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A Chalcolithic hunting station in central Cyprus

by David Frankel and Jenny Webb

Excavations always provide surprises and sometimes sites turn out to be quite different from what was expected. This was certainly the case when we decided to work at Politiko Kokkinorotsos in central Cyprus. On the basis of surface survey and geophysical prospecting by the Sydney Cyprus Survey Project we hoped to uncover a settlement with well-built round houses typical of the latest period of the Cypriot Chalcolithic – and possibly also evidence of the earliest Bronze Age, a time of cultural innovation in which we have a particular interest. In this we were disappointed. What we did find provides instead an important new view of Chalcolithic Cyprus, opening up several intriguing lines of enquiry and explanation.

Kokkinorotsos is a small site in the northern foothills of the Troodos range, set on a river terrace in the narrow valley of the Koufos River as it flows out of the foothills to join the Pedeios, one of the main rivers of the island. Today the area has small pockets of arable land surrounded by steep, pine-clad hills (see photo above). At about 400m above sea level, it is sufficiently high to provide some relief from the summer heat of the central lowlands and is considerably colder in winter.

In 2007, with a team of students from La Trobe University, we cleared 550m² of the shallow cultural deposits of the site, while trial trenches indicated that it did not extend significantly beyond this area. We were frustrated not to find any traces of the stone and pisé buildings that we expected. Nor were there other structural features or burial pits, although a few lumps of daub suggested the presence of light timber structures and we did find remains of a hearth and oven pit. We also excavated three roughly circular pits (3–5m in diameter and up to 1m deep) and a large natural hollow up to 1.5m deep and some 200m² in extent, taking up much of the excavated area. These were filled with massive quantities of pottery, stone and animal bone, all of which appears to have been redeposited, perhaps from midden dumps, during a short and deliberate episode of clearance.

A series of Accelerator Mass Spectrometry radiocarbon determinations provided almost identical dates, showing that the site was used between about 2880 and 2670 BCE. There is so little material from this time from elsewhere in Cyprus that suggestions have been made that there was some sort of cultural collapse and associated redistribution



Three circular pits and a natural depression excavated at Politiko Kokkinorotsos.

of populations. One possible explanation for our site was, therefore, that it represents some such set of events. However, when we look more closely at the artefacts and animal bone another, more interesting explanation emerges.

The animals

We recovered an exceptionally large quantity of animal bones. These were studied by Dr Paul Croft, who counted over 7,000 identifiable pieces of large mammal bone, three-quarters of which are from *Dama mesopotamica* – fallow deer. The remaining animals are mainly feral sheep (mouflon) but include a few goats and a small number of pigs and dogs. Deer are a major contributor to the diet at other Chalcolithic sites in Cyprus, but do not dominate to anywhere near the extent that they do at Kokkinorotsos.

Paul Croft proposed that all the animals at Kokkinorotsos were hunted. This was based in large part on the extensive presence of fallow deer, a species which was never domesticated in Cyprus. The ages at which the sheep and goat had been killed, together with the body parts represented, suggested that these animals were also hunted and not from domesticated herds.

Further observations opened up the related issue of seasonality. Several lines of evidence indicate that hunting was confined to the warmer months. The first is the absence of male sheep over three years of age. This may be explained by the fact that in the summer older males separate from the females and younger animals, which are more easily hunted at this time of year. In addition, there

were a significant number of foetal and neonatal bones, indicating late winter and early spring kills respectively.

Recently we were able to test these indirect arguments. Dr Anne Pike-Tay of Vassar College in the USA has worked extensively on prehistoric seasonality and developed techniques for analysing the annual growth patterns of animal teeth and identifying season of death (odontochronology). She kindly offered to apply her methods to our samples. Her study of 28 deer and mouflon teeth from Kokkinorotsos conclusively demonstrated that these animals were hunted and killed between late winter and late summer.

The stone artefacts

Another colleague, Dr Carole McCartney, studied the chipped stone from Kokkinorotsos. The assemblage is dominated by three tool classes: pièces esquillées, scrapers and burins. Pièces esquillées, which represent over a quarter of the sample, were probably used as small wedges for splitting bone. The second most common tools are scrapers. All show visible polish and sometimes linear striations perpendicular to the tool edge, probably as a result of hide scraping. Burins provide the third element of this formal tool trio. They are also frequently associated with the working of animal products, particularly the grooving of bone or antler. In other words, the chipped stone assemblage is highly specialised and primarily related to processing meat, hides and bone – as might be expected where hunting rather than agriculture was the focus of activity.

A similar story emerges from the ground stone tools. Axes, adzes and chisels are relatively rare. Overall, the assemblage suggests a bias toward the processing of wild foods (nuts and fruits), rather than the chopping, splitting or specialised woodworking common at other Chalcolithic sites.

The pottery

At first sight this picture of a seasonal hunting station seems at odds with the huge quantities of pottery (over one tonne) we recovered. The sheer quantity of this and other material suggests that the site was intensively used, possibly for months at a time, over many generations and perhaps by family groups, rather than by hunters alone. The pottery, all of which was highly fragmented, is likely to have been brought to Kokkinorotsos along with agricultural produce and other supplies from a larger, permanent agro-pastoral settlement or settlements. Other finds include several terracotta anthropomorphic figurine fragments, sherd disks of uncertain purpose, shell beads, worked antler and bone tools.

Understanding Kokkinorotsos

The limited extent of occupation, the absence of substantial structures and burials, the lack of agricultural and timber-working tools and the spring/summer exploitation of animals suggest that Kokkinorotsos was only used in the warmer months, and the exclusive presence of wild animals and a chipped stone toolkit associated with butchery suggest that hunting was the main activity. The site is therefore best understood as a seasonal hunters' camp: used for forays into the surrounding woodland and for preparing meat, hides, antler and other products from the resulting quarry. That other activities also took place at the site is, however, demonstrated by the presence of storage vessels, spouted jars and bowls and fine ware eating and drinking vessels, as well as domesticated cereals and cereal grinding equipment. These clearly indicate the storage and consumption of food and drink at the site and possibly some form of feasting. The earth oven may point in the same direction. Earth ovens are rare in Cyprus and have elsewhere been associated with the preparation and consumption of special foods (notably meat) and with public display and feasting. The figurine fragments and several fragmentary zoomorphic vessels hint at a more formal ritual dimension. The zoomorphic vessels in particular raise the possibility of rituals explicitly associated with hunting.

Kokkinorotsos appears then to have been a special-purpose site – perhaps one component within a broader economic and settlement system involving permanently occupied agro-pastoral villages and seasonally used outstations. In the absence of comparative evidence, it is not possible to know whether the Kokkinorotsos data suggest an increased emphasis on hunting

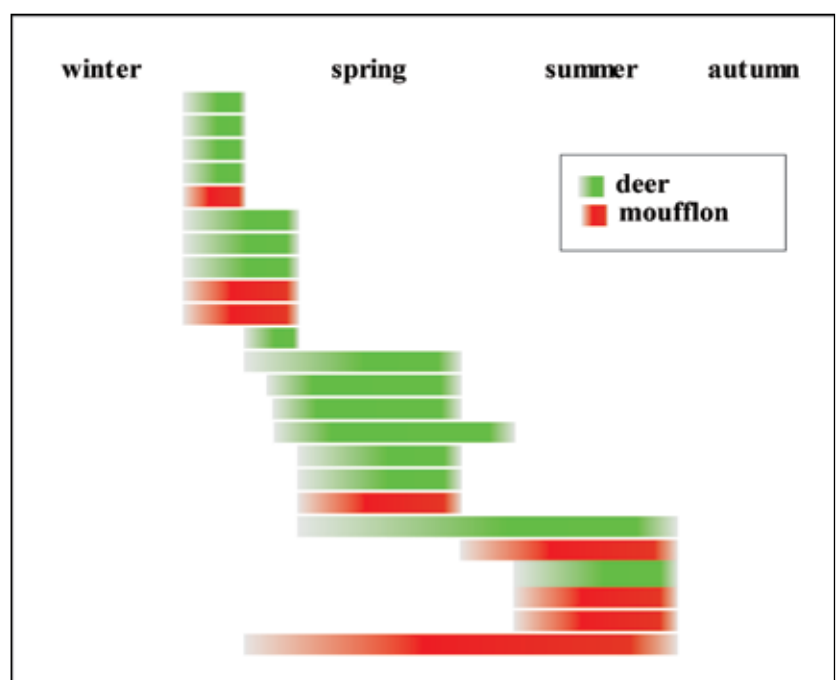
on Cyprus in the period between 2900 and 2700 cal BCE. It is likely, however, that fallow deer were always a highly ranked resource on the island, yielding more meat than any feral competitors without the higher energy inputs associated with the husbandry of domesticates. Kokkinorotsos, although the only non-village site known for the Chalcolithic period, thus opens up the possibility of a complex and variable cultural system on Cyprus during the first half of the third millennium BCE, with community territories made up of a series of sites, each the focus of particular activities appropriate to their ecological setting.

While initially disappointing and certainly not the site we expected to find, Kokkinorotsos has added significantly to our understanding of Chalcolithic Cyprus. The odontochronological analyses pioneered by Anne Pike-Tay and applied here to Cypriot data for the first time provide exciting confirmation of our interpretation of the site and have great potential to address similar issues of seasonality on other sites in Cyprus and elsewhere.

Acknowledgements

Studies by Paul Croft, Carole McCartney and Anne Pike-Tay were crucial in providing the basis for our understanding of Kokkinorotsos. Funding for this research was provided by the Australian Research Council and the Archaeology Program, La Trobe University.

