The Antonine Wall

Papers in honour of Professor Lawrence Keppie

edited by

David J. Breeze and William S. Hanson

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Cover illustrations
Front: The Distance Stone of the Twentieth Legion from Hutcheson Hill (*RIB* III 3507) found in 1969 lying face down in a shallow pit immediately to the south of the Wall (copyright Hunterian, University of Glasgow). **Back**: Restored half-life-sized statue of the Roman god Mars from the annexe of the fort at Balmuildy (*CSIR* 129) (copyright Hunterian, University of Glasgow).

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Introduction

Monumental inscriptions recovered from along the line of the Antonine Wall are an exquisite body of evidence that provide invaluable insights into the Roman frontier. Referred to as Distance Stones, these sculptures are ripe for the testing of emerging non-destructive analytical techniques that cast new, and colourful, light onto sculptural reliefs. This work presents new dimensions that enhance our engagement with them and understanding of their material, cultural and strategic significance.

Non-destructive technologies have had a transformative effect on the analysis and recreation of colours from the Classical world to the extent that ancient statuary can now be digitally and physically re-imagined in authentic polychromy. These techniques are particularly attractive for exploiting the latent research potential of museum collections since they ensure the integrity of the objects under study. Portable X-ray Fluorescence (pXRF) and Raman Spectrometry have been used to undertake *in-situ* analysis to identify and recreate the pigments that would have originally brought life to the Distance Stones.

Polychromy on Roman relief sculpture

Colour plays a pivotal role in our modern perception of and engagement with the world around us. We experience colour in our every-day lives, in our landscapes, on our clothes, objects we interact with and jewellery we wear, in subtle shades of our hair and eyes or on the imagery we are exposed to through artwork, television screens or digital technologies. Thus, we do not live our lives in monochrome, we are immersed in colour as a sensory experience and subconsciously expect to see it wherever we look. This engagement with colour and the cultural significance associated with specific colours is evidenced since before the Upper Palaeolithic (Gage 1999). Yet, despite this, one can still open scholarly books or articles exploring the topic of colour and encounter only black-and-white images, if there are any images at all (Jones and Bradley 1999). If colour is mentioned in relation to ancient statuary, it is often treated as a fleeting footnote or cursory comment (Bradley 2009) without further extrapolation or consideration of either the cultural significance of the colours applied or the transformative effect they would have had on the viewers' engagement with objects.

And yet, colour is subjective (Jones and MacGregor 2002) and culturally defined. It has a transformative effect on the things to which it is applied and carries with it intrinsic symbolic and metaphoric significance and ways of being that transcend the purely visual as it connects to other senses such as sound, smell and touch (Young 2006: 174). Colour can also, for example, act as a medium through which people construct and express identities (Chapman 2002) or it can illicit an emotional response to representations of people, deities, scenes or things (Bradley 2009). Colour can define the social use of

Figure 8.1. Traces of pigment on the Parthenon Marbles, British Museum (© Louisa Campbell).

space, for example the reserving of specific colours for frescoes painted onto the walls of public spaces in Pompeiian homes, psychologically signalling the perception of a wealthy household (Allison 1992). Of course, individuals can also perceive colours differently, as those who are nowadays categorised as 'colour blind' will attest. We are most fortunate that historical accounts by Pliny (*Natural History* XXXV) and Vitruvius (*De Architectura* VII) survive as a rich resource for understanding the techniques used by Roman artists to prepare and apply pigments.

