Identifying ritual deposition of plant remains: a case study of stone pine cones in Roman Britain

Identifying Ritual Deposition of Plant Remains: a Case Study of Stone Pine Cones in Roman Britain

Introduction

The identification and theorisation of ritualised deposition in the Roman world has received significant research focus over the last decade (Fulford 2001; Smith 2001). Yet, as within other theory-heavy areas of Roman archaeology (Pitts 2007), plant remains have been poorly integrated into key synthetic works. Analysis has instead focussed on artefactual and zooarchaeological remains (Smith 2001; Morris 2010), with plant remains only briefly alluded to, or discussed largely within specialist archaeobotanical literature (Robinson 2002; Vandorpe and Jacomet 2011). Whilst there is growing evidence for the use of plants in non-funerary classical Roman religion, as well as structured-deposition in shafts and pits, the absence of systematic methodologies and contextual analysis limits the study of ritual plant use in the Roman world.

The separation of 'ritual' from 'mundane' deposits has been thoroughly critiqued (Brück 1999; Bradley 2005), and the concept of ritual as social practice (Bell 1992) is now commonly used to explore ritualised activities (Chadwick 2012). This necessitates that artefacts, stratigraphy and ecofacts must all be considered in order to understand instances of deposition which may have derived from ritualised activities (Garrow 2012). A closer consideration of the deposition of plant remains will contribute to the construction of a spectrum between waste from everyday food preparation and plant remains purposefully charred and/or deposited as an aspect of ritualised activities. The case study of *Pinus pinea* L. (stone pine) cones is utilised here to explore the methodological criteria available to assess the depositional histories of plant remains in various temple and settlement contexts.

The Integration of Plant Remains into Studies of Roman Ritual Deposition

The literary description of plant offerings in the Roman world is brief in comparison to that of animal offerings (North 2000: 44–45). Cakes, grains, vegetables, breads and wild flowers are mentioned, but broad terms such as 'fruits of the earth' are common (Robinson 2002; Scheid 2003). The presence of plant remains within archaeological ritual deposits has though been widely recognised for over a decade (Palmer and Van der Veen 2002). First, plant foods have been recovered from cremations, representing both offerings and funerary feasts. Pulses, fruits and nuts are commonly present, and regional studies have recognised variation in the types of foods, as well as the types of wood fuel used (Kreuz 2000; Bouby and Marinval 2004; Rottoli and Castiglioni 2011). As the recognition of plant foods from cremation and burials are aided by the distinctive contexts, these will not be discussed here.

Second, plant remains have been recovered from classical temples. Items were hand collected from early excavations, such as intact charred pine cones and figs from the Temple of Isis in Pompeii (Mau 1902), and a pine cone from the Temple of Mithras in London (Grimes 1968: 114; Shepherd 1998: 155, 161). More recent excavations have included systematic sampling, producing detailed evidence for the range of plant foods offered at the Temple of Isis, Mainz (Zach 2002), and the Oedenburg temple (Vandorpe and Jacomet 2011). At these sites, the presence of sediments rich in charred plant remains including processed foodstuffs, within a spatially recognised temple complex and alongside distinctive artefact categories, such as oil lamps, allowed the identification of food remains as votive offerings to the gods.

More rarely, plant remains have been identified as domestic offerings within gardens at Pompeii (Ciaraldi and Richardson 2000; Robinson 2002). Charred plant foods, which do not require heat during food preparation (date, fig and walnut), were recovered from purposefully buried deposits containing high concentrations of charcoal and miniature ceramic vessels. Furthermore, correlations were drawn between the plant materials offered, and those depicted in lararium wall paintings (Robinson 2002). Foundation deposits have been recognised with the same criteria. A pit within a storehouse in the Roman port of Lattara, France, contained charred foods (dates, figs, grapes) alongside oil lamps, pottery vessels, a pin and an egg (Rovira and Chabal 2008).

Table 1: Criteria used in previous archaeobotanical studies of Roman ritual offerings

Criteria	Evidence	References
Range of plants foods	Depicted in artistic and literary evidence	Robinson 2002
	Parts not usually burnt during food preparation	Robinson 2002
	Similar to funerary contexts	Palmer and Van der Veen 2002
	Processed food (bread/pastry)	Vandorpe and Jacomet 2011
Spatial distribution	Discrete, purposeful burial	Robinson 2002 Rovira *et al.* 2008
Co-occurring artefacts	Miniature ceramic vessels, Oil lamps, Coins	Robinson 2002; Rovira *et al.* 2008 Vandorpe and Jacomet 2011

Fewer detailed prehistoric studies of plant remains are available from so-called instances of structured deposition (Richards and Thomas 1984; Garrow 2012). Charred cereals grains from Iron Age storage pits are often interpreted as ritual deposits, yet without any quantitative discussion of the plant remains present (Alcock 1980; Williams 2003; Thurston 2009). When comparison has been undertaken between special deposits containing animal bone groups and archaeobotanical remains, no correlation has been observed (Campbell 2000: 53). Occasionally, pragmatic arguments based on technicalities of preservation allow the recognition of discrete acts of deposition, such as charred spelt and emmer grains in the base of postholes with *in situ* posts at Sutton Common (Van de Noort *et al.* 2007: 131–135). Overall, archaeobotanical remains are rarely incorporated as a category of deposited material (but see Van de Noort *et al*. 2007; Brudenell and Cooper 2008).

The extension of structured deposition studies to the Roman period has similarly seen only tentative attempts to incorporate plant remains. "Carbonized vegetable material" from a crevasse at Cosa, Italy (Brown *et al.* 1960: 10) was the starting point for a discussion of urban foundation deposits. Yet the subsequent detailed contextual analysis of shafts from Greyhound Yard, Dorchester did not incorporate the plant remains which were present (Woodward and Woodward 2004). Where plant remains are interpreted as ritually significant, limited explanation is given. Fulford suggested that the presence of seeds of various plants in pots from wells from the northern Insulae of Roman Silchester may be significant, due to the presence of taxa with both poisonous and medicinal properties, and the repetition of the taxa recorded (Fulford 2001: 206). Many of the taxa highlighted do have medicinal properties, especially deadly nightshade (Lee 2007). However, the use of a large aperture sieve, and a lack of recording of sample size or preservation quality in the early twentieth century study at Silchester (Robinson 2012) means it is unclear whether the taxa listed were a product of purposeful deposition or not. Cereals, seeds, twigs and nuts from the base of Late Iron Age and Roman wells in the Netherlands were suggested as purposeful deposits, without reference to any specific examples (Van Haastern and Groot 2013: 40). Alternatively, plant remains have been used as evidence for the wider settlement character, instead of as an aspect of the structured deposition of materials in the well (Cool and Richardson 2013: 207). Hence plant remains are often treated as palaeoenvironmental indicators, which were not actively engaged with as physical materials. When plant remains are ascribed ritual labels, this is without any detailed consideration of patterns and co-occurrences within and between the archaeobotanical and archaeological data.