The excavations were published in J.M. Webb, D. Frankel, P. Croft & C. McCartney 2009. Excavations at Politiko Kokkinorotsos: a Chalcolithic hunting station in Cyprus. *Proceedings of the Prehistoric Society*, 75: 189–238. The odontochronological data discussed here are presented in D. Frankel, J.M. Webb & A. Pike-Tay 2012. Seasonality and site function in Chalcolithic Cyprus. *European Journal of Archaeology*, in press. □



Results of the odontochronology study on deer and moufflon teeth showing the season of the animal's death.

Volunteer Viewpoints

At the recent 2013 Pella in Jordan season, Tiffany Donnelly asked several volunteers for their views concerning the excavations. These interviews will appear throughout this issue under the Volunteer Viewpoints heading.

Nicki Barnier

Nicki is a Library Assistant with Moreton Bay Regional Council Libraries. She has degrees in Ancient History and Museum Studies. Nicki has been to Pella three times, and loves all things archaeological.

What sparked your interest in archaeology?

When I was little I used to dig around for tree roots in my back yard and pretend that I was trowelling for treasure and old things. I went on to love history at school and did honours in Ancient History at University of Queensland (UQ). I never actually studied archaeology, but I volunteered at the R.D. Milns Antiquities Museum at UQ as an undergraduate.

How did you hear about Pella?

I did a lot of trawling the internet for opportunities to do some archaeology. I had been to Egypt previously and wanted to do something Middle Eastern, and I stumbled across the Pella website. I had received a travelling scholarship from UQ to intern at a number of archaeological museums in England, and I tacked my first Pella season on to the end of that trip.

What made you decide to come?

The scholarship helped, and it was something I'd always wanted to do, I so decided to bite the bullet. I liked the fact that Pella was led by an Australian team, and in an area of the world that was connected to things I knew, even though I didn't know anything about Pella specifically. We had a few Pella pieces at the antiquities museum at UQ, so I recognised the name.

What were your first impressions of the dig?

I was overwhelmed by the beautiful surroundings before anything else, the lush greenery and the mountains surrounding the site, all decorated with archaeological remnants – it's pretty spectacular. And I was struck by the sense of camaraderie in the team as soon as you come in. Everyone is brilliant and welcoming.

What has been the most memorable thing that you'll take away from the excavation?

I found a little lead early Islamic (Abassid) horse in my second season [2011]. I had broken my wrist before I came and one afternoon I was shovelling dirt awkwardly with my cast, and managed to scrape up what I think was the find of the season. There was great excitement among the workmen and everyone else in the team. It's still really thrilling to think back on that moment, the metal peeking out from under the dirt.



*Nicki excavating in Area XIV during the 2013 season.
Photo: Bob Miller.*

What has been the most challenging aspect of the dig for you?

Not being able to convince my family and loved ones to come over. They all think I'm crazy to come to this place, and I haven't managed to drag them here – yet. It would be nice to share this experience with close friends and family.

What one thing around the dig-house do you think would be of interest to an archaeologist in 1000 years' time?

I always think that the spoil heaps of the pottery and bones will be really confusing to archaeologists in the future, when they come across a cache of discarded materials – and they'll ascribe some obscure meaning to them! Though if I knew they were coming I'd try to add in some confusing things on purpose! Either that or the dig-house dress-up box. □

The Sanctuary of Lot at Deir 'Ain 'Abata in Jordan

by Konstantinos D. Politis

Deir 'Ain 'Abata (Arabic = the monastery of the abbot's spring) is located at the south-eastern end of the Dead Sea on a steep mountain slope overlooking the modern town of Safi (biblical *Zoara*) in Jordan. It is accurately depicted as the Sanctuary of *Aghios* (Greek = saint) Lot next to *Zoora* (ancient Safi) on the early Byzantine (late 6th century CE) mosaic floor map at Madaba in Jordan.

Within a year of its first identification in 1986, an international team of archaeologists (including Australians from the out-set) was assembled to survey, excavate and study the site. Support came from the British Museum (London) and from the Jordanian and Greek governments, as well as from private sources.

As revealed by over a decade of the excavations (1988-1998 and 2003), the Sanctuary of Lot consisted of an early Christian-Byzantine monastic complex with a number of hermits' cells above it. The focal point was a triple-apsed basilica church built around a natural cave which early Christians believed was where Lot and his daughters took refuge after the destruction of Sodom (Genesis 19). It is flanked to the south by a large reservoir and to the north by a refectory with an oven, a communal burial chamber and a pilgrim's hostel. The church is adorned by five mosaic floor pavements inscribed in early Byzantine-period Greek and dated to 572/3 CE, April 605/7 CE and May 691 CE. Three other Greek inscriptions on stone which invoke *Aghios* Lot, confirm the Christian identification of the site as Lot's Sanctuary.

The bulk of the material finds date to the early Byzantine period (ca. 5th - 7th centuries CE) and is associated to the church and monastery. The presence of late Hellenistic pottery (1st century BCE-1st century CE) primarily in the cave accounts for the earliest occupation at the site. Early Bronze Age I (ca. 3000 BCE) and Middle Bronze Age II (ca. 2000-1500 BCE) burials in the cave and around the monastery also allude to the area of 'Ain 'Abata as being a sacred one even in pre-Christian times. The final occupation of the site was during the early Abbasid Caliphate (late 8th to early 9th centuries CE) which could indicate a continued veneration of Lot in the vicinity by Christians and Muslims alike.

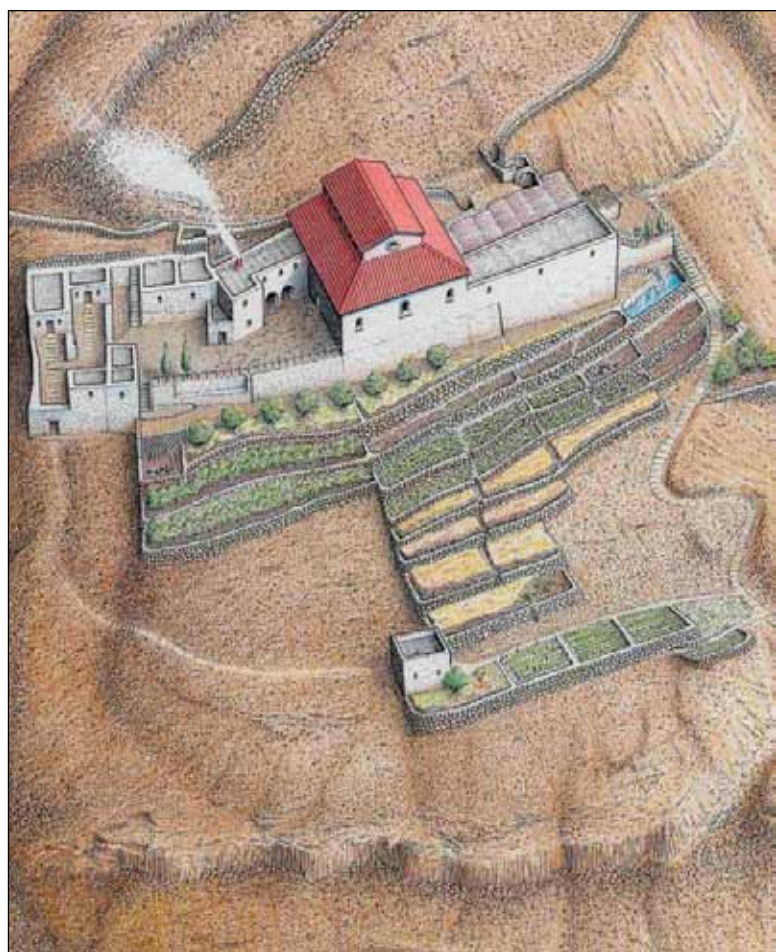
In 1995 the site was proclaimed a Holy Site of Islam by the late H.M. King Hussein and placed under the protection of the Ministry of *Awkaf* (Religion) of Jordan. It is also on the UNESCO Tentative World Heritage List. Building consolidation, mosaic conservation and touristic development has been sponsored by the Ministry of Tourism and Antiquities of Jordan and the European Centre for Byzantine and Post-Byzantine Monuments. In 2008 on-site museum was built complete with a large



Aerial view from NW of the Sanctuary of Lot at Deir 'Ain 'Abata after excavations and conservation works (photo: K. D. Politis).

conservation centre, storage rooms, a hostel and a visitor's shop with a cafe and toilets.

In April 2012 Dr Konstantinos Politis, director of the *Deir 'Ain 'Abata* project lectured on the site at Macquarie, Sydney, Melbourne and Monash universities in Australia. The final report is published in a 600-page volume (<http://hsnes.org/publications.htm>) and is now available for sale (jdabooks@aramex.com). □



Reconstruction of the monastic complex of Aghios Lot at Deir 'Ain 'Abata (J. M. Farrant).

A gift from the Government of India

by Michael Turner
Curator, Nicholson Museum

On 23 November 2012, the Nicholson Museum won a Museums & Galleries NSW IMAGinE award for 'best exhibition + public engagement' for its exhibition *50 Objects 50 Stories*. As its title suggests, the exhibition, together with its accompanying book and TV series, took fifty objects from the Nicholson Museum's collection of over 30,000 with a story to tell.

What is the past after all but a trove of stories, a rich tapestry of experience, of truths and half-truths, of lies and deception depending on your point of view? The question 'how did this object end up in the museum?' transports us into the world of makers, users, writers, artists, archaeologists, dealers, collectors, and of course you, the viewer/reader. All objects, great and small have their stories to tell, sometimes dramatic, often simple and mundane. An object in a museum is after all the sum of its parts, the quality and diversity of which determine its appeal. Beyond archaeological significance (what it is, where it was found) and aesthetic appeal (what it looks like) are the associated stories that add context and colour.

One such story involves a great but little known ancient civilisation and a turbulent period in modern history.