The practice of adorning sculptures with realistic colours did not originate from Rome, as evidenced from surviving pigments on the exquisite marble sculptures that once graced the pediments of the Athenian Parthenon (Jenkins and Middleton 1988; Jenkins 2001), now on display in the British Museum (Figure 8.1). Polychromy on Roman marble statuary is similarly well attested (Østergaard 2011; Happa *et al.* 2009; Siotto *et al.* 2015) and artistic representations of artisans applying pigments to sculptures confirm the practice (Abbe 2015: 177), though attention has focussed predominantly on marble and bronze sculptures (Liverani 2010; Formigli 2013). More recently, approaches that combine archaeological investigation and non-destructive techniques are providing a vehicle to re-imagine authentically how ancient sculptures would have appeared adorned in the vibrant colours of their original polychromy (Verri *et al.* 2010; Abbe *et al.* 2012; Brinkmann *et al.* 2017). Pigment identification techniques are well established (Siddall 2006; Eastaugh *et al.* 2008) and non-destructive analytical technologies are becoming more widely applied, such as on exquisitely preserved Pompeian frescoes (Piovesan *et al.* 2011; Merello *et al.* 2016).

Figure 8.2. Polychromy on marble relief from Nicomedia (reproduced by kind consent of the author: Sare Ağtürk 2015).

Polychromy on Roman marble relief sculpture is gaining attention (Del Monte *et al.* 1998), such as the exquisite marble frieze from Nicomedia (Figure 8.2) depicting Roma and Victory at the *adventus* procession with co-Emperors Diocletian and Maximian (Sare Ağtürk 2015; 2018). It is, however, rare for pigments to survive save for tantalising traces that hint at the original impact such scenes would have evoked in full realistic colour. Post-depositional processes, including acidic soils, environmental conditions and well-intentioned conservation and cleaning episodes by museum staff can have a detrimental impact on the survival of original surface treatments making their authentic reconstruction challenging (Abbe 2015: 174; Campbell forthcoming).

Despite it being the predominant raw material for Roman sculptures on the Empire's north-western frontiers, the practice of applying pigments to sandstone relief sculpture is not well understood. It is against this background that the monumental inscriptions recovered from the environs of the Antonine Wall serve as an excellent resource for investigating polychromy on Roman sandstone relief sculpture.

Antonine Wall monumental sculptures

The Antonine Wall (Figure 2.1) was commissioned shortly before AD 142 by the Emperor Antoninus Pius to define Rome's north-west frontier (Hanson and Maxwell 1986; Robertson 2015; Breeze 2006). The mural barrier is a turf rampart set on a stone base that stretches across central Scotland through the Forth-Clyde isthmus for for some 62 km (38 miles) and separated the Roman-controlled region to the south from the non-Roman north. Monumental inscriptions were recovered from along the line of the Wall and its environs (Keppie 1979; 1998) and many combine inscriptions and sculptural relief. They have been described as the most impressive and visually impactful body of epigraphic evidence recovered from any Roman frontier (Ferris 2000: 110-3; Breeze 2006: 69).

Carved from local sandstone, these monumental inscriptions are a rich textual resource and provide a graphic account of this frontier region (Ferris 2000: 111-13; Breeze and Ferris 2016) commemorating and memorialising actions and reputations of the Emperor and the dedicators in perpetuity (Woolf 1996: 26). They contain recognisable patterns of Roman epigraphic practice with dedications to the Emperor in prescriptive abbreviated Latin. The inscriptions also record the distance of the Wall constructed by each of the three legions stationed on the frontier (*Legio II Augusta, Legio VI Victrix and Legio XX Valeria Victrix*). Many also contain compelling iconography in relief, including depictions of Roman deities or graphic scenes of the Roman invasion and conquest of southern Scotland as well as the subjugation of indigenous northern warriors (Figure 8.3) that were accessible to anyone with Roman affiliation (Kampen 2016: 132) and to local non-Romans alike. It has been suggested that each sector was marked by four stones, two on the north side and two on the south side of the rampart (Steer and Cormack 1969: 125), but this would severely restrict the capacity for engagement with

Figure 8.3. Distance Stone from Summerston Farm (*RIB* I 2193; *CSIR* 137) (© Hunterian, University of Glasgow).

them. Perhaps more feasibly, they were mounted onto stone frames facing south at areas with high footfall for maximum audience exposure (MacMullen 1982; Woolf 1996; Keppie 1998: 53; Hannon *et al.* 2017: 14), possibly even along the Military Way (Campbell in preparation). With their combination of propagandist iconography reinforcing Roman dominance over the region (Keppie 1979: 4-5) and inscriptions memorialising events, the sculptures are powerfully evocative monuments that provide cultural context to mythological, religious or historical events (Strong 1961) from a tightly dated period around *c.* AD 142 (Bruun and Edmondson 2015: 19).

