Akanthou- Arkosykos , a ninth Millenium BC coastal settlement in Cyprus

Article *in* Environmental Archaeology · August 2015

DOI: 10.1179/1749631415Y.0000000018

2 authors:

Müge Şevketoğlu
Cyprus International University
13 PUBLICATIONS **73** CITATIONS
SEE PROFILE

Ian Hanson
Bournemouth University
34 PUBLICATIONS **256** CITATIONS
SEE PROFILE

Akanthou-*Arkosykos*, a ninth Millenium BC coastal settlement in Cyprus

Muge Sevketoglu and Ian Hanson

Cyprus International University, Centre for Archaeology, Cultural Heritage and Conservation, Haspolat, Cyprus

The site of Akanthou-*Arkosykos*, also known as Tatlısu-*Çiftlikdüzü*, (henceforth Akanthou) located on the north coast of Cyprus, been dated to Early Aceramic Neolithic or Cypro-PPNB/MPPNB 8200–7700 BC. It has been revealed as one of the most important early Aceramic Neolithic sites on Cyprus. Rescue excavations since 2000 were undertaken to assess the site and protect it from agricultural damage and threats from construction. The site is now a scheduled monument protected under the Antiquities law. Despite plough and other agricultural damage there is excellent preservation. The excavations have revealed six buildings of stone and mud brick architecture with round and rectilinear features and painted plastered walls and plaster floors. These are enclosed by a wide ditch to the south of the settlement. This feature contains hundreds of individual deposits reflecting the life of a sedentary community and evidence for human exploitation of marine life, domesticated plants and a variety of domestic and semi-domesticated animals. Obsidian finds numbering in excess of 4000 pieces represents the highest number of such finds from Cyprus so far. They have been demonstrated to be of central Anatolian origin and appear to have come to the site as finished products. Akanthou is 40 miles across the sea from the Anatolian mainland and is possibly a key-site that can answer questions regarding the origin of early settlers as well as early domestication and trade in Cyprus.

Keywords: Early Aceramic Neolithic (Cypro-PPNB), Akanthou/Tatlısu, Cyprus, Obsidian, architecture, plaster

The Akanthou site forms part of a sequence of sites that demonstrate the continuation of settlement across Cyprus over time. The late Aceramic Neolithic site of *Khirokitia*, dating to 7000/6800–5200 BC, (Le Brun 2001, 109) was accepted to be representative of the first human colonisation, arriving fully developed and establishing its culture on the island from an unknown location on the neighbouring mainland. Although recent research has proved this to be otherwise, *Khirokitia*, excavated for the first time in the 1930s (Dikaios 1953), still continues to protect its status as a monumental site built by a highly developed and skilled culture.

The earliest evidence of human existence on the island comes from the late Epipalaeolithic (11,000–9000 BC) collapsed rock shelter of Akrotiri-*Aetokremnos*. The discovery of the extinct endemic pigmy hippopotamus and dwarf elephant bones with man-made artefacts is radiocarbon dated (Simmons 1999; Simmons and Mandel 2007, 479; Knapp 2013, 27). Initially a controversial site due in part to the unexplained hiatus until the *Khirokitia* culture, it is now more secure as further continuity in the archaeological record has been discovered. Survey followed by excavation in both the South and North of the island in the early 1990s contributed to this process. The excavations at Pareklisha-*Shillourokambos* uncovered an earlier site, dating to the Cypro-PPNB or early Aceramic Neolithic (8400–7000/6900 cal BC; Guilaine 2011), closing the gap between *Aetokremnos* and the Khirokitia culture. Artefacts from Anatolian obsidian sources and the animal resources exploited by humans implied transport to the island and suggested capabilities of early seafaring in the Mediterranean especially between Cyprus and the surrounding mainland had been underestimated.