In 2006, this fragmentary figurine from the Nicholson Museum went on display at the Art Gallery of New South Wales in the exhibition *Goddess: Divine Energy*. It was the oldest object in an exhibition that explored the many manifestations of the divine female in Hindu and Buddhist art.

The figurine was made by the Harappa or Indus Valley civilisation named after the area and town in Pakistan where the civilisation was first rediscovered in the 1920s. It is now known that the civilisation, which flourished between 2500 and 1750 BCE, stretched beyond the Indus valley, reaching from western Pakistan to the foothills of the Himalayas, an area the size of western Europe. It was a pre-historic, Bronze Age society comparable in size and importance to those in contemporary Egypt and Mesopotamia.

The figurine is one of fifty objects, from the many thousands found, donated to the Nicholson Museum by the Government of India in 1947. Its acquisition becomes of great interest when set against the context of the extraordinary events on the Indian subcontinent at the time.

In May 1947, Nicholson Museum curator Dale Trendall wrote to the Government of India asking for 'a small representative collection of the antiquities from the Indus Valley for display purposes'¹. On 27 June, the Assistant Secretary to the Indian Government replied to say that 'the Director General of Archaeology in India has been



Harappan figurine from the Nicholson Museum, University of Sydney.

requested to select the necessary material and send it to you as soon as possible'².

A few weeks later, on the 14 and 15 August 1947, the Indian Independence Act was invoked. In border areas people moved from one side to the other depending on their religious demographics. Upwards of half a million people were killed in the subsequent riots. At midnight on 15 August, the two self-governing countries of India and Pakistan came into existence with the dissolution of the British Raj.

Meanwhile, the transferral of the objects to the Nicholson Museum slowly but surely worked its way through a system in turmoil. They were sent in November 1947.

One of the most significant figures associated with Harappan civilization is the English archaeologist, Sir Mortimer Wheeler. In 1944, he became Director-General of the Archaeological Survey of India, excavating at the Harappan site of Mohenjodaro. In 1948 he was appointed Professor of the Indian Institute of Archaeology, and the following year became Archaeological Advisor to the Government of Pakistan, helping establish the Archaeological Department of Pakistan as well as the National Museum of Pakistan in Karachi.

Archaeology, it would seem, can transcend all boundaries. □

1. Letter from A.D. Trendall to the Secretary, Government of India, 30 May 1947. Letter held on file in the Nicholson Museum.

2. Letter from Ram Lal, Assistant Secretary to the Government of India, to A.D. Trendall, 27 June 1947. Letter held on file in the Nicholson Museum.

Classical glass at Çatal Höyük?

An interview with Dr Margaret O’Hea

by Tiffany Donnelly

Apart from being a dirt (and sometimes dirty) archaeologist, Dr O’Hea specialises in the analysis of glass in the ancient Near East – how it was used, in what proportions to other media of utensils (pottery, metal), and how those uses changed over time and across regions. Most of this work is centred upon the Roman-Byzantine and early Islamic periods in Jordan, Syria and Palestine. Margaret is a Senior Lecturer in Classics at the University of Adelaide.

What is there for a classical period expert at the Neolithic site of Çatal Höyük?

I was working at Kilise Tepe with Mark Jackson from Newcastle Upon Tyne looking at his Byzantine glass from a church complex. Mark is one of the late antique specialists in Turkey and had been asked to look at the late pottery from Çatal Höyük, a Cambridge University project. A postgraduate student at Kilise Tepe is doing her doctoral thesis on the Roman tombs at Çatal Höyük – most of the objects in these tombs are glass, so I was invited to date and publish the glass. Since I was rather surprised to find there was Roman glass at Çatal Höyük, one of the most famous Neolithic sites in the world, I jumped at the chance. Once there I looked at all the glass. As it turns out there was a small Roman settlement in the lower slopes and fields of Çatal Höyük which had been picked up in surveys and the edges of excavation trenches. The Neolithic team were not used to dealing with glass and they were deeply impressed by the rather ordinary and plain vessels in the tombs. I on the other hand was really excited by the tiny little fragments from the settlement because that was the highest quality imported Mediterranean glass, whereas the tomb glass was local bog standard cheap perfumed oil containers used in funerary rituals. I was there for only a short time, which means I have to go back to finish cataloguing the site glass. That should come out as part of a final monograph on the late material which will be a separate small volume.

Tell me a bit about the site. What is the site like? What do you see if you go there?

When Çatal Höyük was first excavated it yielded houses with magnificent wall paintings. The current project involves at least five universities and is one of the biggest projects in modern archaeology. I was not disappointed: the site itself spans two *tells*, known as the North and South Mounds – both of which are currently being excavated beneath permanent roofing for all weather excavation. They are the size of small aircraft hangars, have constructed walkways for visitors to enter during excavations and viewing platforms with display boards. The dig house is to die for: two storeys, separate labs for human bones, animal bones, a six-person conservation team, an obsidian lab, and pottery lab. I was happy to have a corner of a work table in such a gigantic well-



Inside one of the enclosures at Çatal Höyük.

oiled machine. I became team member 129 for the few days I was there. There is a massive display board at the entrance listing all the sponsors, including the Thames Water Authority. A multi-national project if ever there was one! A conservator out in the trenches conserves the wall paintings which turn up every day.

What type of glass is coming up there? What can it tell us about the use of the site at the time?

The tomb glass is there for two reasons: in the Roman period people of a variety of religions anointed the body with perfumed oil (it hides the stench of the body) and because the vessel had been touched to a dead body almost all religions required it to remain behind as impure. These vessels are called *balsamaria*. The second lot is personal property: bowls, cups, plates for the afterlife. The Çatal Höyük tombs only had the perfumed oil bottles. There were some strange objects, however, which are twisted glass rods. These have been variously described as stirrers and spindle rods – probably for show rather than for use.

The fragment of the town that’s turning up in excavations has very high quality cut glass tableware whose major eastern Mediterranean source is probably Alexandria. It’s rather rare in the Near East (I’d love to find some at Pella!) but common in the west. In the east you tend to find it where there are garrisons of Roman soldiers (like Caesarea or Masada). So I was delighted to have the chance to have a look at this Roman settlement which, if Mark’s guess is correct, may relate to a small military outpost on top of the Neolithic mound: Çatal Höyük stands up high above the Konya plain, so from the top you can see a long way in every direction, and there may well have been a Roman road passing by.

Do you think you’ll be going back there again? Will you be able to study the glass in Australia?

Yes, either this July (2013) or next. The two sites I work on in Syria are currently suspended, so Çatal Höyük came as a good opportunity for me. It sometimes is a lovely thing to be able to parachute in to someone else’s dig that’s all set up. It’s a luxury and a privilege. □

Just another brick in the wall?

by David Thomas

It's hard to avoid renovations these days – the ubiquitous TV shows, DIY magazines propping up the walls in the newsagents, a Bunnings around every corner... and indeed, literally, in our backyard at the moment. So perhaps I should not have been surprised when our highly resourceful builder confessed that he was having trouble sourcing bricks to match the ones in our house's existing walls – never in 30 years had he come across such a supply problem... Which got me thinking: was this an issue that vexed ancient builders too? Or did they have fewer scruples about what went into their walls?

These, and other brick questions, have troubled me for a while, since I rather rashly volunteered to puddle a few mud-bricks at Pella to satisfy my, and Pella Director Stephen Bourke's, curiosity about ancient building practices. Of course, once you start on such a project, it tends to spiral out of control, and before I knew it my already somewhat murky reputation at Pella had been muddled further. Late at night, trench supervisors would furtively offer me their latest 'special' mud-brick, just a little one, a beauty (one whopper was over half a metre long and weighed 32kg!). I tried, but I couldn't say no. Soon bags of mud-bricks eclipsed the booze stores under my bed and my room started to resemble a building merchant's yard.

In the end, I 'restricted' myself to 29 mud-bricks for the study, weighing a total of over 390kg. Each brick was measured and described before being smashed up and puddled (the fun bit) in a bucket of water to dissolve the mud and allow me to collect the interesting bits in a sieve. Unfortunately, quite a few other bits also got caught up in the sieve, so I persuaded a loyal band of easily intrigued volunteers to help sort through the course residue, picking out the small bits of bone, shell, lithics and botanical remains, which I then weighed and gave to people far better qualified than me to analyse. I also kept a small sample of each brick for old time's sake / scientific analysis, but more on that later...

The mud-bricks came from a variety of periods and buildings so that we could investigate whether brick making practices changed over time, and for different structures. Did people building a temple or a palace, for example, take more care about the sort of raw materials they used compared to the bricks for a humble home? Could we identify where the mud was coming from, and use the volumes of mud-bricks to gain insights into the scale of the monumental building projects? Stephen was also interested in the problem of residuality – all those pot sherds from earlier periods that crop up on the sorting mats. A study in Egypt found that a large proportion of sherds in their mud-bricks are residual, indicating that people were regularly 'mining' older ruined structures for mud. If this was happening at Pella, it would have serious implications for the other scientific samples we



*David Thomas puddling mud-bricks at Pella
(photo: Michael Parkin).*

study because if so many of the sherds coming from mud-brick debris do not relate to the use of a building, the same would apply to the other finds.

We're still mulling over the data, but some trends are apparent. The 'dirtiest' bricks, containing the most residue and artefacts, tend to be the older ones from Neolithic and Chalcolithic domestics structures (although Iron Age builders appear to have been quite slovenly too). By contrast, the Early and Middle Bronze Age bricks from the Migdol temple are generally pure. While this might reflect the cultic nature of the building, it might also reflect the scale of the project – the huge quantities of mud-bricks required could not be supplied by recycling ruins on the mound.