The application of colour would have enhanced the performance of these objects, providing a platform for transmitting and transforming complex information in different cultural contexts through an additional layer of meaning that transcends material properties (Miller 2005; Gosden 2006; Ingold 2007). It would have imbued them with vitality and significance in the interface of symmetrical entanglements between things and people (Hodder 2012; Conneller 2011). The intrinsic cultural value of the Antonine Wall sculptures should be considered in the context of their technological, material, conceptual, sensory, emotional and historical properties and their impact on the contemporary audience in original condition (Campbell forthcoming).

The Antonine Wall sculptures from Summerston Farm and Bridgeness (Figures 8.3 and 8.7) serve as exemplars for considering operational sequences, the *chaîne opératoire* (Leroi-Gourhan 1993), as well as the inherent properties of raw materials being modified to achieve desired results through the development or transmission of technological skills and traditions (Phillips 1972; Roux 2016). The apparently prescriptive application of colours to specific sculpted features would have complied with culturally ascribed traditions on raw material that Mediterranian artisans were less familiar with. The material properties of local sandstone vary greatly from those of marble that Roman sculptors were accustomed to carving and pigments would have afforded a better finish to the work with the added benefit of concealing imperfections (Bradley 2009).

Snapshots of colour have revealed themselves to curators and conservators cleaning the Antonine Wall sculptures, including when they were washed with distilled water, detergent or steam cleaned ahead of installation in new exhibitions (Phillips 1972; Close-Brooks 1981; Keppie 1998: 34 and 45). This practice evidently had a detrimental impact on the survival of pigments and other surface treatments which have become challenging to identify using sensitive non-destructive techniques, though it has been possible to extrapolate sufficient data to confirm these exquisite sandstone sculptures were originally adorned in vibrant polychromy (Campbell forthcoming).

pXRF and Raman spectroscopic analysis of the Distance Stones

A recently completed project, generously funded by Historic Environment Scotland (Campbell 2018), explored the applicability of *in-situ* non-destructive analytical techniques. The primary objectives were to determine whether any traces of pigments originally applied to the monumental inscriptions from the Antonine Wall are detectable and to facilitate their physical and digital reconstruction. Nine stones in the Hunterian Museum and one in the National Museum of Scotland were analysed to provide a comprehensive comparative dataset. Altar stones and a statue from locations on or near Hadrian's Wall, now in the Great North Museum: Hancock in Newcastle and Yorkshire Museum in York, known to have retained traces of pigment were also included for comparative purposes.

The pXRF analysis was undertaken with a Niton XL3t 900 SHE GOLDD Alloy Analyser, with a 50kV Ag X-ray tube, 80MHz real time digital signal processing and two processors for computation and data storage respectively. The material properties of the sandstone were challenging to mitigate since the surfaces were not flat and textures as well as colours naturally present in the sandstone were reflected chemically in some background levels of some elements, for example, iron. This technique has been widely used in the fields of archaeology and conservation science (Liritzis and Zacharias 2010; Chaplin *et al.* 2016) to provide non-destructive elemental analysis of pigments used in Antiquity. PXRF can classify pigments that are, for example, rich in iron or copper, but cannot identify the complete compound such as haematite (iron III and oxide) and azurite (copper carbonate mineral) or organic-based pigments such as madder (*rubia tinctorum).*

