williams 2001 with the evidence of the San people mixing red pigment with eland blood).



Fig. 12 Small grinding slab fragment for preparing the pigment, most likely taking place during the burial (F.no. 106019): found in Burial CG7 “Jamila” in Room CR36.1; ex- and re-commodified item. (artefact not cleaned). (Photos: A. Keßeler, Ba'ja N.P.)

The iron oxide-based red (pers. comm. D. Všíanský) on the limestone plate/ bowl fragment (Fig. 9; F.no. 47825; C10:148) was used in collective Burial CG1 to pour/ sprinkle red colour across the last inhumation. The fragment of a larger shallow plate/ bowl was intentionally fractured around its former central oval depression, resulting in an approximately square shape. The depression bears pigment remains, representing a (burial) pigment palette. It was found aside and on top of the last inhumation of the collective burial, positioned with the concave side down. The oval depression contains strong pigment/ stain residue. The flattish, concave, narrow side may have served to pour off the liquid stain and is only slightly pigmented compared to the depression. The two other long sides and the other narrow side of the depression are steeper and less pigmented.

Other Colouring Contexts

For the sake of thoroughness, when dealing with red in Ba`ja, reference should be made to all those findings when red appears in secondary or tertiary contexts or when red pigments are biographically connected with objects and findings situationally or ephemerally. These are usually chance “contacts”, as is often the case for objects of the ground stone industry,

or identifiable and functionally explainable “contacts”, of which an example is given here.

Fig. 13 shows the fragment of a large (c. 40cm in diameter) presumably round plate made of crystalline limestone, which was found in the southwest corner of collective Burial CG11 in Room CR17 with the obverse facing upwards (Gebel *et al.* 2020: Fig. 35); no further fragments of the plate were found in the heavily disturbed burial area of this room: The object may have entered the context of the grave as an intentionally destroyed ex-commodified? fragment; an articulated neonate and numerous bones of disturbed burials/ bone depositions were found nearby, but also red pigmented skull remains (see also Benz *et al.* this volume, Part 2). The base of the vessel fragment is coloured red, but there are also some traces of pigment on fracture surfaces and inside the plate. The biographical record of these red findings shows some complexity: The huge plate must have been used in a special room with a red-coloured floor, which rubbed off on the bottom of the plate. After its (intentional?) fragmentation as an object of a terminated ritual significance, part of the plate ended up in the collective Burial CG11, where it came into contact with red pigments another time and rather ephemerally.



Fig. 13 Example of secondary and tertiary pigmentations: Crystalline limestone plate fragment (F.no 116808) found in collective Burial CG11 in Room CR17, with traces of the red-stained floor on its flat base it once was standing on, and tertiary contact with pigments; ex- and re-commodified item. (Photos: H.G.K. Gebel, Ba`ja N.P.)

Conclusions: Commodifying the Red in Ba`ja¹⁸

Though the commodification of red is embedded in the overall productive milieu of the regional mega-sites, its commodification is a rooted commodification¹⁹ rather than a productive one that serves, preserves, and passes on traditional values and understanding. Such cognitive territories might only become “productive” when stabilising and promoting shared values, beliefs and traditions, contributing to the persistence of the otherwise proliferating and self-reinforcing regional Late PPNB commodification regimes. This does not mean that we have to exclude shifts in the meaning of red during Transjordan’s Late PPNB; it only means that the commodification of red in Ba`ja was rather unrelated to the more boosting parts of the commodification systems. The red in Ba`ja also testifies to the inherent traits of the preceding late foragers’

¹⁸ For the terms and concepts related to Late PPNB productive commodification, see Gebel 2010, 2014, 2017; Gebel *et al.* 2022: The commodification approach is a holistically oriented epistemological tool that moves an empirically nourished Early Neolithic conceptual system by transdisciplinary approaches, in an attempt to obtain testable emic ontological-cognitive explanations of Early Neolithic phenomena, developments, and systems. Productive commodification and its confined territories and reciprocities are understood as the capacity to make tangible and intangible things interacting subjects of shared acceptance and value by (re-) production and to receive, maintain and promote through this further economic, social, and cognitive values/ growth: Neolithic people granted value to things (objects of commodification), and things granted value to people and their social relations, and so forth. It flourished in the southern Levant by *habitus* social organisation and confined reciprocity and – at least – social differentiation/ incipient social stratification, initiating the interrelated and self-promoting systems in their environmental, technological, social, cognitive, and ritual milieus. It creates complex and prolific and thus growth-sensitive material and immaterial subsystems, regimes, and identities. At the same time, the concept covers the explanation of failures and collapse in these aggregation and acceleration trajectories.