Another two coastal sites, known by only surface survey, *Nissi B*each and Akamas-*Aspros* have produced an assemblage of chipped stone similar to those of *Aetokremnos* (Ammerman *et al.* 2006, 19; McCartney *et al.* 2006, 51–54; Ammerman 2010, 86–88). Today, even 20 years since our views on early colonisation started to change, new evidence continues to add to the chronology and theories of colonisation. For example, excavations at the inland site of Ayia Varvara-*Asprokremnos* (Manning *et al.* 2010) have provided evidence for the possibility of 'foragers/campers, temporary visitors' who may have

Correspondence to: Muge Sevketoglu, Cyprus International University, Centre for Archaeology, Cultural Heritage and Conservation, Haspolat, 90040, Cyprus. Email: proheritage@gmail.com

DOI 10.1179/1749631415Y.0000000018

been exploiting the island's resources (Knapp 2010, 79–80). The settlements of *Shillourokambos* and *Akanthou* deserve special attention as they are the only two sites with permanent architecture and closely comparative artefactual evidence. Continuing research at *Shillourokambos* (Guilaine *et al.* 2011), Kissonerga-*Mylouthkia* (Peltenburg 2012) Akanthou-*Arkosykos* (Sevketoglu 2008) Kholetria-*Ortos* (Simmons 1996), Kritou Marottou-*Ais Giorkis* (Simmons 2005), Ayios Tychonas-*Klimonas* (Vigne *et al.* 2011, 2012) and Kalavassos-*Tenta* (Todd 2005) has generated a great source of cultural data. This is enabling scholars to re-evaluate the very important questions of human colonisation, establishment of first permanent settlements and the associated cultural evolution of this new population.

This paper presents a summary of the rescue excavations at Akanthou since 2000. Although some specialist analyses are still to be completed, the summary provides a clear account that demonstrates the importance of the site and on-going survey work to Cypriot heritage.

General site history and regional field survey

The early Aceramic Neolithic site at *Akanthou* is located on the north-eastern coast of Cyprus, at the beginning of the Karpass peninsula that stretches east towards the mainland (Fig. 1). The site's location on the coast has easy access to several natural bays, the coastal plain forested mountains and a fresh-water spring directly below the site. These are all factors which explain this early settlement's placement and the apparent flourishing of early Aceramic Neolithic life over several phases of activity. Its position just opposite the Anatolian coast, visible on a clear day, provides the possibility of direct navigation, and certainly must have attracted early colonisers (Fig. 1). Clearly the population was able to travel using currents, winds and sea going vessels (Vigne and Cucci 2005; Vigne *et al.* 2014).

The first archaeological research that reported *Akanthou* was in the 1931 Cyprus survey. This was followed by work by Anastasiou in 1945 and immediately afterwards in 1946 by P. Dikaios (Stanley Price 1979, 119). It was not until 1972 and 1973, during Stanley Price's survey that obsidian blades were recorded as surface finds. It was this record that attracted the attention of another survey project in 1996 (Sevketoglu 2000). This field survey identified two important points concerning the site. Firstly, finds of obsidian, various animal bones (especially of cattle) and picrolite pendants comparable to examples produced by the *Shillourokambos* excavations in Limassol, pushing the known archaeological chronology of the North of Cyprus back more than a thousand years. Secondly the survey revealed the extent of the threat posed by an industrial poultry farm on the site. The farm had been for some years digging very destructive trenches across the area to bury dead livestock. Agricultural ploughing has also caused considerable destruction to the topmost surviving archaeological deposits. The documentation of the destruction recorded at that time initiated rescue excavations. Work continued from 1999 until 2005 (Fig. 2) and again between 2010 and 2012 with limited resources, to assess and determine the extent of the settlement