Recent studies of ritualised deposition have been focussed on animal bones and artefacts, with minimal incorporation of plant remains into their analysis (Smith 2001; Morris 2010; Allen and Sykes 2011). Archaeobotanical criteria are available for identifying purposefully deposited plant remains (Table 1), yet the lack of integration of these studies into broader synthetic studies results in the assignment of plant remains as ritual deposits based on few criteria. Furthermore, the limited incorporation of plant remains into studies of ritualised deposition may have resulted from a lack of theoretical engagement within archaeobotany. In contrast, 'social zooarchaeology' has emerged as a research field, investigating a wide range of human-animal relationships (Russell 2012; Overton and Hamilakis 2013; Sykes 2014). The concept of materiality has also

recently been extended to plants, through examples of the entanglement of humans and plants through food consumption, plant husbandry and domestication (Van der Veen 2014). The material attributes of plants are also evident in ritualised activities. Livarda has argued that dates (*Phoenix dactylifera*) should be considered as 'perishable material culture', rather than merely foods used in ritual contexts (Livarda 2013: 112). Plant items (fruits, leaves, roots) often have strong smells, textures and colours, which would make an important contribution to the sensory experience and mnemonic effect of rituals (Hamilakis 2011). This applies to both individual plant items, such as dates, or composite materials containing various plant items, such as middens or stable manure (Waddington 2012: 45). The sensory attributes of plant items is particularly evident for the case study subject, stone pine cones, due to their use as incense in mithraic rituals (Bird 2004). The recognition of plant remains as objects which interact with people in ways beyond food consumption highlights the need for plant remains to be considered in detail within studies of ritualised deposition.

Stone Pines in the Roman World

The widespread recognition of stone pine cones in ritual activity (Kislev 1988) makes them a suitable case study for assessing the relevance of depositional criteria. *Pinus pinea* L. – the stone or umbrella pine, is an evergreen tree (Fig 1). Stone pine is considered to have survived the glacial period in the western Mediterranean, before spreading east across the Mediterranean from around 1000 B.C. (Vendramin *et al.* 2008). The tree grows well in coastal areas, and on the low slopes of hills and mountains (Lim 2012). They are currently distributed from Atlantic Portugal to Lebanon and Turkey (Mutke *et al.* 2012). Pine cones are gathered from wild forests from October to the end of March. They are then left to ripen in the sun, before being beaten to extract the nuts (Harrison 1951; Mutke *et al.* 2012), which have been used as food source since the Palaeolithic (Humphrey *et al*. 2014).

Stone pine was grown ornamentally in the Roman world, as depicted in wall paintings (Caneva and Bohuny 2003), but was also utilised for timber (Allevato *et al.* 2010), and the kernels were used within various sauces, fish and meat dishes (Grocock and Grainger 2006; 247, 279, 301). Evidence for their ritual use comes from third and fourth century A.D. Egyptian papyri which state that pine cones were intended for sacrifice (Richmond and Gillam 1951: 6), whilst artistic and artefactual evidence associates pine cones with the cults of Mithras (Bird 2004), Bacchus, Cybele and Silvanus (Crummy 2010: 63). Archaeobotanical finds of stone pine cones beyond their native distribution, such as from the Eastern Desert of Egypt (Van der Veen 2011), indicate their long-distance trade. Furthermore, 61 closed pine cones were recovered from a first century B.C. shipwreck off of Toulon (Girard and Tchernia 1978).

Figure 1: Stone pine growing at Kew Gardens, UK.

Archaeobotanical Evidence

The parts of stone pine cones are one of the most commonly recognised plant remains from ritual deposits in north-western Europe and Britain during the Roman period, alongside date (*Phoenix dactylifera* L.) (Bakels and Jacomet 2003; Van der Veen *et al.* 2008). The cone consists of a number of bracts, each holding two nuts containing single kernels (Fig 2). Each cone can yield up to 100 kernels. Nutshells, bracts, intact cones, and occasionally shrivelled kernels have been recovered from domestic contexts (Murphy *et al.* 2013), cremations and bustum burials (Giorgi 2000; Rottoli and Castiglioni 2011), and ritual deposits (Kislev 1988) throughout the Roman world.

Stone pine cones are large enough to have been hand collected from sites excavated prior to the advent of systematic sampling in the 1970s, significantly increasing the number of records within Britain. However, hand collection overlooks small items in the surrounding sediment, including nutshell fragments and restricts spatial comparisons. Systematic sampling requires multiple soil samples to be taken and processed by flotation, in order to collect plant remains greater than 0.25–0.5mm. We can be relatively certain that pine cone remains collected through systematic sampling include all pine nutshell present, as well as any smaller plant items. All examples within this paper were preserved by waterlogging or charring. Pine cone remains preserve well by charring due to their woody nature (Van der Veen 2007). Similarly, pine cone remains preserve well in waterlogged anoxic conditions, but only when such sediments are present at a site.