Although it's well-known that brick sizes and colours often vary considerably within a wall, Bruce McLaren argued several years ago that the homogenous coloured bands of mud-bricks in the Middle Bronze Age fortifications at Pella were carefully selected. Bruce proposed that the varying permeability of the different types of brick raw materials aided drainage. Such sophisticated ancient knowledge of the properties of mud-bricks shouldn't come as a surprise – we know from cuneiform tablets in Mesopotamia that mud-brick making was subject to detailed contracts, and the craft had a patron god, Kulla, while brick-makers appear in Ancient Egyptian funerary models and tomb

wall scenes such as that in the 18th Dynasty tomb painting, found in the Tomb of Rekhmara.

These days we can enlist a scientific technique called X-Ray Fluorescence (XRF) to measure the chemical components of all sorts of ancient artefacts, including mud-bricks. By borrowing the XRF 'gun' from David Frankel and Mark Eccleston at La Trobe University, I was able to zap the mud-brick samples I kept and plot the resultant data (see page 10). The dendrogram groups together the bricks that are most similar chemically. The bricks from the 'elite' Iron Age and Middle Bronze Age structures are broadly similar to each other (at the top of the graph), and different from the bricks from domestic contexts in the Chalcolithic and Neolithic, as we expected from the amounts of residue in the bricks. The small cluster of bricks at the bottom of the graph is a curious mixture of domestic Early Bronze Age bricks, and elite Middle and Late Bronze age bricks. If we exclude Calcium and Silicon from the analyses, as they are the most common chemical components in all the bricks and focus on the less common elements, the bricks from several different periods and structures cluster even better, suggesting that they were made in a similar way from raw materials from the same sources.

One of the starkest findings of the Pella study is that ceramics account for less than 1% of the weight of the vast majority of the mud-bricks I studied, and most of the sherds were small and non-diagnostic. This contrasts significantly with the high proportion of residual sherds found in the Egyptian study and proves that mud-bricks are not the source of the residual sherds at Pella. That's a relief to everyone, although we'll have to think again about how the residuals are getting into the assemblage.

Like the XRF analysis, Sofie Debruyne's study of the shells from the Pella mud-bricks has identified

some differences between bricks from different types of structures. Although the number of shells is small, she notes that freshwater shells only occur in mud-bricks from domestic and elite buildings (i.e. habitation structures), and not in those from religious and defensive contexts. This may indicate that a different source was being used for the raw materials or the mud for bricks for the religious and defensive buildings was being sifted more carefully. By contrast, the samples from elite dwellings intriguingly contain a much greater variety of shell species than those from domestic areas and this species diversity is also typical for the Iron Age mud-bricks.

Unfortunately, the bone fragments tell us little, due to their small size. The bones are generally from medium-sized mammals. The only specific species Karyn Wesselingh has been able to identify are sheep/goats (no surprise there!), although she notes that an unusually high percentage of the bones are burnt. Anne Dighton is currently analysing the botanical remains, and has already found some weed seeds which may allow us to identify the sort of environment the mud was coming from. Meanwhile, Stephen is still pondering what the ceramic fragments mean and the lithics await further detailed study.

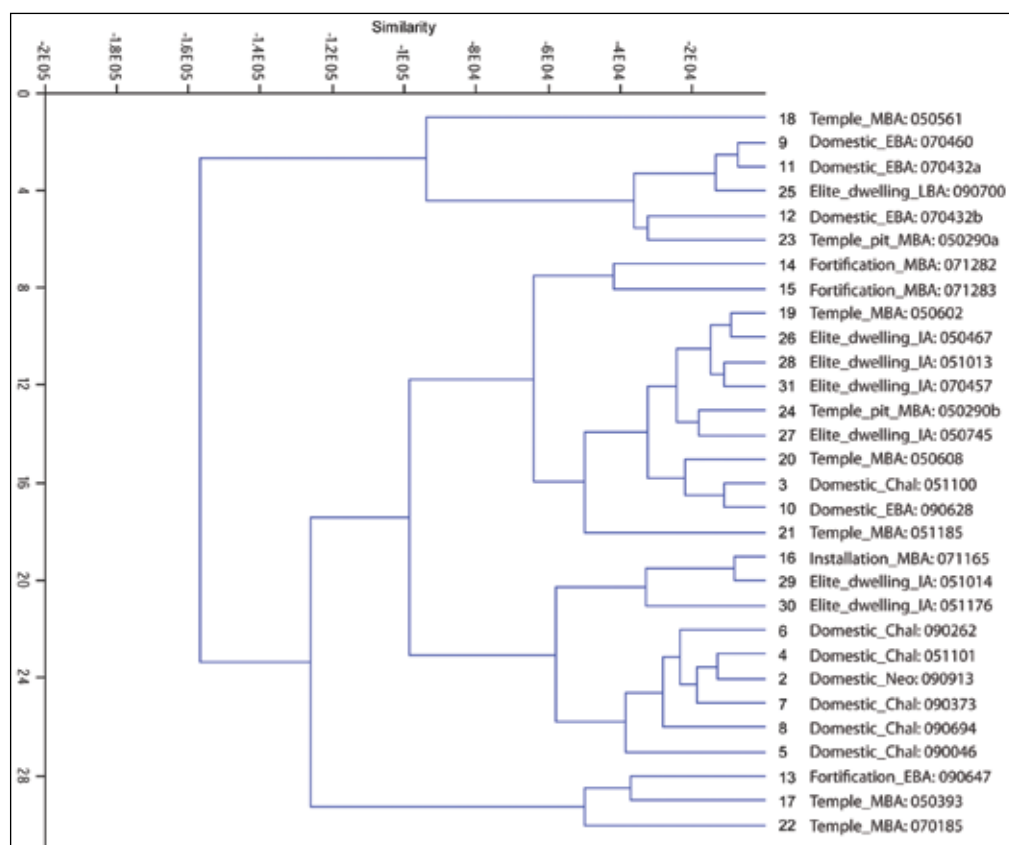
A few other people such as Rob Homsher (at University College London) and Serena Love (at the University of Queensland) have studied mud-bricks at different sites in the region. Rob has compared mud-bricks from the Middle Bronze Age (MBA) fortifications at Pella with those from Megiddo and other sites across the Jordan Valley. He argues that the bricks from Pella are more uniform than those at Megiddo, suggesting that just one brick maker or raw material source was involved in this large scale brick production. The bricks for the MBA fortifications and temple at Pella, however, were made to different recipes,



*12th Dynasty (ca 1900 BCE)
funerary model of brickmakers,
from Beni Hasan, Egypt. British
Museum EA 63837 © The
Trustees of the British Museum
(photo: Lenka Peacock).*

with more ash in the temple bricks. This may correlate with difficult to interpret ritual texts on temple building from Mesopotamia. Serena looked at Neolithic mud-bricks from Çatal Höyük in Turkey and found that the mud-brick recipes varied between households, indicating small-scale localised production. It seems likely that this is also why the Neolithic mud-bricks from Pella are so different from the later mud-bricks.

Mud-brick studies can also provide logistical information about the costs in time, labour and raw materials of the major building projects. The importance of straw as a binding agent is event from the reference in the Bible (Exodus 5: 7-19) to Pharaoh punishing the Israelites by forcing them



Cluster analysis dendrogram which groups together the mud-bricks based on their chemical similarities.



David Thomas using the XRF machine to zap samples and discover their chemical composition (photo: Mark Eccleston).

to collect their own straw, rather than receiving deliveries of it. David Oates, an eminent Near Eastern archaeologist, once observed that modern mud-brick makers in northern Syria require ca 60kg of chopped straw to make 100 mud-bricks. The brick makers also need large open spaces in which to let the bricks dry in the sun. David estimated that 13km² of cultivated land was required to provide enough straw for the ca 810,000 bricks in the outer wall of the Naram Sim palace at Tell Brak, which dates to the 22nd century BCE.

Another Near Eastern archaeologist, William Sumner, calculated that it took one person 2.5 days' labour to mould and lay 1m³ of mud-bricks. Using these data, we can start to understand the project management skills and resources that were required to construct the 1.2km long Middle Bronze Age city walls at Pella, which required nearly one and a half million (or 25,000 m³) of mud-bricks. Who would've thought you could learn so much from 'just another brick in the wall'? □

The significance of the *palaestra* at Hellenistic Jebel Khalid on the Euphrates in North Syria

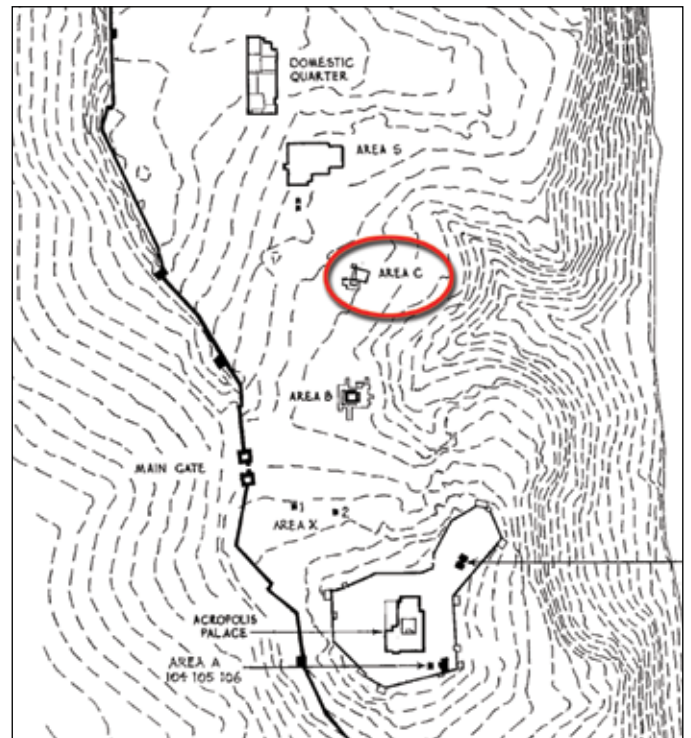
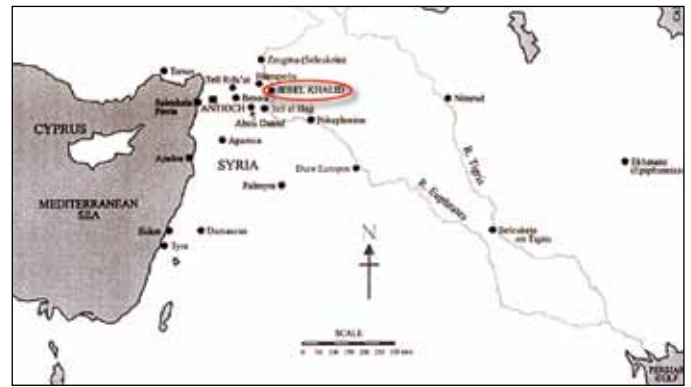
by Graeme Clarke

When the early-third century BCE planners of Jebel Khalid were making provisions in the lay-out of the new settlement for public facilities, they located a site for a *palaestra* (a type of gymnasium) in a central position ('Area C'), just to the south of the market area ('Area S') and to the north of the Temple sanctuary ('Area B') but on a direct alignment with it.