¹⁹ Rooted commodifications are self-evident and recurring productive acts that arise from traditions or necessities without them (or their cause) fulfilling the main criteria of commodities by destination or commodities by metamorphosis. They could also be described as “everyday commodifications”, *i.e.*, relatively self-contained, functional or consequence-free activities and cognitive territories such as cooking, burying, herding goats, collecting wood, dancing, or healing (Gebel forthcoming).

colour value systems that had little to do with its contemporary hypertrophic acceleration and aggregation processes in the regional Late PPNB development (for the features of the Mega-Site Phenomenon, see Gebel a this volume).

As a deeply embedded tangible and intangible commodity (*sensu* thing), red moved in Ba`ja through many parts of the social system where it was determined by the times’ population and social differentiation dynamics and the related developments in the cognitive spheres.

While context-related red symbolic behaviour might have been relatively stable, colour combinations with red may have been less stable and may have underlying developing rules of colour aesthetics and the availability of other colours, all diversifying the commodification of red. To what extent does the penchant for colourfulness in Early Neolithic Ba`ja go beyond what is witnessed for the ornament industries of Ba`ja (see the contributions by Alrashi a and b, and Benz *et al.* this volume, Parts 1 and 2) is unclear. Given the unknown role of perishable (organic) colours, the larger part of Ba`ja’s colour life and its relation to values in social and potentially gender and occasion differentiation remains in the dark.

Table 2 provides the empirically attested overview of the contexts and activities in which red appears in Ba`ja and how this evidence is to be understood in terms of tangible and intangible, respectively, material and immaterial commodification; the table’s entries are only taken up in the following text if this serves the concluding arguments on the various commodification spheres of red in Ba`ja.

Red in Ba`ja was a socialised thing that emphasised and supported specifics in the cultural system it was operated and operating in.²⁰ This took place according to attributed and socially regulated norms and exchanges, which the colour followed and maintained. The main traits of red were:

²⁰ The socio-cultural frameworks of the emergent Late-Final PPNB alternative lifeways (advancing pastoralism and “industrial” hunting with kites) and in the Late Neolithic of the eastern steppes hardly used red pigment. Whatever the additional reasons for this might be, it can relate to a reversal of the landscape-colour mentioned above argument, according to which there is no general colour commodification in colour-poor landscapes if no locally dominant colour raw material is available.

- Red is a thing of beliefs and practices in a social system which satisfied, created, and maintained chiefly
- social and ideological needs for protection, performance and possibly purity, and *vice versa*. Materially, it
- is subject to visibility and display (“eye-catching”),
- used for the construction and marking of segregated/ respected spaces/ arenas,
- serving decorative, symbolic, ritual, magical, memorial/ commemorative purposes, and likely
- is endowed with protective and repelling/ banning power and relations to the other-worldly/ otherness. As
- a commodity ingrained in ancient pre-Neolithic comprehensions, it
- assists biographies (commodifies changing spaces and things) but has no own biographical capacity or creates no own commodification chains. Red
- is a commodity of metamorphosis (see below), may
- have assisted individuals (see below), living or dead, to have a personal identity and properties expressed but
- must not be a status marker *per se*. In that way,
- it is rather a signal of protective affirmation of an identity (child?/ otherness?) than a real social status differentiation. Red
- gave value to subjects and objects by charging them with meaning and giving identity and ideological power (helping performative and prestige-providing commodities/ commodification). Red could most likely
- link spiritually the spheres of the living and the dead (or even beyond, the otherworldly with the landscape; see below), and
- possibly was considered a material and immaterial (symbolic) antiseptic and astringent for its iron salt content (Knüsel 2021). Red ochre
- is not a rare/ precious and difficult-to-obtain material, and it only receives a material value by its production, and
- is not a prestigious commodity demonstrating discrimination *sensu* differentness *per se*, but it is essential for demarcating/ affirming identity for children/ the otherness in burial contexts.
- Red was possibly not subject to “fashion” but to preferential colour patterns/ styles with certain products.