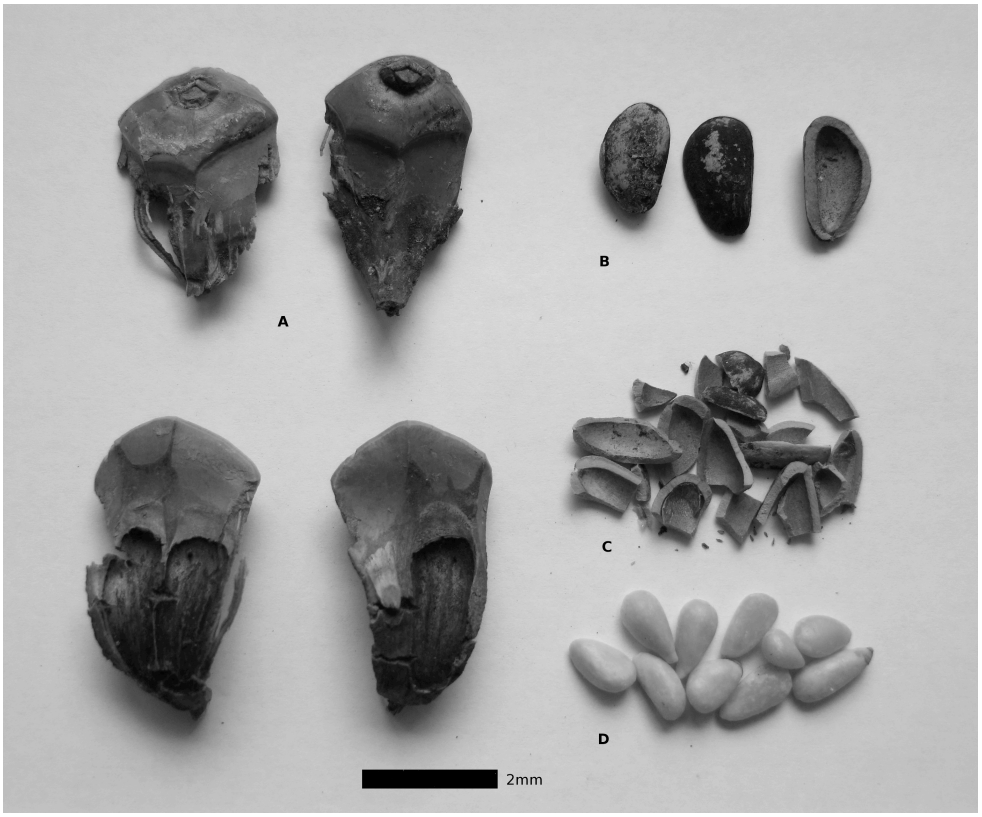

Figure 2: Parts of stone pine cones found in archaeobotanical samples. A = bracts, B = pine nuts, C = fragmented nutshell, D = kernels.

Methodological Criteria

Archaeobotanical data was collected from reviewing published literature from Roman Britain. The type of plant remains present and the mode of preservation was recorded, along with co-occurring artefactual and zooarchaeological remains, and the spatial distribution of the pine cone material. Criteria for the exploration of ritualised deposition were adapted from previous archaeobotanical and archaeological studies. First, taphonomic aspects of the plant remains themselves provide indications of their past use (Table 2). If a whole cone is present, whether it is open or closed can indicate if it was opened to extract the kernels. The presence of bracts and cone fragments, such as the cone apex, also suggest that the entire cone was transported. Nuts can be

extracted and transported over long-distances without impairing the quality of the kernel (Van der Veen 2011: 157). Hence the presence of bracts implies that the entire cone was imported for reasons beyond food consumption, as transport would be costly and take up much more space in cargoes. Some bracts, however, may remain as contaminants in a consignment of pine nuts (Stevens 2011: 104). Furthermore, the fragmentation of shells implies that they were opened to extract the kernel for consumption.

Charring of pine cone remains indicates that they were exposed to fire, which is a common aspect of ritualised offerings (Ekroth 2008). Finally, a high density of plant remains indicates large-scale use (Van der Veen and Jones 2006), which in a potential ritualised deposit can be interpreted as purposeful burning and/or deposition. For instance, sampled sediments from the temples at Mainz and Oedenburg were described as charcoal rich, and the densities of plant remains recovered ranged from 10 to 15 items per litre (Zach 2002; Vandorpe and Jacomet 2011). Criteria have also been utilised from synthetic studies; spatial co-occurrences or avoidances with artefacts commonly recovered from Roman religious deposits (Smith 2001: 26), such as miniature ceramic vessels and oil lamps (Robinson 2002), as well as those from structured deposition; intact pots, quernstones, and animal bone groups (Fulford 2001; Shaffrey 2003; Morris 2008).

Table 2: Taphonomic criteria for assessing ritualised deposition of stone pine cones

	Implications	Key reference
Burning	Chthonic offering	Ekroth 2008
Fragmented nutshells	Kernels extracted for consumption	Monckton 2000
High density	Purposeful deposition	Van der Veen and Jones 2006
Open cone	Cone opened to extract kernels	Kislev 1988
Presence of bracts	Whole cones imported	Booth *et al.* 2007, 281

Stone Pines in Roman Britain

Stone pine nuts were imported to Britain amongst a wide range of new plant foods from the earliest Roman period, typified by a deposit of charred pine nuts, lentils, figs and anise from a *c.* A.D. 60/61 pottery shop at Colchester (Murphy 1984). The possibility that stone pine trees were later cultivated in southern Britain has been suggested, due to increasing numbers of finds of stone pine remains in southern Britain (Campbell 1999; Robinson 2007; Bateman *et al*. 2008: 114; Pelling 2008a), and the ability of stone pines to grow in Britain today (Fig 1). It is not possible to ascertain whether pine cones originated from local trees or importation. Either way, pine cones still represent rare items in Roman Britain. The only other native pine, *Pinus sylvestris* L. (Scot's Pine), has smaller pine cones and is considered to be absent from southern Britain by the Roman period (Rackham 2006). Stone pine has been identified from 32 records in Britain. Of these records, around half are from temples or cremations, and half are from domestic sites (Van der Veen *et al.* 2008). A selection of these records is presented here, which provide contrasting evidence for the depositional histories of pine cone remains (Table 3).

Sacred Space

The remains of stone pine cones have been recovered from a range of sacred places present in Roman Britain, including classical style temples, Romano-Celtic temples and shrines (Smith 2001: 16). Excavation of the third to fourth century A.D. Carrawburgh Mithraeum, on the eastern section of Hadrian's Wall, produced several records of pine cones due to anaerobic preservation (Richmond and Gillam 1951). During phase 1 (early third century A.D.), an intact pine cone was present adjacent to the altar. In subsequent phase 3, pine cones were present on either side of the apse. Neither of these pine cones were charred, but it was not recorded whether they were open or closed. Hence whole pine cones were utilised as 'votive' objects, whereby their location within the temple indicates their significance. Pine cone remains were also present in the form of a very charred pine cone within a bunker in the gravelled nave, alongside *Corylus avellana* L. (hazel) charcoal. Through experimental

burning, these remains were interpreted as pine cone fuel. Lumps of the pine cone fuel were also present in a votive deposit buried beneath the the phase 3 altar, alongside a castor ware beaker, a chicken head and a tin cup. A further example of a charred cone is from the Temple of Mithras in London, where a waterlogged, but partially charred single pine cone was discovered from the floor of the nave, alongside chicken bones (Grimes 1968: 114; Shepherd 1998: 155, 161). At these two sites, the charred remains are likely to represent a burnt offering, or more specifically incense used in mithraic rituals (Bird 2004).