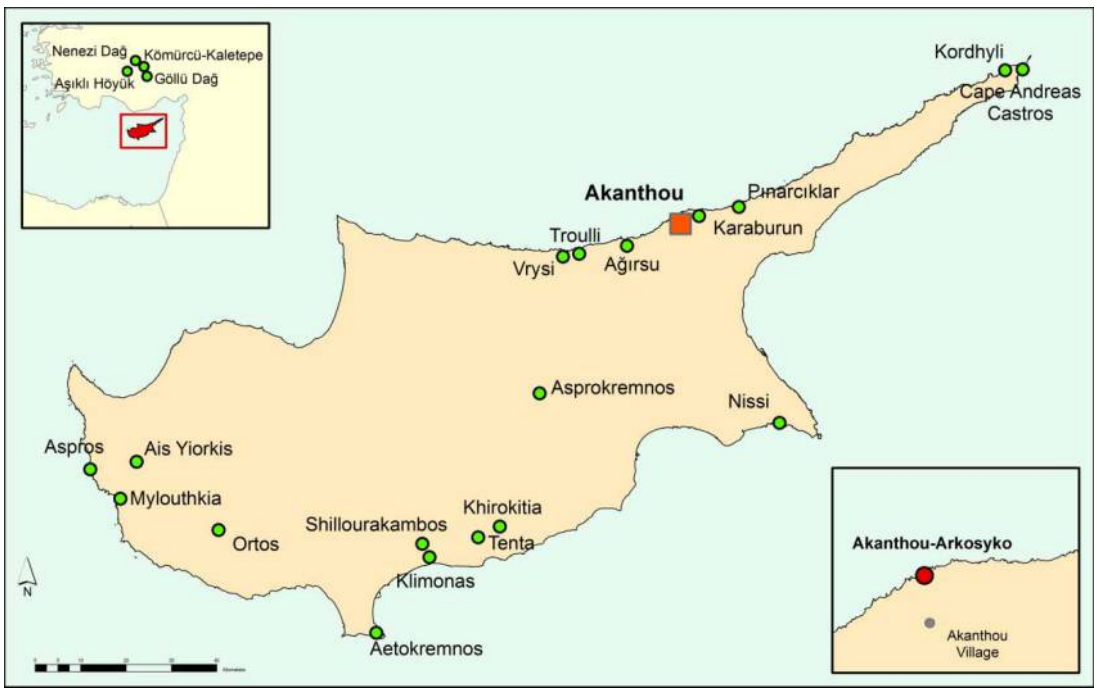

Figure 1 Map of Cyprus showing sites mentioned in the text. (By Ahmet Alemdar.)

Figure 2 Overall view of Akanthou-*Arkosykos* looking South in 2005.

site, especially in the light of the additional threat of construction, and ensure it was protected. Within a limited area of excavations and surface surveys, it has been demonstrated that the site is one of the important early settlements in Cyprus (Sevketoglu *et al*. 2004; Moore 2005; Porteus 2010).

The project in 2014 continues the assessment and the analysis of finds. The project has been successfully expanded to include a wider field survey to locate new as well as previously known sites, as the northern coastal belt is threatened by continuing development.

Regional field survey

A new field survey from 2011 to 2012 covered the coastal belt extending from the locality of Akanthou-*Yali* to the west and *Davlos* to the east. One site in *Karpass* peninsula, Cape Andreas- *Kordhyli* (Stanley-Price 1979, 123, F.27) was also included in this survey, given the destruction of Cape Andreas-*Castros.* Identification of this coastal site and recording of its visible stone architecture were crucial in order to issue a protection measure (Fig. 3). During the regional survey, 40 sites belonging to various periods were relocated and some new discoveries were made. Three prehistoric sites are noteworthy of mention here. The sites of *Mersinlik-Pınarcıklar (*Phlamoudhi-*Pygadoullia)*, Tatlısu-*Karaburun* (Akanthou-*Mavri Skala)* and Esentepe-*Ağırsu* (Ayios Amvrosios-*Gliphonera*) are three prehistoric sites with great archaeological potential; the first two were not previously recorded. *Pınarcıklar*, about 11 km to the east of the *Akanthou* site, is identical in terms of its topographic location and its surface finds including obsidian blades which, as with *Akanthou*, may be indicative of *Pınarcıklar*'s importance, like *Akanthou*, as a gateway for obsidian import into the island. Future excavations in this coastal region may clarify whether sites like *Akanthou* are unique or more frequent along the north coast (for example, like the site at Klepini-*Troulli* where obsidian has also been found; Dikaios 1962; Peltenburg 1979).

The second site, *Karaburun*, is only 2 km to the east of *Akanthou* and is rich in surface finds which include chert blades, grinding stones and polished axes. Although further intensive field walking and surface collection is planned, only test excavations can prove the date and culture of the site and assess the extent of agricultural damage. No obsidian, pottery or other small finds were available on the surface to date the site more precisely other than to indicate a pre-Bronze Age date. A further site, *Ağırsu*, located 20 km west of *Akanthou* on the coastal belt was reported in the 1996 and 1997 survey (Sevketoglu 2000, 73). It was at the time a threatened site, with building development causing significant damage, due to removal of soil. The site was originally assessed by the author to have similar architecture to that of

Figure 3 Overall view of Cape Andreas-*Kordhyli*, as pre-excavation surviving surface features. (Copyright Thomas Sagory.)