After this basic understanding of red in Ba`ja, which follows the empiric contexts presented before and hypothesises a use preference of red for children, we complement the information in Table 2 by commenting on some of the main features of red’s commodification, respectively on its various roles in the living and sepulchral spheres:

Tangible and Intangible Living Spheres

The attested red pigment procurement, the primary and secondary red pigment processing, and its use in households/ household production (crafts) show the particular and not a general use of the colour in the living spheres (Table 2).

The pigment red most probably also entered the settlement via sandstone ring production. The waste was recycled and transformed into pigment lumps and pellets (balls), possibly by manufacturing different qualities through different additives. The fact that there were standardised pigment balls indicates that there must have been units or dosages for red.

For the rooms with red-stained floors and/ or walls, it must be assumed that they were protected territories serving ideological purposes having a symbolic/ ritual character. Accordingly, it cannot be ruled out that when the purposes of such exceptional rooms or their red floors, walls, and possibly murals ceased to exist, they were intentionally destroyed. In Ba`ja, we have clear indications of household room terminations, including the clearing out and destruction (including burning) of their inventory (Gebel *et al.* 2019, 2020).

The red-stained rooms and the use of red on and with burials indicate marking and protecting territories created by red. This repelling property of red spaces might be symbolically supported by red ochre’s antiseptic properties (iron salt content).

We must assume that red also had many magical functions in Ba`ja that cannot be identified archaeologically. The study by Bille (2019) for today’s Bedouin village, Beidha, near Ba`ja, offers an insight into the scope of such a magical spectrum. The author provides many examples of dominant magical meanings connected with organic and inorganic materials, including colours from present-day traditional social environments in Beidha. They underline that our focus on the symbolic and ritualistic meanings of red falls

Table 2 Preserved and currently known contextual/ activities and commodification evidence of red pigments in Ba`ja. (in grey: probable use/ contexts, archaeologically not identified yet)

Biographic Contexts	Archaeological Evidence (Contexts/ Activities, Incl. Archaeometrical Findings)	Tangible (Material) Commodification	Intangible (Cognitive) Commodification
Pigment procurement	Extraction (mining) of suitable red pigment stone qualities from local Umm Ishrin bedrock, possibly jointly with sandstone ring raw material procurement	Intention to recycle the waste from the sandstone ring production (recycling behaviour and disposition); is not a rare and precious material	Disposition for recycling; at this stage, red is not yet charged with a meaning except for being taken from nature
	Collecting hematite pieces in the landscape	Used as a pigment source for special purposes and as medicine/ mineral with medical properties	Considered as magically active mineral
	Collecting of flakes, carving and grinding residue from sandstone ring workshops (production waste deposits)	Recycling behaviour	Recycling disposition and preparing a commodity of metamorphosis**
Primary pigment processing (colour production)	Grinding and pounding pigments with slabs, manos, pestles, and abraders: most likely no specific types, ad hoc use of available suitable tools (Figs. 2-3)	Raw material receives tangible value Production of pigment	Preparing commodities by metamorphosis** charged with symbolic, ritual and magical? meaning for rooms, burials, items
	Recycling waste/ residue from flaking, carving and grinding sandstone rings (Michiels <i>et al.</i> 2012)	Raw material receives tangible value Commodification of pigment waste by recycling available through sandstone ring production Production of pigment	Preparing commodities by metamorphosis** charged with symbolic, ritual and magical? meaning for rooms, burials, items
	Producing ready-for-use dosed and storable red pigment pellets (balls) as well as pigment lumps with/ without additives (Figs. 1, 11)	Established measures/ doses of red pigment (qualities, quantity)	Storage of prepared pigment/ paint commodities by metamorphosis** Red pigment pellets (balls) a measure?
	Producing red pigments/ colour products for exchange	"Red-to-Go": gaining exchange value by participation in exchange networks	Receiving wealth and reputation through product identities
Secondary pigment processing and use in household production (except for building/ burials)	Palettes: production and use of palettes (supports) for mixing/ dissolving/ liquidising pigments (Figs. 4-5)		
	Colouring beads	Applying red to beads	Giving value (amulet and other meaning, aesthetics/ "preferential colour patterns") to beads
	Plastering and colouring basketry items red	Plastering and painting basketry items red as commodities of destination*** if not intended for use in funeral contexts	Giving value (symbolic/ magical meaning, aesthetics/ „preferential colour patterns") to basketry
	Wall paintings (murals) (Fig. 8)	Furnishing a room with a mural Decoration?	Associating/ fixing a meaning to a room: Symbolically/ ritualistically / magically/ commemorative? Decorative/ artistic value?
Building contexts	Selecting of red-pigmented wall stones for special display meaning	?	?
	Staining and polishing floors and wall plaster in red (Figs. 6-7)	Segregating a room/ space by staining it red Red is used as a tangible charged antiseptic	Red creates a protected and symbolically clean and pure space
	Intentional destruction of red floors/ walls (plus murals)	Destruction of special room functions/ room/ mural meanings	Termination behaviour: "resetting" spaces