The archaeobotanical evidence from Romano-Celtic temples in Britain similarly shows the varied evidence for pine cone deposition. The Triangular Temple in Verulamium provides comparable evidence with Carrawburgh of charred pine remains. Within the early second century A.D. temple, a brick-lined pit on the western side contained charred pine nutshell, a coin and *Quercus* sp. (oak) charcoal. A comparable assemblage was retrieved from a rectangular pit within the floor of the second phase of the temple, where oak charcoal, a beaker, plates, dishes, bronze rings, a coin, and charred pine nuts and bracts were recovered. Wheeler took these assemblages as votive offerings (Wheeler and Wheeler 1936: 116), whilst Lewes interpreted them as foundation offerings (Lewis 1966: 95–96). These plant remains from the Triangular Temple were all hand collected, so it is not possible to evaluate the assemblages against plant remains in other parts of the temple. Similarly, the plant remains are reported very briefly, with no quantification or detail of nutshell fragmentation. At Lower Brook Street, Winchester, an intact pine cone was recovered from a waterlogged pit around 10m to the south of a Romano-Celtic Temple, adjacent to a pit containing a wooden statue of the goddess Epona. No samples were taken from the pit, and no finds were reported (Biddle 1975). Yet, the presence of an intact cone strongly indicates that it was imported to Britain for uses beyond food supply. Intact pine cones were also recovered from a nearby well in the Cathedral Car Park, Winchester, but again the reporting of these finds lacked sufficient contextual detail (Biddle and Quirk 1964; Murphy 1977).

In contrast, shrine sites in south-east Britain which have been systematically sampled have produced relatively scarce evidence of pine cones, or any other plant offerings. From the Sanctuary complex at Springhead (CTRL excavations) a single charred bract was recovered from the spring infill in front of the shrine, and two charred bracts and a single nutshell were recovered from a nearby chalk quarry. These were the only records of pine cone from the excavation despite extensive sampling. The remains were interpreted as either altar fuel or offerings (Stevens 2011: 103). Without the architectural evidence for sacred space, these remains would have been interpreted as food remains, although the slightly higher number of bracts than nutshells suggests that whole cones were used. Comparative evidence comes from the shrine at Westhawk Farm, Ashford (Booth 2001). A single charred nutshell was recovered from a pit fill within the centre of the probable polygonal shrine, accompanied by just a few weed seeds (Pelling 2008b). Other fills of the pit produced few artefactual remains; one coin, two nail fragments and a few pottery sherds. Again, without the spatial associations with the shrine, these pine remains would not have been ascribed a ritual origin.

Military Settlements

Pine cone remains have also been attributed ritual origins from sites without obvious religious architecture. The waterlogged sediments from the A.D. 44/5 ditch of the fortress annex at Alchester contained cone fragments and nuts. Only preliminary results are currently available, but there is no mention of charring or nutshell fragmentation (Sauer 2006; Booth *et al.* 2007: 281). Yet the presence of a whole cone implies that it was imported for reasons beyond food supply, which was interpreted as religious supply for the soldiers (Booth *et al.* 2007: 281). In contrast, systematic sampling and detailed publication of the early second century A.D. probable military annex at Orton's Pasture, Staffordshire, shows a more blurred distinction between the use of pine cones in ritual activities and in food preparation. Charred bracts, cone apex, unopened and fragmented nutshells were identified from three pits within the southern enclosure, whilst samples from the northern enclosure contained only crop-processing waste (Monckton 2000). The archaeobotanist suggested that these remains represented food consumption waste, on the basis of fragmented nutshell indicating that kernels had been extracted. Yet, in the synthetic discussion, the archaeobotanical remains were integrated with the spatial and artefactual evidence, to show that the pine cone remains co-occurred with date stones and grapes, several intact pots, as well as specialised vessels, including a ceramic lamp with Bacchic decoration. The pine cone remains were restricted to two pits, within which layers of sand separated the deposits containing the pine remains (Ferris *et al*. 2000: 77). The spatial co-occurrence of stone pine with other rare plant foods and artefact categories provides strong evidence for ritualised deposition.

Settlements

An equally varied picture of the character of stone pine deposits is provided from settlement sites. First, charred bracts and nutshell were recovered from a burnt deposit of Flavian date within room W16 in the west wing of

Fishbourne Palace. A 0.23m thick deposit of burnt material contained burnt pottery, jewellery, architectural fittings, and charred nuts and bracts (Reynolds 1996). Whilst the reporting of this deposit is brief, and the sampling appears very limited, the co-occurrence of stone pine and distinctive artefacts does provide tentative evidence that whole pine cones were also utilised in ritual offerings within the domestic context in Roman Britain.

Whole pine cones have also been recovered from waterlogged deposits in wells and waterholes. At 1 Poultry, London, four whole cones, bracts and nutshells were recovered from early second century A.D. dumps around a water tank. These dumps contained other food waste, such as flax, grape and coriander (Davis 2011), but a Venus figurine was recovered from the same area. The nearly complete spatial restriction of stone pine to this area of the site, despite extensive sampling of waterlogged deposits, combined with distinctive artefacts, led to the suggestion that the material may have derived from ritual activity in the nearby Walbrook Valley (Merrifield 1995; Hill and Rowsome 2011: 347). At Claydon Pike in the Upper Thames Valley, a whole cone was found in a mid-Roman waterhole at the edge of an enclosure away from the main settlement focus (Robinson 2007), but only small amounts of animal bones and pottery were recovered from the context (Miles *et al.* 2007: 121).

At the final category of site, pine cone remains represent food-processing waste. A late fourth century A.D. hearth within an aisled building at Fullerton, Hampshire, produced a single charred nut fragment alongside cereal-processing by-products (Campbell 2008). The absence of bracts combined with clear contextual evidence for food preparation strongly indicates an origin of food-processing waste. Similarly, at Monkton-Mount Pleasant on the Isle of Thanet, fragmented nutshell and crop-processing by-products were recovered from various pits within the settlement. Bracts were absent, and the fragmented nutshell occurred at low densities (Pelling 2008a). Comparably, samples from an occupation layer exposed within a cable trench excavation through Springhead Roman town produced a low density of fragmented nutshell alongside crop-processing remains (Campbell 1999). Fragmented nutshell has also been recovered from various waterlogged refuse deposits from London and York (Willcox 1977; Hall and Kenward 1990). Stone pine cone remains from waterlogged samples from a third century A.D. well within a residential building at Great Holts Farm, Essex were also interpreted as food waste (Murphy *et al.* 2000). Fragmented nutshells, cone fragments and bracts, were present throughout four well fills alongside other food waste, such as *Corylus avellana* L. (hazel) nutshell, and debris from flooring material, implying that they represent the regular disposal of refuse into the well. However, the co-occurrence of bones of *Accipiter nisus* L. (sparrowhawk) and *Turdus* sp. (thrushes), unique within Roman Britain (Allen pers. comm.), with the remains of a stone pine cones within the basal context of the well (6463) (Germany 2000: 40, 196, 213) suggests the well fills may not be so mundane after all.