As with pXRF, portable Raman spectroscopic analysis is also becoming increasingly utilised in materials science (Castro *et al.* 2005; Bell *et al.* 2010; Bersani and Lottici 2016; Marucci *et al.* 2018). Using a handheld SciAps Inspector 500 with a 1030 nm laser, this technique enables progression from pXRF-determined elemental characterisation of samples to the provision of compound identification and identification of organic-based pigments such as madder. Raman has additional challenges to mitigate, such as some pigments absorbing source laser wavelengths causing large fluorescence backgrounds that obscure Raman signals or some materials being challenging to detect and 'fingerprint', such as diluted pigments on quartz-rich or heterogeneity of sandstone influencing results (Von Eynatten *et al.* 2003; Everett and Gillespie 2016). The applicability of the kit has not been widely tested in the cultural heritage sphere; for this reason, this project is both exploratory and revolutionary in terms of the analysis of Roman sandstone statuary since the technique has only previously been applied to Roman marble sculptures (Cosano *et al.* 2017: 191).

Summary of results

There is not the space to document fully the results of this research here (c.f. Campbell forthcoming), but in summary they confirm that a palette of pigments dominated by reds and yellows was originally applied to the Antonine Wall sculptures (Figure 8.4). A prescriptive formula for colours expected to appear in specific contexts on these Roman frontier relief sculptures is evident from work elsewhere (Jones and Bradley 1999; Bradley 2009) and desired shades have been achieved through mixing of materials, though it is not clear whether this is the result of selectivity or availability of some pigments. For example, traces of red in letters are relatively widespread on various types of Roman inscriptions, but the work reported here suggests pigments can derive from locally sourced ingredients. This is confirmed by the presence of madder and realgar reds in the lettering of the Antonine Wall sculptures as opposed to the deeper and richer red of vermilion confirmed in letters on Hadrian's Wall sculptures (Figure 8.5). This is not an unusual practice as evidenced by the mixing of organic dyes such as madder and indigo to produce a purple pigment (Clarke *et al.* 2005) or cinnabar and haematite extending the valuable and rarer cinnabar (Rozenberg 1997; Kakoulli 1997).

The results correspond with recent analysis of altars to Sol and Mithras at Inveresk where traces of red oxide and red ochre with yellow clay ochre were identified by light microscopy (Siddall 2016: 148). There a single particle of pink madder was also detected and considered to be unintended as a pigment, more possibly a contaminant from the artisan's workshop. Madder is an organic pigment undetectable by pXRF, but the visible reddish tint on many Antonine Wall sculpture letters suggests

Sample	Colour	Areas on Antonine Wall Distance Stones
	Minium (Red Lead)	Summerston - captives' chests, head, beard, thigh and cheek to depict blood; eagle beak Bridgeness - neck of decapitated warrior, fallen captive's shield; top frame and right pediment
	Red ochre	Summerston – rider's standard; N of Antonino; Bridgeness – rider's cloak;
	Madder Red	Summerston - letters
	Realgar	Eastermains – Letters; pelta rosette
	White Lead	Summerston – Victory's dress trim
	Orpiment	Summerston – Victory's dress (main body)
	Yellow ochre	Bridgeness – cheeks of rider and soldier

Figure 8.4. Colour palette for Antonine Wall sculptures

Sample	Colour	Areas on Hadrian's Wall Stone Altars
	Vermillion	Mithras altar I - name of dedicator (Lucius Antoninus Proculus) Mithras altar II – Mithras cloak; circular symbol on column
	Red ochre	Mithras altar II – left column Altar to The Matres – side column
	Azurite	Mithras altar I – inscription letters, except for dedicator's name
	Orpiment	Mithras altar II – background to Mithras' head; creases of Mithras' cloak

Figure 8.5. Colour palette for Hadrian's Wall sculptures.

a high probability for its use. It may have served as a more easily sourced alternative to vermilion reds expected to be seen in the inscribed letters, and has also been used as a red colourant in Pompeii (Eastaugh *et al.* 2008: 499). The Raman results on several letters on an Antonine Wall sculpture from Eastermains (*RIB* I 2185) supports this hypothesis.