Ayios Epiktitos-*Vrysi* from the exposed sections (Fig. 4). A lack of pottery on the surface was noted (Sevketoglu 2000, 73). The site received further damage in 2007, 2010 and finally in 2012, which prompted rescue excavations carried out by the author in the same year. The site's chronology was clarified as a result of this research. The pottery and other finds recovered from the very limited sieving of removed deposits dumped at the border of the site suggested the presence of Chalcolithic and Ceramic Neolithic occupation. Although only a single sample has been sent for radiocarbon dating from one of the uppermost and apparently undisturbed deposits of the site dated to 4328–4066 cal BC (5367 ± 29 BP, OxA-27792), the evidence strongly suggests that the site spans both periods, and possibly goes back to

Figure 4 Photograph showing depth of deposit at Esentepe-*Ağırsu* (2007), with a cut through one of the Neolithic (1997).

the Aceramic Neolithic period. This demonstrates that a lack of pottery or obsidian on the surface does not mean lack of settlement, but further test excavations are necessary to define a site's chronology. Rescue work and research in the future will further define these sites, answer additional questions and provide the basis for more formal protection measures to be set in place.

The site stratigraphy and other important features at Akanthou/Tatlısu

The rescue excavations carried out between 2000–2005 and 2010–2012 were undertaken through stratigraphic excavation, identifying and excavating each deposit in sequence. These were fully recorded and planned using the single context planning system and adaptations of the Museum of London recording forms (Museum of London 1994). Excavation in spits was avoided as this was found to confuse and destroy the ability to identify stratigraphic relationships. All contexts were 100% dry sieved to maximise the retrieval of small objects, with bulk samples taken for wet sieving or other relevant analysis. Samples of specific materials such as plaster and charcoal were collected. Over 2000 archaeological contexts were identified, excavated and recorded in the nine excavation seasons, in a trench measuring 13 m × 22 m as well as from surface collection. The excavation exposed architectural and other features of settlement including plastered floors and work areas, as well as a substantial linear ditch cut into bedrock. Small finds are representative of the social and economic life at the time of early Aceramic Neolithic period in Cyprus; farming communities and the domestication of plants and animals.

Later archaeological activity at the site is represented by three distinct layers of plough soil which contained pottery from the last three millennia, and a backfilled well containing Iron Age pottery. These features were superficial, and their removal revealed a dense concentration of early Aceramic Neolithic settlement deposits under only 0·2 m of plough soil. Given the evidence of very destructive plough damage to the upper settlement deposits, any later archaeological horizons have clearly been truncated and homogenised. Currently, five broad phases of earlier archaeological deposits survive and have been identified. They are all early Aceramic Neolithic based on the types of finds and features recorded. They represent two periods of settlement occupation separated by an erosion/collapse phase, perhaps indicating abandonment or settlement-shift. These phases are:

Phase A – Settlement occupation and building material production, built over by;
Phase B – (8190–7748 BC) building collapse, erosion and rubbish layers, that covers;
Phase C – settlement occupation, which is built upon;
Phase D – an extensive plaster surface, that overlies;
Phase E – (8234–7965 BC) occupation deposits underlying the plaster surface.

Evidence for the latest Neolithic settlement (Phase A) is generally fragmentary as a result of later ploughing activity, bioturbation and natural erosion processes. The surviving deposits are mainly represented by truncated cut features of rubbish pits and post-holes. However, there are also isolated remnants of occupation: plaster floors and truncated structural remains of plaster-lined pits. They are also a series of complex features of associated post-holes, pits filled with multiple thin layers of fine lime or mud plaster and pits filled with stone and ashy deposits. These features are consistent with an activity area for the manufacture of quicklime and tempered plaster for lining pits and covering floors and walls (Fig. 5 Phase A plan). Frierman outlines the possible installation types (Frierman 1971, 213).