Table 3: Summary of taphonomic criteria at selected sites where stone pine has been identified. C = charred. W = waterlogged.

Site	Preservation	Parts represented	Charring	Fragmented nutshell	Average density (Items/L)
Carrawburgh Mithraeum – altar and apse	W	Whole cone	-	-	?
Carrawburgh Mithraeum – bunker and offering pit	C	Bracts and nutshell	+	?	?
London Mithraeum	W/C	Whole cone	+	?	?
Triangular Temple – western and rectangular pit	C	Bracts and nutshell	+	?	?
Alchester	W	Cone fragments and nutshell	-	-	?
Orton's Pasture	C	Whole cone, apex, bracts, nutshells	+	+	0.53
Lower Brook Street, Winchester	W	Whole cone	?	?	?

Springhead shrine	C	Bract and nutshell	+	-	0.007
Westhawk Farm, Ashford	C	Nutshell	+	?	0.025
Fishbourne Palace	C	Bracts and nutshells	+	?	?
1 Poultry, London	W	Whole cones, bracts, nutshell	-	?	-
Claydon Pike	W	Whole cone	-	-	1.4
Fullerton	C	Nutshell	+	+	1.8
Monkton Mount Pleasant, Isle of Thanet	C	Nutshell	+	+	0.25
Springhead Roman town	C	Nutshell	+	+	0.125
Great Holts Farm	W	Cone fragments, bracts, nutshell	-	+	4.2

Discussion

There is clearly much variation in the taphonomic conditions and contextual associations of stone pine cone remains. Several categories of deposit can be characterised. First, the presence of high-density, primary deposits of plant items which are not usually charred during food preparation, alongside distinctive artefact categories, strongly indicates their purposeful charring or deposition. From Britain, examples are the charred remains from the Triangular Temple, Carrawburgh Mithraeum, London Mithraeum and Fishbourne Palace. As these deposits were only hand-collected, other plant foods may have been missed, and exact densities are not known. Beyond Britain, the dense charred deposits of plant foods from domestic offerings in Pompeii and the Oedenburg and Mainz temples are similar examples.

The second category is where stone pine cone remains have a clear spatial connection with sacred space, but do not occur in high-densities or alongside distinctive artefacts. For instance, at the Westhawk Farm and Springhead shrines, charred stone pine nutshells were deposited in pits, indicating that they were charred in the vicinity. The third category is where only a plant item is present, usually a food, which is nationally rare (Van der Veen *et al*. 2008). Examples are the whole pine cones found at Alchester, Claydon Pike and Lower Brook Street. Such instances should encourage detailed examination of the stratigraphy, artefacts and other ecofacts in the deposit. Finally, when fragments of food-processing waste (pine nutshells) are found alongside crop-processing waste (cereal chaff), with no spatial or artefactual patterning, this strongly implies that the plant remains derived from food-processing, as at Fullerton, Springhead Roman town and Monkton-Mount Pleasant.

Whilst the investigation of taphonomic criteria has proved valuable, the usefulness of individual criterion is hindered by disparities in the quality of recording. The density of stone pine remains does not always separate settlement sites from temples and shrines. However, where visible agglomerations of charred material were identified, many were not systematically sampled. In such cases, density values cannot be ascertained. The presence and absence of charring can only be assessed at waterlogged sites, as otherwise uncharred remains do not survive. The only example where partially charred waterlogged remains were noted is the pine cone from the London Mithraeum. Any charring of intact cones at other sites with clear ritual architecture, such as Carrawburgh and Lower Brook Street was not noted, but the reporting of these examples is brief. Furthermore, exposure to fire often reduces plant remains to ash (Chadwick 2012: 300), and charring may also derive from attempts to open the nutshell, or disposal in hearths after kernel removal (Kislev 1988). Nutshell fragmentation was noted at settlement sites where the co-occurrence of nutshells with crop-processing waste strongly suggests food waste. Yet fragmentation may be caused by various pre and post-depositional processes. Furthermore, classical literature demonstrates that there is no clear division between the meals consumed by people and foods offered to the gods (Robinson 2002: 97).

Overall, pine cones were at least imported partially as objects intended for use in ritualised activities, as has been argued for dates (Livarda 2013). Terracotta pine cones, which may have acted as substitutes for actual stone pine cones, have been discovered at Witcombe villa, Gloucestershire, to the east of a room interpreted as a temple (Green 1976: 172), and from a villa at Rapsley, Surrey (Bird 2002; Hanworth 1968). Stone pine cone replicas also feature on funerary monuments, such as the limestone pine cone found within a walled cemetery in Roman Southwark, which would have originally been attached to a monument (Blagg 2000).

This discussion has highlighted the importance of assessing as many taphonomic criteria as possible, and above all, comparing plant remains with the artefactual and architectural evidence in examinations of ritualised deposition. Stating the plant remains present is not sufficient analysis. The abundance, type of plant remains and as much taphonomic information as possible must be included in order to understand their depositional history. Furthermore, the recognition of high-density assemblages of plant remains with no obvious source from food-processing, and the presence of nationally rare plant foods, should encourage the detailed examination of other artefacts, ecofacts and stratigraphy. Plant remains are clearly key aspects of ritualised deposits at numerous sites, and should be considered within all depositional studies.

School of Archaeology, University of Oxford

Acknowledgements

I would like to thank Dana Challinor for useful comments and discussion on the subject. I am very grateful to the anonymous reviewer and the editor for comments on the text. Research for this paper was undertaken during an AHRC funded PhD studentship.

Bibliography

Alcock, J. 1980. Classical religious belief and burial practice in Roman Britain. *The Archaeological Journal* 137: 50–85.

Allen, M. and Sykes, N. 2011. New animals, new landscapes, new worldviews: the Iron Age to Romano-British transition at Fishbourne. *Sussex Archaeological Collections* 149: 7–24.