As expected due to the lack of intervention from conservators or from cleaning, some of the results from Newcastle and York are clearer. Indeed, the Hadrian's Wall sculptures produced unexpected results. One of the Carrawburgh altars to Mithras (*RIB* I 1544) from Newcastle (Figure 8.6a) composed of arenaceous limestone, has high mercury in several letters and high copper in others combined with higher than average zinc and low levels of iron. This suggests the name of the dedicator, *Lucius Antoninus Proculus*, was depicted in a bright scarlet vermilion while blue pigment, most likely azurite, as opposed to Egyptian blue, *Caeruleum,* which is also copper-based, was used to paint the letters on the top and bottom rows (and presumably the other letters).

The second Carrawburgh altar (Figure 8.6b) (*RIB* I 1546) depicting a relief sculpture of Mithras also confirms the application of vermilion to the god's cloak as well as probably lead white background

Figure 8.6. Altars to Mithras from Carrawburgh, Great North Museum: Hancock. a. *RIB* I 1544 b. *RIB* I 1546 (© Louisa Campbell).

and a bright golden yellow background framing Mithras' head where hollowed-out sun rays would have reflected candlelight in the darkened spaces where this cult was practiced. High calcium and sulphur also confirm that a layer of gesso (calcium sulphate) was applied to the sculpture prior to painting. Some of these elements of colour were recognised at the time of excavation (Richmond and Gillam 1951: 37-38). No corresponding evidence was found for a similar practice on the Antonine Wall sculptures, though ongoing work will explore this further.

This significant finding confirms the negative impact of modern cleaning and conservation practices on ancient statuary, since the two Carrawburgh altars have not been subjected to intensive cleaning and show considerably better preservation of original pigments. This may also suggest the lettering of Antonine sculptures may have been painted solely in red, as has been noticed during cleaning of

the Summerston Farm sculpture (Keppie 1998: 34 and 45), perhaps elevating the status of legions charged with securing the Roman Empire's furthermost boundaries as the Emperor's designated representatives. Bold red lettering throughout would certainly have made these inscriptions easily legible in drawing the reader's eye and high lead in the A of Antoninus Pius' name AELIO on the Bridgeness stone (*RIB* I 2139) indicates the presence of bright red minium. This may have been used to embolden the emperor's name against a different red for the dedicators (Second Legion) – though it is equally possible that minium was used for all the lettering on this stone as no other clear evidence for pigments was recovered from inscribed letters.

A preference for shades of red pigment is further evidenced on iconographic features. Bright red minium (red lead) is present on the chests, beard, head, thigh and cheek of captives on the Summerston Farm relief sculpture (*CSIR* 137), probably to depict splashes of blood on warriors fresh from a battle with the Roman legions. This corresponds with similar features on the Bridgeness sculpture, where minium is evident on the shield of a fallen warrior as well as the decapitated neck of another. The latter remains visible, as does the red from iron oxide pigment applied to the rider's cloak and that of the individual on the far right of the sculpture (right panel). Intriguingly, minium is also present on the beak of the eagle on the right panel of the Summerston Farm sculpture, perhaps symbolising Rome feasting on the blood of her captive enemies (Figure 8.3). Minium is described by Pliny (*Natural History* XXXIII, 40) the 'brilliant colour of the kermes berry'. It was used by Roman artists to create splendour, light and luminosity (Bradley 2011: 97) and specifically for the depiction of blood and carnage (Pliny *Natural History* XXXIII, 36).

Yellow ochre is present on skin-coloured areas such as the cheeks of the rider, soldier and fallen northern warrior on the Bridgeness sculpture (*CSIR* 68), potentially confirming layering of colours to achieve realistic skin tones. It is likely that layers of ochres were applied to gesso here (now washed off after episodic cleaning) to give skin a life-like appearance, similar to the techniques used on the Copenhagen head of Caligula where layers of brown, red and yellow ochre with chalk were painted onto an undercoat of black burnt bone (Brinkmann *et al.* 2017: 50). This practice is further evidenced by the apparent presence of lead white, iron oxide (red ochre) and carbon black confirmed on the bare leg of the life-sized statue of Mars from York during this research.