This public facility was designed to serve a number of functions.

Characteristically, *palaestrae* are peristylar buildings with a central courtyard surrounded by a colonnade, with service rooms opening off the ambulatory. The colonnade itself could provide light as well as shelter or shade and could serve for classrooms in basic education for young boys to mid-adolescence (reading, writing, mathematics, music), whilst the courtyard could be used for their physical training (wrestling, boxing, a variety of competitive games). As such, *palaestrae* came to be regarded as social clubs where the menfolk of the town might gather to watch and admire from the colonnade their sons and cheer them on at their competitive and body-building sports – military training was never far from the objectives of Greek education. When the youths scraped down the sand, dust and oil after their sporting activities, washing facilities were needed, and as such *palaestrae* came to serve also as city bathing establishments (excavation has shown that the houses in the nearby *insula* were without bathing facilities)¹. In this regard it is worth quoting Posidonios (from Hellenistic Apamea on the Orontes): "All the people of Syria, because of the great plenty which their land afforded, were free from worry about the basics of life, and so were ever meeting for a continual life of feasting, turning their gymnasia into baths in which they anointed themselves with expensive oils and perfumes" (*apud* Athenaeus *Deipnosophistae* 12.527e).

In the course of excavation of the Jebel Khalid *palaestra* a fragment of a bronze *strigil* was recovered (see opposite), used for scraping down after exercise, as well as a stone ball (*sphaira*) used in a game like bowls or skittles, and in one of the interior rooms a large circular washing-basin (*loutron*) has been uncovered, sunk into the floor (see page 12; similar to ones found near the gymnasium at Olympia) along with a plethora of large, pitched-lined,



Location map and site plan of Jebel Khalid.

water jars. Furthermore, literacy is attested at the site generally not only by graffiti on pots and plaster (over 80 examples) but also by the recovery of a number of styluses in both bone and bronze, and music-playing is attested by a fragmentary bone flute (see page 12).

Excavation has further revealed that the site was initially deeply quarried for limestone blocks and other building material (no doubt intended for the *palaestra* itself) and subsequently levelled off with a deep fill of waste stone chippings to create a floor level. This in turn entailed the



Bronze strigil fragment from the *palaestra*.

¹ See Dr Heather Jackson, Where's the Bathroom? Problems of identifying rooms in a Hellenistic housing *insula*, in L. Hopkins - A. Parker (eds.), *Archaeology of the Near East - an Australian Perspective*. Sydney, 2001, pp.90-99 and eadem, *Jebel Khalid on the Euphrates Volume. IV: The Housing Insula*, Mediterranean Archaeology Supplementary Volume (forthcoming).



Loutron sunk into floor of the palaestra.



Fragment of a bone flute from Jebel Khalid.

invest in this costly monumental construction - and to maintain it over the life of the settlement? For it was no idle undertaking, requiring a major input of labour to erect, and the institution itself entailed the selection and appointment of an overseeing official, the hiring of teachers and trainers, the establishment of the curriculum to be taught (along with a supply of teaching materials), arrangement for the provision of expensive high-grade oil for the sporting activities etc.

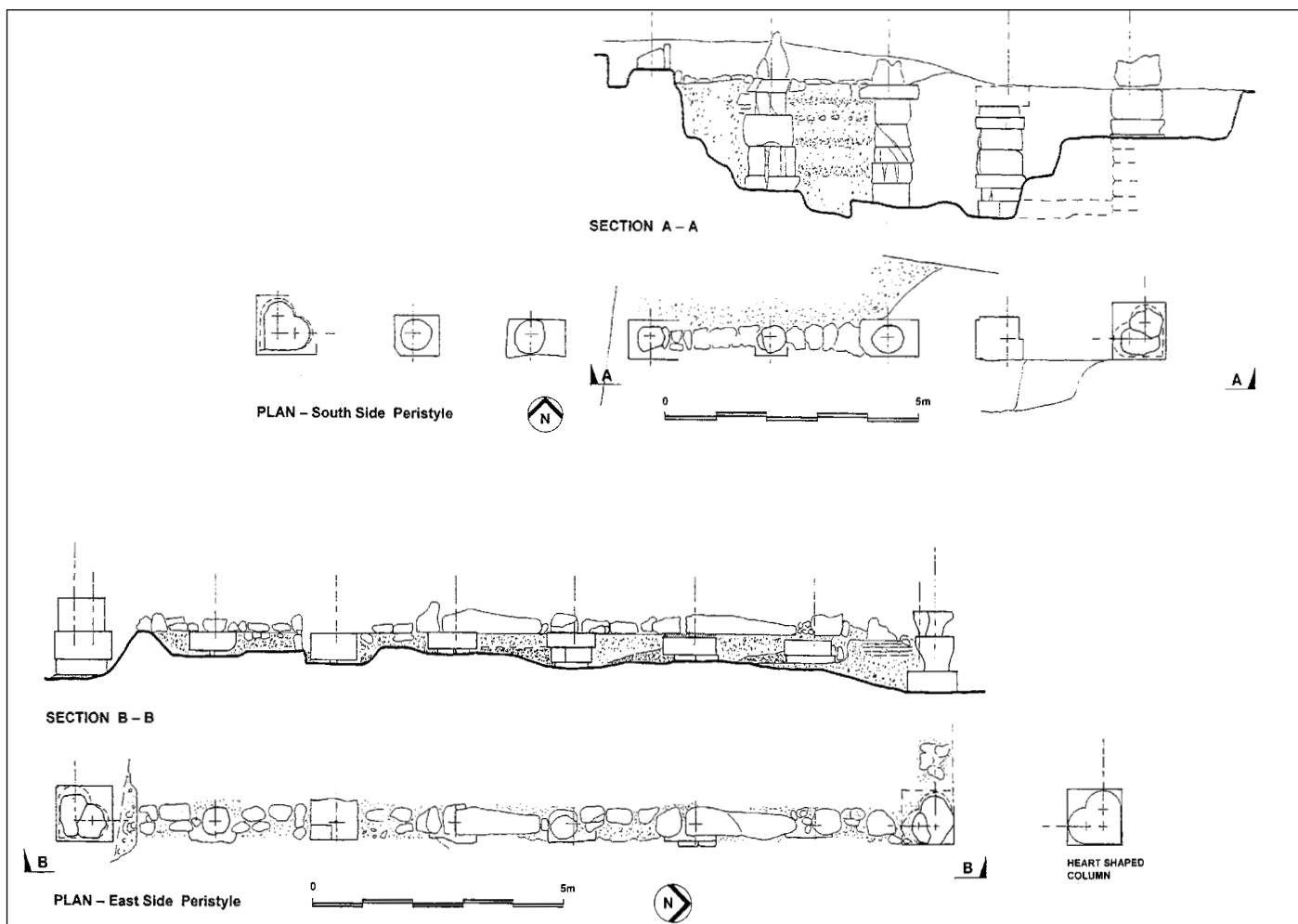
Palaestrae can rightly be regarded as being quintessentially Greek, providing a characteristic mixture of physical and educational training, with public displays of physical sporting activities, and requiring performers to train in the nude. Our reading of the institution is inevitably coloured by the propaganda of 2 Maccabees (c.4) – cf. 1 Macc. 1.14ff. – as being hopelessly alien to Semitic traditions (cf. Lucian's *Anacharsis*, *passim*), though the narrative in 2 Maccabees clearly concedes that many Jews did in fact freely and enthusiastically participate: even so, this is still a Greek institution, erected in Greek



South stylobate showing corner cordiform columns.

construction of high piers (ranging from 2.5m to 3.0m in height), based on the quarried bedrock, for supporting the weight of the columns of the colonnade. The peristyle itself had eight columns per side (as in the *palaestra* at Delphi) with cordiform (heart-shaped) columns in the corners (see right; as in the *palaestra* at Miletus), each side being 17.5m in length. The order was Doric and the columns (some 27 column drums have so far been recovered) were left unfluted but they show traces of plaster. After its abandonment as a *palaestra* and partial demolition towards the end of the life of Jebel Khalid in the late 70s BCE, the building was reused for squatter domestic occupation, with the odd bread-oven built within the colonnade and some of the original, but now abraded, massive architrave blocks (some 2.5m in length, probably deemed too difficult to remove for recycling elsewhere) re-used to create house-walls (see plans and sections: page 13). A coin from the courtyard floor of Seleucos II (246-225 BCE) along with eight sherds of datable black-gloss pottery fragments (seven Attic and one Antiochene) and an early Rhodian amphora handle, all found sealed in the underfloor foundations (otherwise consisting largely of sterile limestone chippings), confirm that this was a third-century BCE construction – like the Temple to the south and the Palace up on the Acropolis.