Allevato, E., Russo Ermolli, E., Boetto, G. and Di Pasquale, G. 2010. Pollen-wood analysis at the Neapolis harbour site (1st–3rd century AD, Southern Italy) and its archaeobotanical implications. *Journal of Archaeological Science* 37(9): 2365–2375.

Bakels, C. and Jacomet, S. 2003. Access to luxury foods in Central Europe during the Roman period: the archaeobotanical evidence. *World Archaeology* 34(3): 542–557.

Bateman, N., Cowan, C. and Wroe-Brown, R. 2008. *London's Roman Amphitheatre: Guildhall Yard, City of London*. London: MoLAS Monograph 35.

Bell, C. 1992. *Ritual Theory, Ritual Practice*. Oxford: Oxford University Press.

Biddle, M. 1975. Excavations at Winchester 1971, tenth and final interim report. *The Antiquaries Journal* 55: 295-337.

Biddle, M. and Quirk, R.N. 1964. Excavations near Winchester Cathedral, 1961. *The Archaeological Journal* 119: 150–194.

Bird, J. 2002. A group of mural-crowned cult pots from South-east England. In M. Genin and A. Vernhet (eds.) *Céramiques de la Graufesenque et Autres Productions d'époque Romaine: Nouvelles Recherches. Hommages à Bettina Hoffmann*. Montagnac: Archéologie et Histoire Romaine 7: 301-311.

Bird, J. 2004. Incense in Mithraic ritual: the evidence of the finds. In M. Martens and G. De Boe (eds.) *Roman Mithraism, the Evidence of the Small Finds*. Brussels: Museum Het Toreke: 191–9.

Blagg, T.F.C. 2000. Sculptures and architectural fragments. In A. MacKinder. *A Romano British Cemetery on Watling Street. Excavations at 165 Great Dover Street, Southwark, London*. London: MoLAS Archaeology Studies Series 4: 61-63.

Booth, P. 2001. The Roman shrine at Westhawk Farm, Ashford: a preliminary account. *Archaeologia Cantiana* 121: 1–23.

Booth, P., Dodd, A., Robinson, M. and Smith, A. 2007. *The Thames Through Time: the Archaeology of the Gravel Terraces of the Upper and Middle Thames: the Early Historical Period, AD 1–1000*. Oxford: Oxford University School of Archaeology.

Bouby, L. and Marinval, P. 2004. Fruits and seeds from Roman cremations in Limagne (Massif Central) and the spatial variability of plant offerings in France. *Journal of Archaeological Science* 31: 77–86.

Bradley, R. 2005. *Ritual and Domestic Life in Prehistoric Europe*. London: Routledge.

Brown, E.E., Richardson, E.H. and Richardson, L. 1960. *Cosa II: The Temples of the Arx*. Rome: American Academy in Rome.

Brück, J. 1999. Ritual and rationality: some problems of interpretation in European archaeology. *European Journal of Archaeology* 2(3): 313–344.

Brudenell, M. and Cooper, A. 2008. Post-middenism: depositional histories on Later Bronze Age settlements at Broom, Bedfordshire. *Oxford Journal of Archaeology* 27(1): 15–36.

Campbell, G. 1999. The charred plant remains. In A. Boyle and R. Early (eds.) *Excavations at Springhead Roman Town, Southfleet, Kent*. Oxford: Oxford Archaeological Unit Occasional Paper 1: 36–39.

Campbell, G. 2000. Plant utilization: the evidence from charred plant remains. In B. Cunliffe (ed.) *The Danebury Environs Programme. The Prehistory of a Wessex Landscape.* Oxford: Institute of Archaeology: 45–59.

Campbell, G. 2008. Charred plant remains. In B. Cunliffe (ed.) *The Danebury Environs Roman Programme: a Wessex Landscape During the Roman era Vol 2 pt. 3. Fullerton, Hants, 2000 and 2001*. Oxford: English Heritage and Oxford University School of Archaeology: 161–164.

Caneva, G. and Bohuny, L. 2003. Botanic analysis of Livia's villa painted flora (Prima Porta, Roma). *Journal of Cultural Heritage* 4(2): 149–155.