Exploitation of lime and plaster floors in Anatolia and Levant are well known (Garfinkel 1987, 69). The extensive use of gypsum or limestone in flooring, production of beads and 'vaiselle blanche' and in sculpting skulls in the PPNB (8700–7000 BC) has been described by Hauptmann and Yalçın (2001, 61). In Anatolia, Aşıklı's building T, with red coloured floors and their ritual function has been suggested (Yalçın and Pernicka 1999). Plaster and painted plaster are recorded in other Early Aceramic Neolithic sites in Cyprus, including *Shillourokambos* (Chazelles 2011, 622–625), *Mylouthkia* wells (Peltenburg 2012, 73) and *Tenta* (Todd 1987, 45).

The remaining intact floor surfaces and features of Phase A were built over layers of erosion and collapse (Phase B). These are formed against and over the remnants of standing walls of the preceding settlement (Phase C). There are clear examples of wall collapse, with exterior painted plaster sealed by sudden structural failure. There are also deposits of mud brick erosion, with a widening of wall bases by re-deposited mud brick run off, and formation of erosion channels in surviving wall structures. Remaining walls and mud brick collapse were homogenised by worm action. Some settlement activity continued in this phase, with hearths built and used between collapsing buildings, sealed by further wall collapse. A calibrated radiocarbon date has been established for a collection of carbonised pistachio seeds taken from one of these sealed hearths providing a date of 8190–7748 cal BC (8820 ± 38 BP, OxA-13996, Fig. 9).

The collapse and erosion covers the intact remains of settlement occupation (Phase C, Fig. 6). This is formed of six identified buildings, numbered [425, 426, 427, 561, 644, and 728]. All of these structures appear to have stood contemporaneously at least