What motivated the inhabitants of Jebel Khalid to



Plans and sections of the eastern and southern stylobates (Dr.B.Rowney).

style, intended for athletic training, education and civic entertainment in Greek ways of being. Whilst *palaestrae* were constructed down on the Levantine coast (much more open to cultural changes) and elsewhere in Seleukid territory during this period, this is the only one attested so far archaeologically within inland Syria for the whole of the Hellenistic period (Damascus had to wait until the time of Herod the Great for its *palaestra*, Joseph. *B.J.* 1.21.11 [422]). This building is eloquent for at least the “Greek” aspirations of the settlers of Jebel Khalid in the course of the third century BCE, for having their sons reared in the traditions of Greek *paideia* and for providing public entertainment and social activity in Greek style (Ἑλληνικὴ ἀγωγή καὶ διαίτα - *Hellenike agoge kai diaita*).

But was it intended for “Greeks” only? As the book of Maccabees reveals, *palaestrae* could prove attractive to some of non-Greek descent also. An amphora in local fabric was recovered in the Jebel Khalid *palaestra* marked with the imprint of the owner’s personal signet-ring – and the image is decidedly not Greek; it derived, in all likelihood, from the ring of some upwardly-aspiring, socially-mobile local Syrian (see opposite)². *Palaestrae* could prove to be one way of integrating a mixed community. □



Seal impression on amphora from the palaestra.

² See Dr Heather Jackson, A local jar seal. Appendix to G. Clarke, Jebel Khalid Stamped Amphora Handles 2000-2005, *Mediterranean Archaeology* 18 (2005), pp.186-9, plate 22.

Volunteer Viewpoint



Jack McBride

Jack excavating in Area XXXII. Photo by Bob Miller.

Jack is a retired school Principal. He was previously a history and English teacher in NSW schools. He has always been interested in history and has lately had the opportunity to delve into archaeology. This is his second season as a Pella volunteer.

What sparked your interest in archaeology?

I've travelled a lot and seen a lot of archaeological sites – from Mexican pyramids to the Kimberly in Australia – and have been absolutely fascinated. I've always had a love of history and three years ago I made the decision to go back to University and start an archaeology degree at the University of New England.

How did you hear about Pella?

I looked it up on the internet after somebody had told me about volunteering with a university dig. I discovered the NEAF site via the Sydney University website, and sent off an application.

What made you decide to come?

It was the opportunity to do some archaeology. The site itself was of less importance when I made my decision because at that stage I didn't know a lot about the deep significance of Pella. I certainly do now.

What were your first impressions of the dig?

I think the place is well organised. It is everything I'd been led to believe about the level of comfort etc. I wasn't surprised or disappointed by any aspect of the reality when I got here. Driving up the *Tell* in the bus the first time we arrived, past the West church, I remember seeing those columns sitting there and thinking: we've come to the right place! The other thing that struck me was the size and scale of the site, and the fact that it wasn't just one

period. There were so many civilisations on top of each other and the site encompasses all of them. My interest in history is more Roman and Greek, but the Bronze Age trenches I've been digging in both seasons have been great.

What has been the most memorable thing that you'll take away from the excavation?

I suppose the most exciting thing is when you make a discovery in a trench – a small pitcher jug in my first season, a jar full of wheat in a baulk, even the pottery sherds. I get a real pleasure when I see a sherd with a handle, especially when the thumb print of the person who made it is still there and you can touch it and make contact with that person. You can't touch things in museums and I'm a tactile person – to be able to touch it is great.

What has been the most challenging aspect of the dig for you?

Getting my head around the history of the site is probably the hardest thing, even on my second season here. I really value the afternoon talks Steven and the other core staff give which help make sense of the site. It's overwhelming at first for volunteers, because you're in the company of people who have been here many times, who have such a depth of specialised knowledge. As a volunteer you don't have that expertise so you feel a bit in awe. As you get to know the history and archaeology of the site it starts to fit together.

What one thing around the dig-house do you think would be of interest to an archaeologist in 1000 years' time?

The collected artefacts – pottery, bone, small finds – clearly that's going to be of use to archaeologists well into the future. □

Pella In Jordan

Dusting off some gems from the vault

by Stephen Bourke

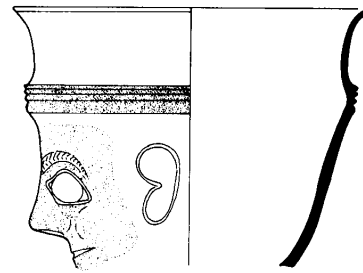
Introduction

When you're involved with such a long-running project as Pella, it is inevitable that you view current achievements against a background of what has come before, and it occurred to me that some of our choice discoveries from more than 30 years ago, are not as well known to the current crop of students and volunteers who work at Pella as some of our more recent discoveries. So when Ben Churcher asked me for something on Pella for the Bulletin, I thought I might draw attention to some of the more intriguing finds made around 30 years ago. I've chosen four objects spread across the time periods to illustrate the range of discoveries great and small, which Pella has produced.

1. A Pottery Head-Shaped Cup. White Slipped and Red-Brown Painted. Middle Bronze Age (ca. 1600 BCE). Excavated in 1980, from Tomb 20, located on the north face of Tell Husn, (Area XI, T.20).

This decorated drinking or libation vessel is unique in Jordan, and a very rare find anywhere across the Levant. Earliest examples come from Anatolia, and seem to date from the early Middle Bronze Age (ca. 1800 BCE). The few examples in the southern Levant (complete vessels from Tell Haror in southern Israel, and Jericho in the Palestinian West Bank) are approximately contemporary with the Pella find, but later than the Anatolian examples.

All three southern Levantine vessels are found in tombs, and may indicate the presence of a very specific (and rare) religious rite, perhaps a libation ceremony connected with commemorating the dead. If so, it would seem very likely that the custom/ritual is non-local, and sourced to the northern Levant/southern Anatolia. Given the rarity of the head-cup, it makes one wonder as to the origin of the



*Gems from the Vault.
Object 1 above, Object 2 to right.*



individual so honoured. Is this scant evidence for the slow infiltration of new (Hurrian?) peoples from the north, or marking the grave of someone who died a long way from home?

2. A Limestone Figurine. Coated with fine 'talc-like' white plaster. Late Bronze Age (ca. 1500 BCE). Excavated in 1981, from a room built against the inner face of the east city wall (Area III, Trench C).

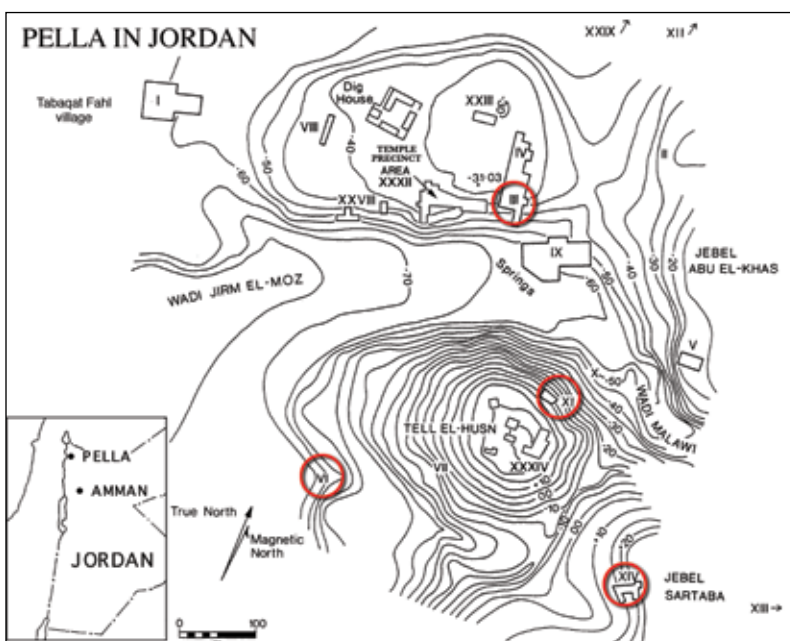
The object was found with a complete conch-shell, a group of sheep knuckle-bones, and several pottery bowls and jars. The piece is unique. When discovered in 1981, the excavator Tim Potts described it as 'an early Brancusi'. The vaguely anthropomorphic shape, but without specific identifying features, seems to echo the more abstract examples of the earlier Aegean Cycladic idols.

The object was (perhaps inevitably) assumed to be some form of religious artefact when first discovered, but no subsequent parallel, either inside Jordan or beyond, has ever shed useful light on the matter. The find-spot, in a small room built hard against the inner face of the city wall, was unexpected to say the least. This area of the walls always seemed the likely home of the city watch, garrisoned in small barrack-like rooms along the inner face of the wall, beside the city gate.

The presence together of the knuckle-bones, used in games of chance and in divination, and the conch shell, perhaps employed to raise an alarm or for ritual summonings (?), along with this exquisite figurine, has led to some fairly imaginative scenarios, when trying to work out what's going on.

Is it the tool-kit of a local diviner, who watched the stars from the high eastern walls of the city, seeking knowledge of the future in a decidedly uncertain time? Or do we have a soldier's recreational equipment - wine (the amphora/bowls), music (the conch), gaming (the knuckle-bones) and good-luck figurine?

We are no closer to knowing precisely how to view these objects than we were when Tim found the figurine in 1981. Which is why, even today, we still call it 'Tim's Object'...





Gems from the Vault.

Object 3 left, Object 4 to right (showing the cross on a hill enclosed in a shrine-like open structure).