The lustrous, golden-like yellow of orpiment has been applied to adorn the dress of the winged goddess Victory on the Summerston Farm sculpture, trimmed with lead white and possibly with splashes of red blood from the nearby indigenous captives fresh from battle. This is in line with Victory's depiction on Pompeiian frescoes, or the skirts of the goddess Roma and winged Victory on the Nicomedia relief (Figure 8.2) where colours are exceptionally well preserved due the sculpture's placement in the interior of an imperial cult building (Sare Ağtürk 2018: 416).

The primary material foci of this research, the Antonine Wall monumental inscriptions, have been challenging to analyse using non-destructive techniques that work more effectively on 'clean' heritage materials that retain visible pigments. It has, however, been possible physically and digitally to reconstruct colours that would originally have adorned these unique Roman sculptures. Despite the variety of pigments catalogued by Pliny (*Natural History* XXXV) and Vitruvius (*De Architectura* VII), it is not surprising to confirm that a restricted palette of reds and yellows dominated the repertoire of Roman artisans who painted these inscriptions and relief sculptures, with occasional hints of

Figure 8.7. Digital reconstruction of the Bridgeness Distance Stone (*RIB* I 2139; *CSIR* 68) by Lars Hummelshoj.

blue, white and black on the examples from northern England that will be published separately. This is not an uncommon practice and more exotic, less readily available, pigments defined by Pliny as 'florid', would have been restricted, which explains the Roman artisans' practice of mixing cinnabar with other minerals to extend its use. That Pliny's 'austere' category of pigments were commonly available and accessible across the Empire, including red and yellow ochres, carbon black, *terres vertes*, chalk-based whites and mixtures of these colours (Siddall 2006: 28) is, therefore, unsurprising in this context on the edge of Empire. The palette of colours on the Antonine Wall and other frontier sculptures can, therefore, be designated predominantly into Pliny's 'austere' categorisation that were capable of being locally sourced. The others, including orpiment and realgar, are rarely used and not locally available. These can be categorised as 'florid' and were most likely imported from other provinces.

It has been possible to reconstruct digitally an iconic scene from the Bridgeness sculpture using authentic colours identified from this research (Figure 8.7). The realistic representation of this sculptured scene was achieved by matching the pigments with pantone codes and taking account of experimental work confirming how the original pigments would have worked with the sandstone. Authenticity is preserved through the various shades of reds on the cloak and tunic of the rider, and bright minium red depicting blood on the fallen northern warrior's decapitated body and neck. Slight artistic licence has been taken with the colour of the cuirass which is depicted in bronze in line with representations of the Praetorian Guard on Musée du Louvre (Russell Robinson 1975: 147) and those recovered from a shipwreck near Cuea del Jarro dating from first-third century (D'Amato 2009: 42) or the striking digital reconstruction of a cuirass from the Athenian Acropolis (Brinkmann *et al.* 2017: 129). The bonze terminals of the rider's *pteruges* (defensive skirt made of strips of leather) have been similarly extrapolated from other evidence (D'Amato 2009: 102) such as a life-size sandstone representation of Mars at the Yorkshire Museum. The result is a realistic, and terrifying, image of warfare that served as a powerful propagandist tool simultaneously striking fear into the hearts of the indigenous population while evoking a sense of dominance for a more Romanised audience.

Despite the inherent challenges, it has been most rewarding to confirm that non-destructive in situ analytical technologies are incredibly useful in the field of materials science, particularly for the analysis of curated museum collections. Taking this a step further to reconstruct the original pigments applied to Roman sandstone statuary has been a valuable contribution to understanding and recreating how these sculptures would originally have been perceived and received by contemporary audiences. Such integrated and interdisciplinary approaches to the investigation of archaeological materials offer innovative routes for material culture studies which will be progressed during the next four years of a Fellowship funded by Historic Environment Scotland and the Lord Kelvin / Adam Smith Fellowship, University of Glasgow.

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