Table 2 *continued*

Biographic Contexts	Archaeological Evidence (Contexts/ Activities, Incl. Archaeometrical Findings)	Tangible (Material) Commodification	Intangible (Cognitive) Commodification
Sepulchral contexts*	Using grinding tools and palettes/ supports for mixing/ dissolving and liquidising pigment lumps at (during) burial ritual (Fig. 9)	Re- and ex-commodification of grinding tools and palettes/ supports used at (during) burial ritual Decision not to apply red pigment	Preparing the activation of protective and repelling forces for a corpse, possibly considering red especially for children
	Leaving grinding tools and palettes/ supports and "spare" pigments (in the shape of pigment stones, lumps, pellets (balls) with the burial	Ex-commodifying items and pigments related to the specific burial	Act of ex-commodifying "spare" items and pigments/ paint seen belonging to the interred person
	Sprinkling/ pouring/ painting liquidised red pigment over corpses/ clothing and intentionally? over grave goods (Fig. 9) and leaving "spare" pigments (pigment raw material, prepared colour; Figs. 1?, 11) as well as the palettes/ tools mixing the colour (Figs. 12-13) in the grave	Action supports the emotionality of burial ritualistic arousal dedicated especially to dead children and to the peer group Performing a protective identity affirmation Protecting the burial's material territory: safety, untouchability Choosing the iron oxide- rich paleosol for burying to use its protective capacity (paleosol contains red ochre naturally)	Activating protective, repelling and social cohesion forces for a buried individual, possibly investment of special empathy by a child's peers; red is used as a preparation to make the burial untouchable/ a corpse "safe" for the living (Knüsel 2021) Protected affirmations: marking and performing child/ otherness identity/ origin, protecting the transformation into the otherworld/ otherness, protecting and helping the burial's intangible territories (family origin, memory) Paleosol is understood as a naturally protected burial ground for its red pigment content Decision-making to provide red to a corpse/ child/ arguments not to apply red pigment
	Painting red colour on corpses/ their clothing and/ or accompanying items like plastered containers/ mats (before and at burial ritual)	Using prepared colour/ paint (colour with additives) Performing identity affirmation (child/ otherness?)	Protective affirmation: marking child/ otherness identity <i>etc.</i> Containers for the protecting of the transformation (journey to the otherworldly/ otherness) <i>etc.</i> (for all aspects see cell above)
	Re-commodification of terminated red-coloured items	Re-commodified ritual item (e.g., Fig. 13, with a red-related biography)	Re-commodified burial good (re-charged burial good)
	De- and ex-commodification of terminated red-coloured items	Through ex-commodification fragmented necklace/ single beads	Meaning of ex- and re-commodified red/ reddened items/ burial good
	Re-commodified household baskets and mats for infant burials and/ or Production of funeral wickerwork	Re-commodification of baskets and mats by (re-?) plastering and staining red for (secondary) baby burials and/ or Produced as a funeral product (becomes a commodity by metamorphosis)**	Ultimate protection of an infant burial, activating all properties of untouchability
Other/ secondary use contexts	Colour abrasion on items standing on red floors, e.g., the limestone plate Fig. 13	Re-commodification of previous ritual objects?	Re- and ex-commodification of previous ritual objects (return to other ritual/ symbolic contexts): ritual objects stay in ritual contexts?