3. A Hellenistic Pottery Vessel, White Slipped and Red Painted. Middle Hellenistic (ca. 150 BCE). Excavated in 1982, on the lower western slopes of Jebel Sartaba, in the midst of a Chalcolithic farmstead (Area XIV, Trench N).

This isolated find, a splendid fine-ware jug, recovered most unexpectedly from a shallow pit cut down into a Chalcolithic period (ca. 4000 BCE) farmstead, was thought to indicate the presence of a nearby Hellenistic period cemetery. Robbed tombs from further down the slope behind the south face of Tell Husn demonstrated the presence of Late Hellenistic/Early Roman graves in the vicinity, but nothing quite as early as this *lagynos* has ever been identified in the robbed graves south of Husn.

The American Wooster College team trekked up to the high summit of Jebel Sartaba to excavate a small fortress (Area XIII), expecting it to be Hellenistic, partly on the basis of this find. As the fort was probably never finished, a firm construction date was difficult to determine, although all architectural indicators seemed to suggest a later Herodian/Early Roman date (ca. 50 BCE-50 CE).

It was only when Sydney teams excavated on Tell Husn (after 1988) that John Tidmarsh identified earlier Hellenistic occupation on the east Husn summit. Later Herodian/Imperial Roman (ca. 50 BCE-80 CE) occupation was detected on the north face of Husn in 1983, and very early Ptolemaic period (ca. 250 BCE) occupation more recently (in 2007) on the far west slopes.

It is only on the eastern Husn summit area (above the Early Bronze Age terraces) that Seleucid period (ca. 200-50 BCE) occupation was finally isolated, although precisely what form this occupation took is still debated. This one jug has led us a merry dance, but John may have finally found it a worthwhile context, although what it was doing in a small pit isolated halfway up the Sartaba slope still intrigues. I still worry about what might be slightly further up the slope....

4. A small Bronze Plaque. Late Roman/early Byzantine (ca. 350 CE). Excavated in 1981, in a three-chambered tomb on the south side of Tell Husn. Approximately 2cm x 2cm in size. (Area VI, Tomb 39).

This small bronze plaque, folded into two leaves, was perhaps worn as a medallion. It was found in one of the graves within the three-chambered Tomb 39, excavated towards the end of the 1981 field season. This tomb produced spectacular glassware, the head of a wooden figurine (probably of Mithras), and several small ivory plaques, carved with exquisite delicacy, including dancing maenads and comic masks. Associated coins (one probably employed as an amulet), date around 320-360 CE.

The 2cm square bronze plaque has illustrated on one side a cross on a hill enclosed in a shrine-like open structure, along with a second building, more elaborate in form. On the other side of the plaque is a man riding a donkey. This would seem likely to be a representation of the Golgotha shrine and the Church of the Holy Sepulchre on the one side, and Christ's entry into Jerusalem on the other. These images (of Golgotha and Christ) are among the earliest known to Western art.

Given the date of the tomb, it seems likely that the elaborate church (?) building is the first Church of the Holy Sepulchre, built by Constantine the Great in 336 CE. However, the combination of dancing maenads, comic masks, a head of Mithras, and a medallion celebrating Christianity in Jerusalem, suggests the individual to whom they all belonged enjoyed a complex inner life, to say the least.

Director Tony McNicoll noted the coin/medallion (from Thessalonike in northern Greece, dating around 320 CE) as possibly of special significance for the owner, as it was very worn, perhaps indicating it had been handled constantly over a life-time. Tony suggested the coin may date from the time the owner entered the

military, a profession suggested by the maenad/Mithras elements in his collection. If this 'tentative biography' as Tony put it is correct, then the soldier may have 'demobbed' around 340 CE, perhaps at Jerusalem during its Christian rebirth under Constantine. Pella had even then long been associated with early Christianity (as the City of the Refuge in 70 CE), so perhaps Pella suggested itself as a peaceful retirement venue for a curious pilgrim, or just possibly a convert.

Reflections

These are just four examples 'from the vault', which still

Volunteer Viewpoint

Roz Cheney

Roz was a producer of radio features and acoustic programs at the ABC; she was executive producer of The Listening Room, and arts editor at ABC radio from 1995 to 2001. Roz was one of the staff that founded the radio station now called Triple J. Her current interests are French, Iyengar Yoga, history, reading, gardening and textiles.

What sparked your interest in archaeology?

My sister Ann was an archaeologist and she studied prehistory at Berkley and Harvard. She spent time in east Africa doing field work, particularly with the Leakeys in Lake Turkana. When she was writing her doctorate in anthropology and botany I travelled with a sound engineer to Arusha in northern Tanzania where Ann was working with a small tribe of hunter gatherers, the Hadza. We spent a month with her in the field and then year making hours of radio programs which were broadcast on ABC FM – location recordings with ambient sounds of the Hadza and the Akie of the South Massai Steppe.

How did you hear about Pella?

In 2009 I went on a three-week trip to Iran led by John Tidmarsh. It was an absolute feast and a delight. Through John I heard about NEAF so I decided to join, and I now go to all the talks and lectures at Sydney Uni. That's how I heard about Pella.

What made you decide to come?

In the last ten years I've become very interested in Central Asia and the Middle East and I've travelled in Uzbekistan, Azerbaijan, Georgia, Armenia and Iran. I've done extensive reading on the history of the region, including special travel books on the Middle East. Coming to Pella was a way of extending my reading and experience in a practical way.

What have been your first impressions of the dig?

The first thing I realised was that the site occupies a very large area – several square kilometres. I had thought it was in a rather uninhabited corner of Jordan but it's actually in a rural area. The other thing that struck me was the complexity of it. When you're here you begin to bring together the things you've read about the history of the

retain their power to intrigue after 30 years reflection.

What does the Middle Bronze Age head-cup indicate about the makeup of Pella's population at the time? Are we missing something important on the Sartaba slopes in the Middle Hellenistic period? And what does the Late Bronze Age limestone figurine and the Byzantine bronze plaque have to say about the inner life of soldiers through the ages?

A few more notes from the complex symphony that is Pella through the ages. □



*Roz and trench supervisor Bob Stone discuss a plan in Area XXIV.
Photo by Bob Miller.*

Middle East and relate it to the lives of the people who have lived here for the last ten or twelve thousand years. I never realised how clearly the Jordan rift valley is an extension of the east African rift valley. Given my earlier travels in Africa I feel as if I've come full circle. It's been a revelation thinking of those early hominids walking up here.

What has been the most memorable thing that you'll take away from the excavation?

I think what I've found most interesting is that you do this meticulous detailed work in the trenches and then you stand right back and hypothesise and try to draw conclusions about the big picture. The recording in the trench is an incredible exercise in file management. The interesting part is what you do with it.

What has been the most challenging aspect of the dig for you?

I always thought that sharing a room would be the most challenging, but it's been fine. The weather was appalling to start with, and I found the dighouse very cold that first week!

What one thing around the dig-house do you think would be of interest to an archaeologist in 1000 years' time?

Mobile phones. □

Aerial Archaeology and the Black Desert of Jordan

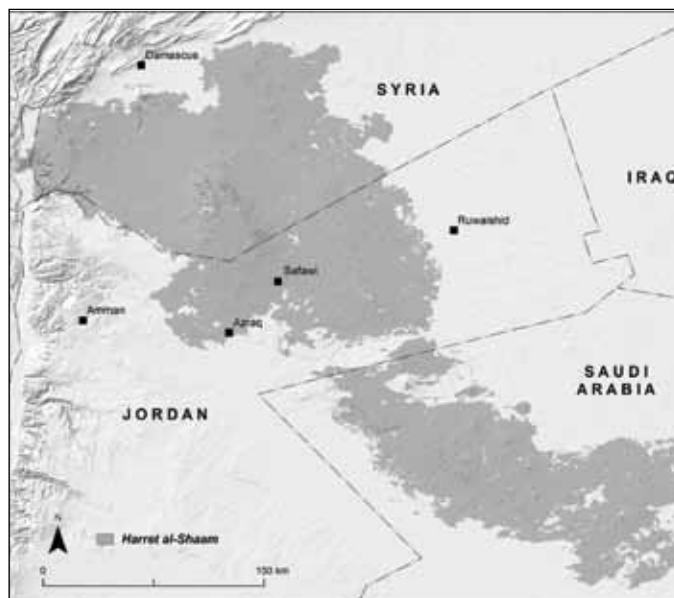
by Rebecca E. Banks

The Aerial Archaeology in Jordan (AAJ) project completed a short season of flying in Jordan in May 2012, the second half of a season started in October 2011. The 2011-12 flights were the most recent in a series beginning in 1997. To date we have flown c. 300 hours. The objectives are:

- To create a permanent aerial photographic record of sites and landscapes both known and new discoveries
- Mapping of sites
- Monitoring of sites and regions in danger
- Interpretation of satellite imagery on virtual globes
- Acquisition of historical aerial photographs of the region
- Collaboration with ground projects
- Promotion of research

As usual flights ranged widely across the country but most this season were concentrated on the Panhandle of Jordan.