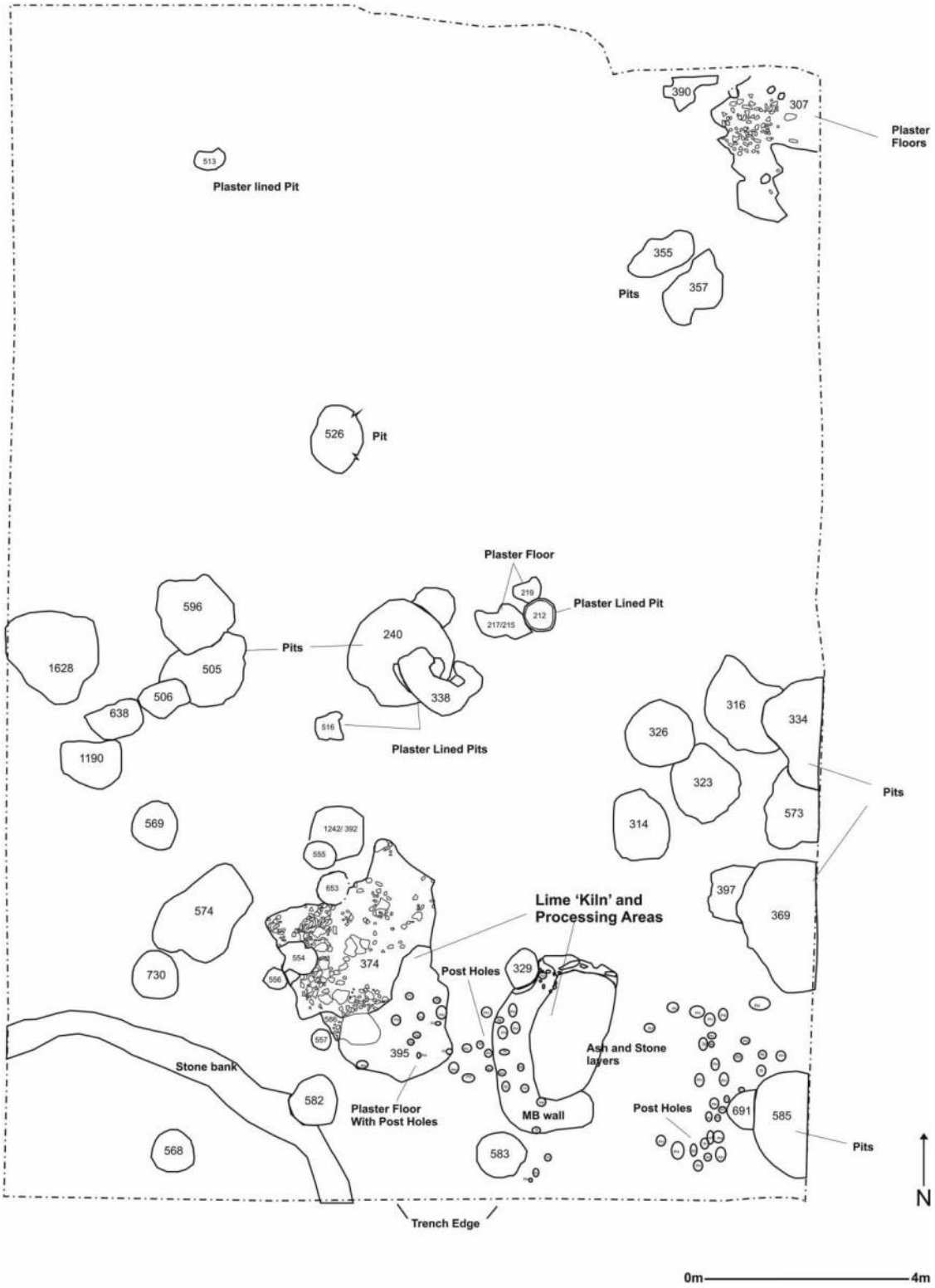

Figure 5 Plan of Phase A.

during part of their lifetime as they abut and observe each other. They were, however, constructed over time with additions built against earlier structures. Associated with the buildings were cut features, post-holes, plaster-lined pits (Sevketoglu 2006, 131, Figs. 5–7) or containers, hearths, internal occupation layers and floor surfaces within buildings. The foundations of each building were placed directly onto, or cut through, an extensive and clean plaster surface [241] that has been revealed across the whole width of the trench (Phase D). Several plaster-lined pits cut this surface and were situated in the space between buildings. Some were deliberately filled with stones and other artefacts including an antler pick and had small hearths and areas of burning associated with them. There is a complete absence of occupation