* Lumps of red and yellow ochre were found in the Burials CG1, CG6, CG7, CG9, CG11, CG12[?], DG1, and DG2.

** Commodities by metamorphosis: things produced to represent a meaning in exchange (Gebel 2010).

*** Commodities by destination: things produced for material exchange (Gebel 2010).

short of understanding the role of red in Early Neolithic Ba`ja. It is an old problem of ritualistic and symbolic research that ignores the step-brother of spiritual behaviour, which expresses beliefs magically, giving specific actions, words, materials, colours, and others an inexplicable power that can bring about change.²¹

Tangible and Intangible Sepulchral Spheres

The attested red pigment used in sepulchral contexts apparently shows a particular and not a general use of the colour in the funerals (Table 2). Using red on and with burials indicates marking, possibly protecting, and separating the burial space by red from the territories around. At the same time, the red iron oxide-containing paleosol of Ba`ja was chosen as a burial ground for most of them (see below). Aside from the colour's tangible and symbolically antiseptic properties, its repelling function might be meant to alarm/ warn anybody touching the burial unconsciously.²² That could mean that especially child burials were untouchable.

The death of a child must have been a unique and extremely intense empathy trigger in Ba`ja, too. The thanatological, socio-neuroscientific, ethological, and ontological implications of a child's death are described in Gebel *et al.* 2022; here, the strong evidence of empathy, emotions, respect, care, and possibly collective grief management attested with child burials is explained in greater detail.

The red colouring of adult bones in the collective graves must not relate to their burial and could be "collateral" if only children received the red sprinkling. However, the red colouring of adults should not be ruled out since a red pigment palette (Fig. 9) was left on top

²¹ Bille mentions (2019: 329, 332) that not only colours but also shiny or bright materials are preferred for at least aesthetic reasons. Red plays a limited role in the current magical cognitive spheres of Beidha, compared to blue. Blue is the colour that repels the evil eye and has a protective capacity, illustrating how culture-specific colours can be valued.

²² As a general rule, if we may generalise the strong evidence from Basta, burials were subject to protection in the Late PPNB and cared about when disturbed by, *e.g.*, re-building areas. The evidence suggests that this might relate only to burials of which the deceased are still known, or to skulls.

of collective Burial CG1: The burial hosted primarily subadult and adult males (Benz *et al.* this volume, Part 2: Appendix 4). Future offfield and infield research on Ba`ja's human bone colouration must particularly secure information if adult bones received their colouration from being sprinkled or secondarily from pouring red liquid on the children's bodies in a grave. Another question to be followed is if preferably a pure red pigment without additives was liquefied from a red pigment stone on a palette/support and sprinkled during the burial, and/ or if a colour mixed with additives (a paint) could have also been used. Individual I of the double child Burial CG5 carries red paint on its bones, which might come from painting the corpse and/ or its plastered mat in which the bones were wrapped; see Reifarth *et al.* this volume.

The red pigment becomes unremovable when applied to burial sediments. The permanency of this marking a confined territory must have received a possibly magical meaning, not only in the sense of sepulchral untouchability.

Regarding the question on status or identity provision through red: So far, we have no indication that the use of red can ascribe a social status or any status at all, except that in the sepulchral context, it probably can assign child or otherness identity. Performed affirmation of such identities through red would unite with the colour's impact and perception: expression of the Ba`ja type of extreme empathy with the dead, especially children, protecting their transformation into the otherworldly/ otherness' material and intangible territories (safety, memory). We believe that children especially were the "receivers" of red for their being in the otherness (hypothesis of this research), but what about their lifetime? Is it conceivable that they also wore red during their lifetime, *i.e.*, they were also "bearers" of red in terms of protective red cloths, ornaments, or skin decoration?

Concerning the commodity statuses related to red: The production and use of the red pigment fully support the definition of a commodity by metamorphosis: It is a product made for giving meanings to things (precisely, a thing produced to represent meaning in exchange; see Gebel 2010). Leaving pigments and colour-preparing items in a burial formally reflects an act of ex-commodification. At the same time, it may also testify that spare colour/ colour items must remain with the dead since they belong to their ritual.