Chadwick, A.M. 2012. Routine magic, mundane ritual: towards a unified notion of depositional practice. *Oxford Journal of Archaeology* 31(3): 283–315.
Ciaraldi, M. and Richardson, J. 2000. Food, ritual and rubbish in the making of Pompeii. In G. Fincham, G. Harrison, R.R. Holland and L. Revell (eds.) *TRAC 99. Proceedings of the Ninth Theoretical Roman Archaeology Conference Durham 1999*. Oxford: Oxbow Books: 74–82.
Cool, H. and Richardson, J. 2013. Exploring ritual deposits in a well at Rothwell Haigh, Leeds. *Britannia* 44: 191–217.
Crummy, N. 2010. Bears and coins: the iconography of protection in Late Roman infant burials. *Britannia* 41: 37–93.
Davis, A. 2011. Botanical remains. In J. Hill and P. Rowsome (eds.) *Roman London and the Walbrook Stream Crossing: Excavations at 1 Poultry and Vicinity, City of London Part II*. London: Museum of London Archaeology Monograph 37: 524-533.
Ekroth, G. 2008. Burnt, cooked or raw? Divine and human culinary desires at Greek animal sacrifice. In E. Stavrianopolou, A. Michaels and C. Ambos (eds.) *Transformation in Sacrificial Practices*. Berlin: Lit Verlag: 87–111.
Ferris, I., Bevan, L. and Cuttler, R. 2000. *The Excavation of a Romano-British Shrine at Orton's Pasture, Rocester, Staffordshire*. Oxford: British Archaeological Reports British Series 314.
Fulford, M. 2001. Links with the past: pervasive "ritual" behaviour in Roman Britain. *Britannia* 32: 199–218.
Garrow, D. 2012. Odd deposits and average practice. A critical history of the concept of structured deposition. *Archaeological Dialogues* 19(2): 85–115.
Germany, M. 2000. *Excavations at Great Holts Farm, Boreham, Essex, 1992-94.* Chelmsford: Essex County Council.
Giorgi, J. 2000. The plant remains. In A. Mackinder (ed.) *A Romano-British Cemetery on Watling Street: Excavations at 166 Great Dover Street, Southwark, London*. London: MoLAS Archaeology Studies Series 4: 65–6.
Girard, M. and Tchernia, A. 1978. Remarques à propos des cones de pin pignon (Pinus pinea) découverts sur l'épave de la madrauge de Giens. In A. Tchernia, P. Pompey and A. Hesnard (eds.) *L'Épave Romaine de la Madrague de Giens (Var), Campagnes 1972-1975: Fouilles de l'Institut d'Archéologie Méditerranéenne*. Paris: Éditions du Centre National de la Recherche Scientifique: 117–118.
Green, M. 1976. *A Corpus of Religious Material from the Civilian areas of Roman Britain*. Oxford: British Archaeological Reports British Series 24.
Grimes, W. 1968. *The Excavation of Roman and Medieval London*. London: Routledge & Kegan Paul.
Grocock, C.W. and Grainger, S. 2006. *Apicius: a Critical Edition with an Introduction and an English Translation of the Latin Recipe Text Apicius*. Totnes: Prospect.
Hall, A. and Kenward, H. 1990. *Environmental Evidence from the Colonia: Tanner Row and Rougier Street*. London: Council for British Archaeology.
Hamilakis, Y. 2011. Archaeology of the senses. In T. Insoll (ed.) *Oxford Handbook of the Senses*. Oxford: Oxford University Press: 208-225.
Hanworth, R. 1968. The Roman villa at Rapsley, Ewhurst, Surrey. *Surrey Archaeological Collections* 65: 1-70.
Harrison, S. 1951. Edible pine kernels. *Kew Bulletin* 6(3): 371–375.
Hill, J. and Rowsome, P. 2011. *Roman London and the Walbrook Stream Crossing: Excavations at 1 Poultry and Vicinity, City of London Part 2*. London: MoLA Monograph 37.
Humphrey, L.T. *et al.* 2014. Earliest evidence for caries and exploitation of starchy plant foods in Pleistocene hunter-gatherers. *PNAS* 111(3): 954–959.
Kislev, M. 1988. Pinus pinea in agriculture, culture and cult. In H. Küster (ed.) *Der Prähistorische Mensch und seine Umwelt. Fetschrift für Udelgard Körber Grohne zum 65. Geburtstag.* Stuttgart: Konrad Theiss Verlag: 73–79.
Kreuz, A. 2000. Functional and conceptual archaeobotanical data from Roman cremations. In J. Pearce, M. Millett and M. Struck (eds.) *Burial, Society and Context in the Roman World*. Oxford: Oxbow: 45–51.
Lee, M.R. 2007. Solanaceae IV: Atropa belladonna, Deadly Nightshade. *The Journal of the Royal College of Physicians of Edinburgh* 37: 77-84.
Lewis, M. 1966. *Temples in Roman Britain*. Cambridge: Cambridge University Press.
Lim, T. 2012. *Edible Medicinal and Non-medicinal plants: Volume 4, Fruits*. New York: Springer.
Livarda, A. 2013. Date, rituals and socio-cultural identity in the North-western Roman provinces. *Oxford Journal of Archaeology* 32(1): 101–117.
Mau, A. 1902. *Pompeii: its Life and Art*. New York: The Macmillan Company.
Merrifield, R. 1995. Roman metalwork from the Walbrook - rubbish, ritual or redundancy? *Transactions of the London and Middlesex Archaeological Society* 46: 27–44.
Miles, D., Palmer, S., Smith, A. and Jones, G.P. 2007. *Iron Age and Roman Settlement in the Upper Thames Valley: Excavations at Claydon Pike and Other Sites within the Cotswold Water Park*. Oxford: Oxford Archaeology.
Monckton, A. 2000. Charred Plant Remains. In I. Ferris, L. Bevan and R. Cuttler (eds.) *The Excavation of a Romano-British Shrine at Orton's Pasture, Rocester, Staffordshire*. Oxford: British Archaeological Reports British Series 314: 67–71.
Morris, J. 2008. Associated bone groups; one archaeologist's rubbish is another's ritual deposition. In O. Davis, N. Sharples and K. Waddington (eds.) *Changing Perspectives on the First Millennium BC*. Oxford: Oxbow: 83–98.
Morris, J. 2010. Associated bone groups beyond the Iron Age. In J. Morris and M. Maltby (eds.) *Integrating Social and Environmental Archaeologies; Reconsidering Deposition*. Oxford: British Archaeological Reports International Series 2077: 12–23.
Murphy, C., Thompson, G. and Fuller, D.Q. 2013. Roman food refuse: urban archaeobotany in Pompeii, Regio VI, Insula 1. *Vegetation History and Archaeobotany* 22(5): 409–419.
Murphy, P. 1977. *Early Agriculture and Environment on the Hampshire Chalklands: circa. 800 B.C. - 400 A.D.* M.Phil Thesis. University of Southampton.
Murphy, P. 1984. Environmental archaeology in East Anglia. In H.C.M. Keeley (ed.) *Environmental Archaeology: a Regional Review*. London: Department of the Environment: 13–42.