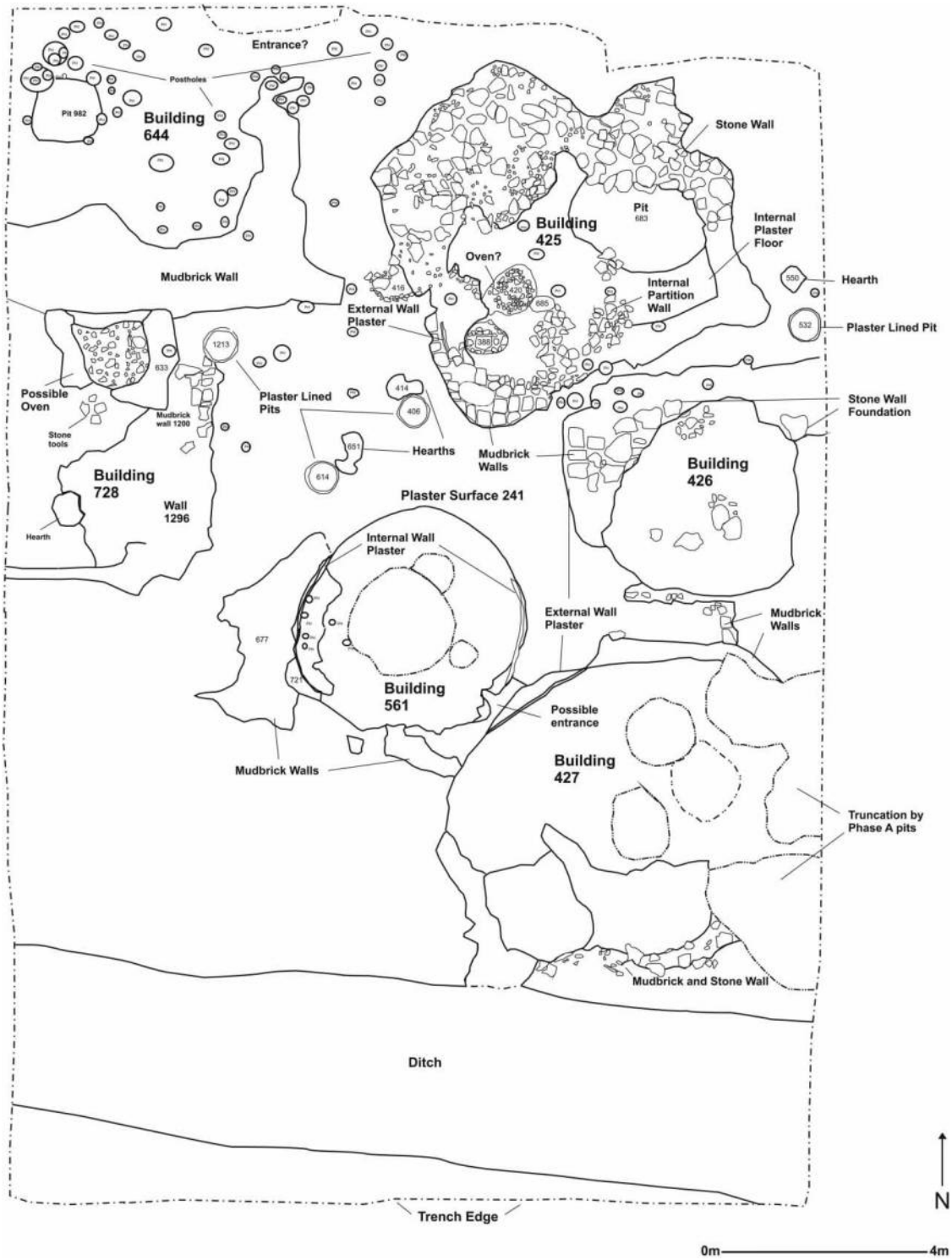

Figure 6 Plan of Phase C.

deposit build-up on the surfaces outside and under the buildings. These indicate that the spaces between buildings were used as work areas and kept clean. This is also indicated by a group of artefacts found *in situ* on the plaster surface under rapidly deposited mud brick erosion and layers of building collapse: these consisted of a boar tusk, three pieces of fallow deer antler, a smoothed stone and a piece of possible horn were recovered next to three complete obsidian blades (0.07 m in length). It is possible that this represents a tool making kit left on a ground surface, perhaps for fitting obsidian blades to hafts (Fig. 7g).

Walls of building structures [426] and [644] were built directly over backfilled plaster-lined pits set into and lipping onto the extensive plaster floor [241]; providing evidence that the surface was in use before the construction of Phase C buildings, which were then built over time. The surface seems to have been re-plastered at different times. Although natural soil and bedrock is visible in the base of some cut features