Different from the de- and ex-commodification²³ of burial goods (see *e.g.*, Gebel a this volume), ex-commodifications by added red represent the identity- and protection-providing²⁴ capacity of the colour for buried dead²⁵ in the Ba`ja community. Here we are approaching a difficult, yet unsolvable question: Can we assume that all children were deliberately buried in and with red because even those without added red were buried in a paleosol naturally containing the red iron oxide? Could the red paleosol even have been the reason why people buried their dead

²³ However, the deliberate fracturing of burial cover slabs with children burials would imply that aside protective a terminating behaviour can be involved in the burial ritual. The behaviour that burial goods were made unusable or destroyed for or during the burial (Benz *et al.* 2019; Gebel a this volume) could also apply to other fragments found in burials, *e.g.*, fragmentary grinders or stone vessels. Could these represent intentionally fragmented terminated property of the deceased? The termination of households and household items attested in Ba`ja is part of a common de- and re-commodification behaviour (Gebel a this volume).

²⁴ Any sealing capacity of red would fall into this capacity of protection by red.

²⁵ From the Basta evidence, red hardly occurs with adult burials, supporting the hypothesis expressed here that red in burials preferably relates to interred children. Does the red in Ba`ja's mixed-age collective burials relate to the children interred or the men found there (no female adults yet identified in the investigated collective graves, except for a few in CG11)? In this context, another question might be interesting: What is the significance, also from a thanatological point of view, of the collective burials of Ba`ja, which are unusual for the Late PPNB of Jordan, especially in comparison with Ba`ja's single and double burials of children, which are also uncommon for the Late PPNB? It should also be noted here that the collective burials CG1, CG11, CG12 (Benz *et al.* this volume, Part 1) and DG1 (Gebel and Hermansen 2001) represent, in our opinion, a real mortality profile of the extended families who inhabited the respective house during a specific period: The proportion of children in the collective burial DG1 (as well as in the intramural cemetery of lower Area C of Ba`ja) may be direct evidence of infant mortality and the number of women that must have been present in the settlement (but not attested with the dead in Areas D and C). Did this contribute to the special attention, care and empathy child burials received at Ba`ja? The burials of Ba`ja cannot be compared at all with those of the neighbouring and contemporaneous Basta, where mainly adult single burials occur, which are absent in Ba`ja. Are we dealing here with a thanatologically different sector of the sepulchral system in Ba`ja, and/ or an expression of an other kind of inhabitants' composition than that of the large mega-sites? However, these questions can only be approached with more graves excavated in Ba`ja.

(children and adults alike) because burials are protected areas?²⁶ Small amounts of added red in a child burial would not have been noticeable/ identifiable if these pigments were defused and united with the naturally present iron oxide of paleosol. For the naturally occurring iron oxide in these sedimentary deposits below Ba`ja's architecture, where most children were buried, see also Gerlitzki and Martin this volume. Occurrences of ex-commodified secondarily pigmented items appearing as re-commodified objects in burial contexts (*e.g.*, the stone plate fragment Fig. 13 in Burial CG11) may testify to red-based/ -related "prolonged" biographies of former ritual-related objects.

Red's Commodification: the Broader Societal-Deathlore Contexts

In the following, we add some general aspects to the broader embedment of red in Ba`ja's cognitive environments, using higher levels of concluding abstraction.

The red-related cognitive processes for both the sepulchral and the living developed the general capacity of the colour to influence and manage threat/ fear/ alertness, rule settings (boundaries, sanctions), protection, affirmation, forces/ power/ stressors/ stimuli, the establishment and control hidden supernatural meanings, medical, and possibly healing properties (Table 1).