Murphy, P., Albarella, U. and Germany, M. 2000. Production, imports and status: biological remains from a Late Roman farm at Great Holts Farm, Essex, UK. *Environmental Archaeology* 5: 35–48.
Mutke, S. *et al.* 2012. Mediterranean Stone Pine: botany and horticulture. *Horticultural Reviews* 39: 153–201.
North, J.A. 2000. *Roman Religion.* Oxford: Published for The Classical Association [by] Oxford University Press.
Overton, N. and Hamilakis, Y. 2013. A manifesto for a social zooarchaeology. Swans and other beings in the Mesolithic. *Archaeological Dialogues* 20(2): 111–136.
Palmer, C. and Van der Veen, M. 2002. Archaeobotany and the social context of food. *Acta Palaeobotanica* 42(2): 195–202.
Pelling, R. 2008a. The charred plant remains. In P. Bennett, P. Clark, A. Hicks, J. Rady and I. Riddler (eds.) *At the Great Crossroads: Prehistoric, Roman and Medieval Discoveries on the Isle of Thanet 1994-95*. Canterbury: Canterbury Archaeological Trust: 262–269.
Pelling, R. 2008b. Charred and waterlogged plant remains. In P. Booth, A.-M. Bingham and S. Lawrence (eds.) *The Roman Roadside settlement at Westhawk Farm Ashford, Kent, Excavations 1998-9*. Oxford: Oxford Archaeology: 349–357.
Pitts, M. 2007. The emperor's new clothes? The utility of identity in Roman archaeology. *American Journal of Archaeology* 111(4): 693–713.
Rackham, O. 2006. *Woodlands*. London: Collins.
Reynolds, P. 1996. Plant remains. In B. Cunliffe, A. Down and D. Rudkin (eds.) *Chichester Excavations IX, Excavations at Fishbourne 1969-1988*. Chichester District Council: 236.
Richards, C. and Thomas, J. 1984. Ritual activity and structured deposition in Later Neolithic Wessex. In R. Bradley and J. Gardiner (eds.) *Neolithic Studies: a Review of Some Current Research*. Oxford: British Archaeological Reports British Series 133: 189–218.
Richmond, I. and Gillam, J. 1951. The Temple of Mithras at Carrawburgh. *Archaeologia Aeliana* 29: 1–92.
Robinson, M. 2002. Domestic burnt offerings and sacrifices at Roman and pre-Roman Pompeii, Italy. *Vegetation History and Archaeobotany* 11: 93–99.
Robinson, M. 2007. The environmental archaeology of the Cotswold Water Park. In D. Miles, S. Palmer, A. Smith and G.P. Jones (eds.) *Iron Age and Roman Settlement in the Upper Thames Valley: Excavations at Claydon Pike and Other Sites within the Cotswold Water Park*. Oxford: Oxford University School of Archaeology: 355–364.
Robinson, M. 2012. The place of Silchester in archaeobotany. In M. Fulford (ed.) *Silchester and the Study of Romano-British Urbanism*. Portsmouth, Rhode Island: Journal of Roman Archaeology Supplementary Series Number 9: 213-225.
Rottoli, M. and Castiglioni, E. 2011. Plant offerings from Roman cremations in Northern Italy: a review. *Vegetation History and Archaeobotany* 20(5): 495–506.
Rovira, N. and Chabal, L. 2008. A foundation offering at the Roman port of Lattara (Lattes, France): the plant remains. *Vegetation History and Archaeobotany* 17(S1): 191–200.
Russell, N. 2012. *Social Zooarchaeology: Humans and Animals in Prehistory*. Cambridge: Cambridge University Press.
Sauer, E. 2006. Alchester: origins and destiny of Oxfordshire's earliest Roman site (The Tom Hassall Lecture for 2005). *Oxoniensia* 71: 1–30.
Scheid, J. 2003. *An Introduction to Roman Religion*. Edinburgh: Edinburgh University Press.
Shaffrey, R. 2003. The rotary querns from the Society of Antiquaries' excavations at Silchester, 1890-1909. *Britannia* 34: 143–174.
Shepherd, J.D. 1998. *The Temple of Mithras, London. Excavations by WF Grimes and A Williams at the Walbrook*. London: English Heritage Archaeological Report 12.
Smith, A. 2001. *The Differential Use of Constructed Sacred Space in Southern Britain, from the Late Iron Age to the 4th Century AD*. Oxford: British Archaeological Reports British Series 318.
Stevens, C. 2011. Charred plant remains from Springhead. In C. Barnett, J. McKilney, E. Stafford, J. Grimm and C. Stevens (eds.) *Settling the Ebbsfleet valley. High Speed 1 Excavations at Springhead and Northfleet, Kent. The Late Iron Age, Roman, Saxon, and Medieval Landscape. Volume 3: Late Iron Age to Roman Human Remains and Environmental Reports*. Oxford: Oxford Wessex Archaeology: 95–105.
Sykes, N. 2014. *Beastly Questions: Animal Answers to Archaeological Issues*. London: Bloomsbury.
Thurston, T. 2009. Unity and diversity in the European Iron Age: out of the mists, some clarity? *Journal of Archaeological Research* 17(4): 347–423.
Van de Noort, R., Chapman, H.C. and Collis, J.R. 2007. *Sutton Common: the Excavation of an Iron Age "Marsh Fort"*. York: Council for British Archaeology Research Report 154.
Van der Veen, M. 2007. Formation processes of desiccated and carbonized plant remains - the identification of routine practice. *Journal of Archaeological Science* 34(6): 968–990.
Van der Veen, M. 2011. *Consumption, Trade and Innovation: Exploring the Botanical Remains from the Roman and Islamic Ports at Quseir al-Qadim, Egypt*. Frankfurt am Main: Africa Magna Verlag.
Van der Veen, M. 2014. The materiality of plants: plant-people entanglements. *World Archaeology* DOI:10.1080/00438243.2014.953710
Van der Veen, M. and Jones, G. 2006. A re-analysis of agricultural production and consumption: implications for understanding the British Iron Age. *Vegetation History and Archaeobotany* 15(3): 217–228.
Van der Veen, M., Livarda, A. and Hill, A. 2008. New plant foods in Roman Britain - dispersal and social access. *Environmental Archaeology* 13(1): 11–36.
Van Haastern, M. and Groot, M. 2013. The biography of wells: a functional and ritual life history. *Journal of Archaeology in the Low Countries* 4(2): 25–51.
Vandorpe, P. and Jacomet, S. 2011. Remains of burnt vegetable offerings in the temple area of Roman Oedenburg (Biesheim-Kunheim, Haut-Rhin, Alsace). First results. In Wiethold J. (ed.) *Carpologia: Articles Réunis à la Mémoire de Karen Lundström-Baudais: Actes des Rencontres d'Archéobotanique, Organisées par Bibracte, Centre Archéologique*

Européen et le Centre de Recherches Archéologiques de la Vallée de l'Oise, 9-12 Juin 2005, Glux-en-Glenne. Glux-en-Glenne: Bibracte 20: 87–100.
Vendramin, G.-G., Fady, B., Gonzalez-Martinez, S., Hu, F. S., Scotti, I. and Sebastiani, F. 2008. Genetically depauperate but widespread: the case of an emblematic Mediterranean pine. *Evolution* 62: 680–688.
Waddington, K. 2012. (Re)cycles of life in Late Bronze Age Southern Britain. In R. Jones (ed.) *Manure Matters: Historical, Archaeological and Ethnographic Perspectives*. Farnham: Ashgate Publishing Limited: 41–59.
Wheeler, R.E.M. and Wheeler, T.V. 1936. *Verulamium. A Belgic and Two Roman Cities*. Oxford: Society of Antiquaries Research Report 11.
Willcox, G. 1977. Exotic plants from Roman waterlogged sites in London. *Journal of Archaeological Science* 4(3): 269–282.
Williams, M. 2003. Growing metaphors: the agricultural cycle as metaphor in the Later Prehistoric period of Britain and North-western Europe. *Journal of Social Archaeology* 3(2): 223–255.
Woodward, P. and Woodward, A. 2004. Dedicating the town: urban foundation deposits in Roman Britain. *World Archaeology* 36(1): 68–86.
Zach, B. 2002. Vegetable offerings on the Roman sacrificial site in Mainz, Germany - short report on the first results. *Vegetation History and Archaeobotany* 11: 101–106.