The Panhandle is dominated by the Harret al-Shaam, a lavafield extending from Syria in the North into Saudi Arabia in the South, and is the location of thousands of stone built structures – the ‘Works of the Old Men’. These ‘Works’ comprise predominantly the following types of structures: Kites – long walls (‘tails’), usually two or three, narrowing to an enclosure (‘head’) probably used for hunting; Wheels – circular enclosures with internal divisions from a central ‘hub’, like the spokes of a wheel; Pendants and Cairns – a mound of stones, round or square, not necessarily containing a burial, with a ‘tail’ of smaller



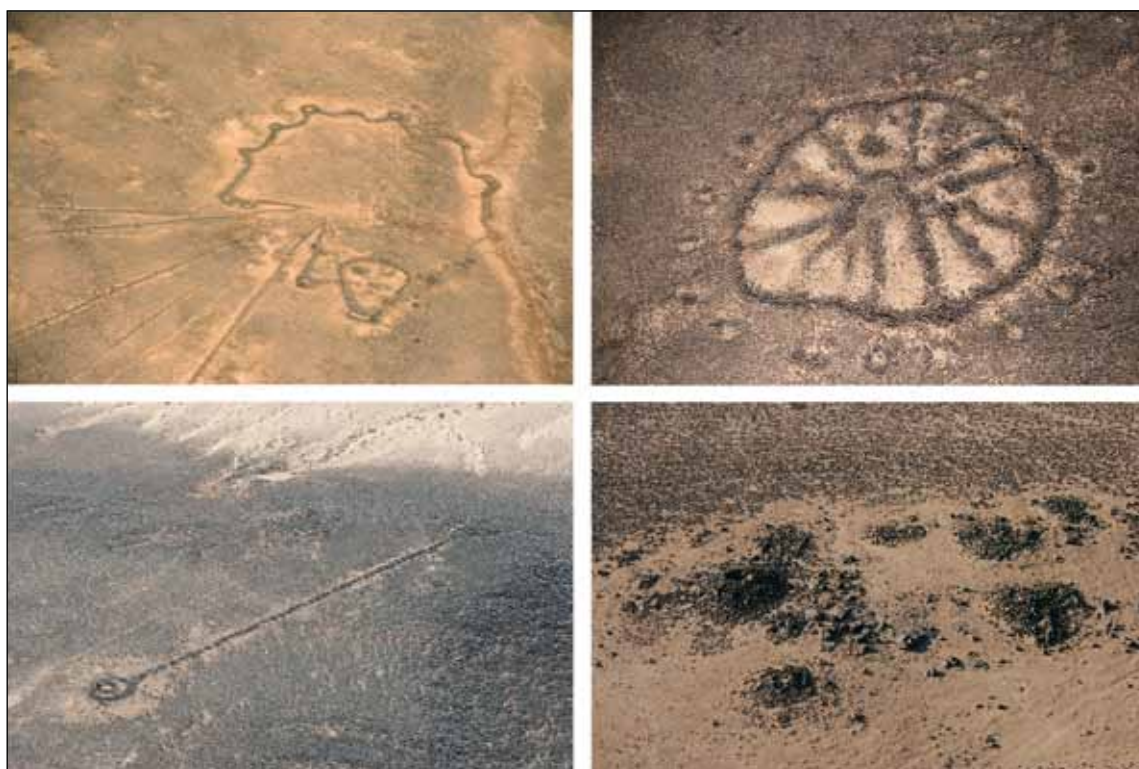
Map showing the extent of the Harret al-Shaam.

Drawn: Mat Dalton.

mounds of stones in the case of a Pendant; and Walls – low walls of stones meandering across the landscape.

First remarked by the Royal Air Force flying the Cairo to Baghdad Airmail route, they have also captured our attention, first in the historical imagery of the RAF and the Hunting Aerial Survey photographs of 1953, and then through the AAJ project's flying program. The AAJ has incorporated these structures into the many sites being photographed and recorded through active aerial photography, and through the use of historical and contemporary satellite imagery. The result is increasing documentation as to the distribution of the sites as well as the different types of sites.

With the increasing affordability of satellite imagery one could ask what the benefit of investigation by aerial



Rock built structures found in the Harret al-Shaam: from top to bottom, left to right – a Kite, Wheel, Pendant, and Cairns.



Wide and zoomed in screen shots of 3D reconstruction of a Qattafi Kite made using 123DCatch: note the location of the head of the kite over a basalt ridge.

photography is for these sites. One advantage in the examination of these sites from helicopter or aeroplane is the ability to observe the landscape in relation to the site, in particular the topography. Pendants and Cairns are commonly found on the highest ground, and Wheels next to the depression of a Wadi. The adaptation of the landscape into a built structure is particularly noticeable with Kites, where the 'tails' will lead through a narrow pass or over a crest, presumably to offer the hunters the extra element of surprise as the animals are herded into the limited enclosure of the 'head'.

This season's flying saw experimentation with the use of two new recording mediums – a mounted 'Go Pro' that photographs automatically at fixed intervals, and video camera. These two mediums allow for review of the features as we saw them in flight, and of the flight itself. The material can also be incorporated into the increasing digital presence of the project: our website, online archive, and through social media. Recent experimentation with 3D reconstructions from aerial photography taken circling a site in a helicopter has yielded excellent results also, as the reconstruction shows the breadth, depth and height of the site and the surrounding landscape. Photographs captured by different cameras from the same flight can be utilised for these reconstructions, allowing for numerous angles and details that were taken to be incorporated into a final 3D picture.

The availability of satellite imagery through digital globes such as *Google Earth* and *Bing Maps* has meant that the study of these types of sites is able to extend past the borders of Jordan where our aerial photography cannot extend, into greater 'Arabia'. Local variations of type have been discerned, such as a 'Sock' Kite in Syria. There is also a new type of structure altogether in Saudi Arabia, the 'Gate'. The extent of new discoveries using satellite imagery has meant the rewriting of estimates of number. The number and extent of Kites given by Echallier and Braemer in 1995 when they counted 507, and the assumption that these sites were restricted to the basalt Harrat of Arabia is now significantly altered with examples found from southeast Turkey to the Yemen and the total now standing at 3,381.

Combine the evidence of these numerous prehistoric stone structures with the 'desert castles', caravanserai and

villages located on the desert fringe dating from the Roman to Early Islamic period in Jordan, and questions naturally arise regarding the ancient climate and landscape, which may have been able to support a higher human and animal population than now. These are questions where the answers are not in the scope of aerial imagery alone. Follow up investigation on the ground is always necessary to answer many of the resulting questions that arise from aerial research. Collaboration is therefore paramount.

It is a continuing pleasure for AAJ to collaborate with researchers on the ground by making aerial photography available through the Aerial Photographic Archive for Archaeology in the Middle East (APAAME). The aerial imagery taken by the AAJ since 1997 is available on the archive's online site at *Flickr.com*, as well as ground photographs, maps and historical imagery. Users are welcome to make a direct request to us; through direct contact with colleagues in the field, the AAJ is increasingly coordinating to take photography relevant to current research projects.

These surveys are part of a promising increase in archaeological investigation in the steppe and Basalt Desert regions of Jordan. Despite its wealth of material, the Basalt Desert had attracted little research since the RAF's pilots' fascinating aerial images. The result of these investigations will hopefully be an increased awareness and appreciation of structures that are all too readily erased by the bulldozer and increasing expansion of the region's population.

Acknowledgements

The AAJ project and APAAME gratefully acknowledge the financial support of: The Packard Humanities Institute, Australian Research Council, British Academy, The Palestine Exploration Fund, The Prehistoric Society, The Robert Kiln Charitable Trust, Seven Pillars of Wisdom Trust, Society of Antiquaries of London, The University of Western Australia Research Grants Fund, and Private donations. You can find out more about the project, and follow our research and fieldwork at: <http://www.flickr.com/apame/collections> and www.apame.org. A big thank you to David Kennedy and Mat Dalton for their comments on this paper. □



NEAF ARCHAEOLOGICAL TOURS

NEAF, in conjunction with the Academy Travel, run study tours to places that would be of interest to all people interested in archaeology and history. Our tour to Greece will be departing later this year and there are still places available. NEAF has several other tours in the pipeline for 2014. Please refer to the NEAF website or contact Academy Travel (1800 639 699) for further details.



Greece: The Essentials

6-26 October 2013

with Ben Churcher

This tour has been designed for people who may not have travelled extensively in mainland Greece before, and for those who wish to revisit the great sites of ancient Greece in style, with a highly experienced tour leader. It aims to develop our appreciation of the history, mythology, architecture, art and literature of the Hellenic world. The comprehensive 20-day itinerary takes us from the Peloponnese to Macedon, stopping at isolated Homeric sites, beautiful Classical-period cities, historic Roman battlefields and rich Byzantine treasures. As we visit sites ranging from the Bronze Age Nestor's Palace at Pylos to the birthplace of Alexander the Great at Pella in Macedonia, we will experience a diverse range of Greek landscapes and cultures, enjoy some downtime on the picturesque island of Skiathos and view those essential sites that allow us to visualise more than 3000 years of Greek history and civilisation.

Coming up in 2014 (Please see the NEAF website for more details)

May 2014. Uzbekistan & Turkmenistan with Ben Churcher

September 2014. Greece & Turkey: In the Footsteps of Alexander the Great with John Tidmarsh.

Pella Volunteer Program January-February 2015

Pella in Jordan is not only one of the longest running excavations in Jordan but, if you ask us, it is also one of the more fascinating sites in the Levant and certainly one that is set in a truly wonderful landscape.

With over 20 years experience at running the Pella Volunteer Program we are confident that we can provide a 'full-immersion' experience for anyone who has ever wondered what it would be like to part of a major Middle Eastern excavation. Working alongside professional archaeologists, conservators, illustrators and photographers, participants of the volunteer program are included in all facets of life at Pella while they live and work at the site.

In addition, excursions to some other gems of Jordanian archaeology are part of a volunteer's time at Pella as weekly trips are taken to nearby sites in the company of archaeologists who have broad experience in both Jordanian culture and its long, fascinating history.

Further information on Pella is available at the NEAF website. Please join us by registering your interest using the form available at the NEAF website.



The Near Eastern Archaeology Foundation was established at the University of Sydney in 1986 to promote research into the archaeology of the Middle East and North Africa. Activities include the annual production of the NEAF Bulletin, a lecture program and study tours. Support for research is through travel grants, fellowships, publication subsidies and field program finance.

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