Red appears with parts of the ritual inventory of the Late PPNB villages' living and sepulchral spheres, which are controlled by the social and cognitive frameworks of a strict societal *habitus* and the Late PPNB confined relational group selves' constitutionality (Gebel 2017; Gebel *et al.* 2022), controlling any social expression by supposedly fierce informal magic, ritual, and symbolic regimes (Gebel 2017, Gebel *et al.* 2022). Red operated in the "conservative" commodification sectors of Ba`ja's social environment that practised social differentiation (Benz *et al.* 2019) ahead of incipient social hierarchisation, which we see in larger contemporary Basta. We assume that these fierce

²⁶ There is the notion around that also the yellow ochre relates to children (pers. comm. M. Benz) since lumps of that material were found in the burials at Ba`ja, too. However, this is even more difficult to state since decayed/ prepared yellow ochre becomes invisible for excavators in our sedimentary environments, if not attested by real lumps.

regimes were governed by *habitus* conventions, with group selves consisting of individuals (Gebel 2017; Gebel *et al.* 2022).²⁷

Ba`ja's deathlore incorporated the red. This other side of the societal framework, the deathlore, must have spiritually united the community of the village's living and dead (Gebel *et al.* 2022): In the mindset of the Ba`jans, red could have been understood as having the power to link or unite the otherworldly/ otherness ontologies with their being part of a landscape in red. Red participated in both worlds with different functions, serving with different conventions but able to connect both existences or, in other words, commodify these links.

While the resulting context-related red symbolisms might have behaved relatively stable, colour combinations with red may have been less stable and were underlying developing rules of colour aesthetics and the availability of other colours. To what extent the penchant for colourfulness in Early Neolithic Ba`ja goes beyond what is witnessed by the ornament industries of Ba`ja (see the contributions by Alrashi a/b, Alarashi and Benz, and Benz *et al.* this volume, Part 1) is unclear. Given the unknown role of perishable (organic) colours, the larger part of Ba`ja's colour life and its relation to values in social and potentially gender and occasion differentiation remains in the dark.

Neolithic Colour Research: Preparing a Prolegomenon²⁸

We need an epistemically valid framework for Neolithic colour research able to trace its empiric findings in the empirically researched socioeconomic and cognitive milieus and their commodification regimes. Its disciplinary framework needs to employ aside the archaeological anthropology,

²⁷ Ba`ja possibly remained on the level of a segmentary community/ of social differentiation which situationally assigned its leaders/ leader groups, possibly representing a flat-topped chiefdom at the utmost.

²⁸ Instead of a research outlook for Ba`ja's colours, an expanded topic is offered here since the emic approach of Ba`ja research could make the necessary difference in future prehistoric colour research. In the context of a final publication, such a section may not seem appropriate: Due to the novelty of the findings and the research on *Red in Ba`ja* presented here, it was unavoidable.

geological, and archaeometric approaches those of social neurosciences, colour psychology, cognitive sciences, human ethology, cultural ontology, and others. Of course, this cooperation has to be embedded in an epistemically sound transdisciplinary framework to be developed parallel with the first transdisciplinary experiences (see also Gebel *et al.* 2022).

This contribution's focus on the colour red in a small Early Neolithic community can be only used as a pioneering start. Still, it cannot serve as an example of prehistoric colour research. It is by no means a pioneering approach since it dealt with only one colour and had to disregard the colour regime in which it was operating.

Like in other periods, colours in a Neolithic system are only implicitly perceived but act as powerful sub-regimes that influence developments not through innovation and (a direct) productivity but through rooted receptions and adaptations, unobtrusively but significantly. They give things value and power and direct their reception by people; people use them to direct and obtain their cultural expression and grant power and manipulation potentials to colours through cognitive attributions and investment. Colours operate primarily on the unconscious levels of human impression and expression. To approach a colour system and its complexity, knowledge about all its elements is mandatory: Without the latest scientific techniques for identifying volatile/ perishable and organic colours (see Reifarth *et al.* this volume), the cultural colour palettes of a Late PPNB will not be revealed. This will become perhaps the most challenging sub-discipline of future archaeological specialisations.

Phenomenological approaches to recording prehistoric colour universes (*e.g.*, Tilley 1994, 1999, 2010) appear most appropriate as a first step if, together with ethnographic and archaeological findings, they help to define the needed transdisciplinary research frameworks; phenomenological approaches will fall short if the empirically recorded ethos of the respective culture are not or only insufficiently included. For the time being, it would be helpful if a comparative phenomenological approach with a landscape anthropological perspective could investigate the relationship postulated here between landscape colours and the use of colour in settlements (*e.g.*, Ba`ja compared with a Neolithic site in the eastern "colourless desert").

This paper also sought to prepare a framework for future colour research in Ba`ja and for the Late PPNB of South Jordan. The request by Benz *et al.* (this volume, Part 1) for systematic colour research in Ba`ja, which first compiles basic (*i.e.*, also systematic SEM, XRF, XRD *etc.* research) data on provenience, use, composition, and contexts, would be the other first step. As is usual in archaeological research, such “new” topics are often placed in competition with the archaeological productivity of other new and innovative topics, so we may even need to wait longer for such systematic approaches and programmes. Nevertheless, this request is posed here and a yield of this contribution.

In the same place, Benz addresses the topic of preferences for colour pattern compositions, saying “that the choice of colours was not an arbitrary act. ... every ornament had a very individualistic deliberately chosen composition of colour patterns from a common repertoire ...”. And: “The ornaments that could be reconstructed had different main colours, intersected by clearly contrasting hues.” Most strikingly, she concluded, with reference to ethnological studies, that the importance in Ba`ja’s necklace compositions “was merely the colour itself but rather the pattern.” Colour’s visual attraction reflects culturally defined preferences and aesthetics. These research fields are tricky but needed, and there are Neolithic sites (especially in Anatolia and southeast Turkey) with suitable material evidence to develop the epistemic means of preferential colour pattern research.

A prolegomenon advocating for an emically grounded colour research has to address the emotionality landscape colours trigger at its inhabitants. Those who stayed in or visited Ba`ja today and experienced the colours and the erosive figures of the site’s rocky “galleries” during the changing lights of the years’ days and nights could hardly escape their immediately emotionalising impacts. How much more must this have affected early Neolithic man, who existentially felt part of their natural environment, exchanged with nature on existential levels, and hardly saw nature as a subject of control and productivity? The colours and their mineral states, the seasonally changing vegetation, and the light must have evoked emotional responses in these people that were decisive for understanding life in their place. The red of the landscape was absorbed into parts of the domestic and sepulchral arenas; it raises the question of how this transmission was expressed

ritually, symbolically and magically and how it acted integratively.

About Neolithic “colour thinking”: Humans attribute traits and emotions to colours on various levels of the (un-)consciousnesses. This exposes the question of how the people of Ba`ja were thinking about colours. We moderns presume that colour perceptions and effects, or colour energies, can always be rationalised in a culturally specific, causal, taxonomic, and even measurable way (see the colour psychology literature, research on advertising). But what if “colour thinking” in the early Neolithic was originally a subject of causal-meronomic thinking (Gebel *et al.* 2022) and only then underwent a culture-specific rationalisation? This would mean that a colour was understood as part of a natural colour community and that its meaning was initially derived from its natural habitat context. This would have led to meronomic attributions, which then appeared meronomically rationalised in various contexts (pragmatic, magical, symbolic, ritual). Meronomic “colour thinking” highly depends on the colour palette offered by the surrounding nature and imported mineral or organic pigments and objects. Exotic colours, we suspect, must have undergone very special, meronomically supported commodifications.

At the end of this contribution, we would like to give the floor back to Bo Dahl Hermansen, to whom we originally owe *Red in Ba`ja* as a topic. In 2002, Hermansen (Hermansen n.d.) stated, ahead of the last years’ encounterings of red, that the colour was used to mark surfaces behind or under which things of ritual or symbolic significance were placed or hidden. He further suggested, quite comprehensible and using a theory of the structuralist psychologist J. Lacan (1966) based on Freud’s *fort-da* – concept²⁹, that the red colour may have been used “to signify an axis through the Ba`jan’s universe that distinguished ‘here’ (the world of the living) from ‘there’ (the world of the sacred and spiritual).” While we have a problem with Hermansen’s wording and concept for religious-historical reasons (“religious, sacred”), we fully agree with his conclusion that red must have supported a constant awareness of the presence of the otherness’ and its forces. However, Hermansen’s conclusion that the role of red was to protect the living from these forces

²⁹ “*fort*” and “*da*” stand for a symbolism of absence and presence.

appears not to be supported by our post-2002 evidence. But what if we overlook that *Red in Ba`ja* represents a dichotomous system, emic to the Late PPNB village universe?

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