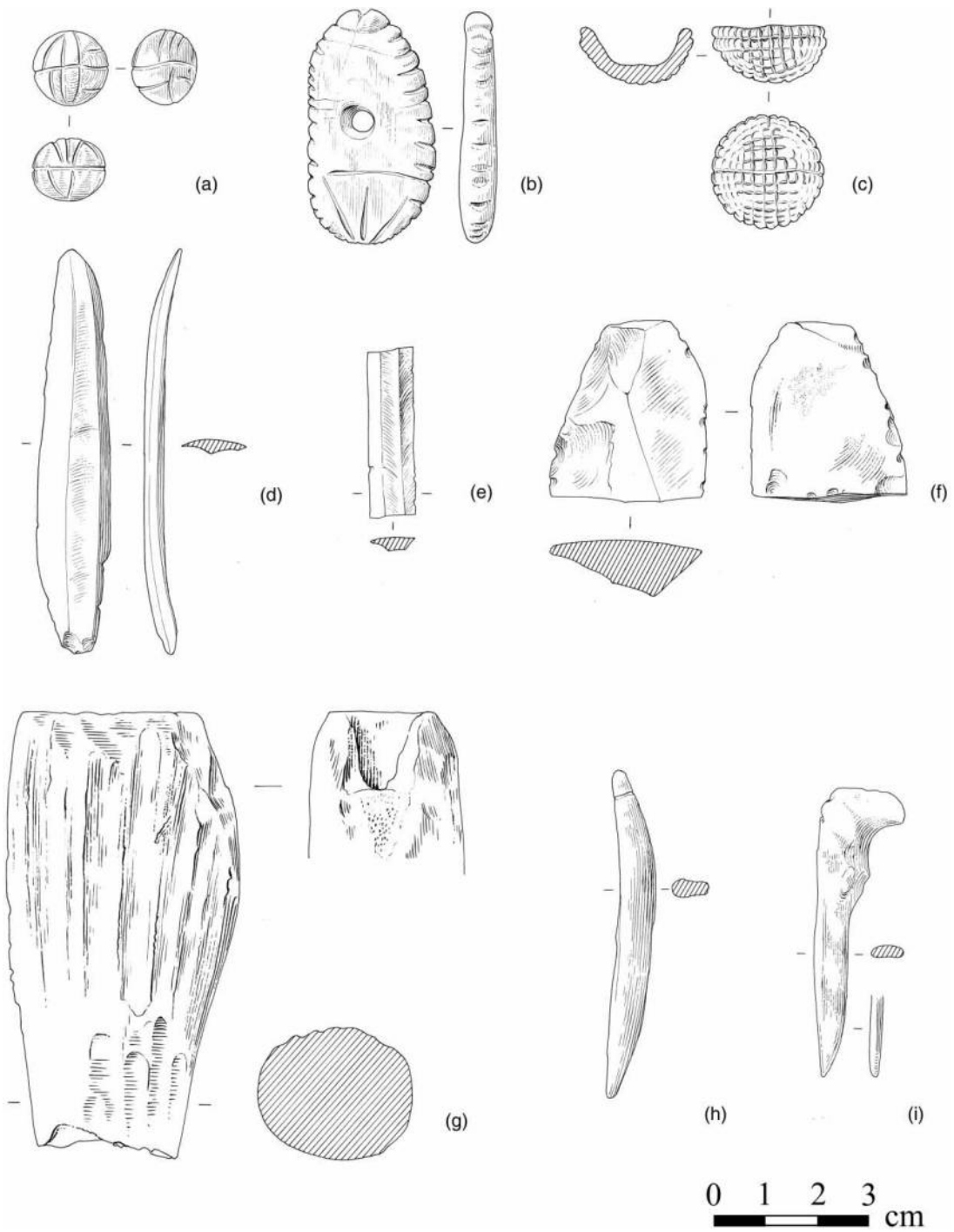

Figure 7 Selection of representations of artefacts found at Akanthou; (a) stone token, (b) possible female figure, (c) picrolite 'thimble', (d-f) selection of obsidian blades, (g) haft made from horn, (h–i) bone tools. (Illustrations by David S. Neal.)

that truncate this plaster surface at the southern half of the trench, there are archaeological deposits beneath the surface. A small trial trench dug through the surface against the section of the northern trench revealed occupation deposits (Phase E) upon which the plaster surface [241] was laid.

The plastered surface and buildings respect a linear feature, that of a wide ditch. It runs in an east-west direction across the whole trench and is substantial. It appears to have been constructed before the surface was laid and is cut through natural deposits, with no evidence of truncation of settlement deposits during its construction. It was clearly contemporaneous with several phases. The building [427] (Phase C) and the plaster surface (Phase D) appear to run up to the ditch. One of the walls of this building collapsed into the ditch during Phase B collapse/abandonment, along with a wall that appears to have lined the top of the ditch's northern edge. During Phase B, the ditch slowly filled with erosion and rubbish/occupational deposits, and so had a considerable length of use.

Architecture

Six architectural units were exposed. These six structures vary in their construction methods, material, shape and size. We can, however, categorise the majority as circular and of stone and mud brick construction. Two of these may be platforms; one has a substantial stone foundation, the other is formed by a mud brick wall that encloses sloping layers of crushed limestone and coarse plaster tipped onto the surface [241]. Two other buildings appear to have stone foundations. Others have mud brick and rough limestone mortar. All are built directly on the extensive surface [241] belonging to Phase D. There is evidence of fine wall plaster used in the interior of the buildings, fragments of which survive at the base of standing walls sealed by occupation deposits. Some exterior plaster also survives at the wall bases, and some fine plaster survives as wall collapse on the surface. Fragments also survive that are painted white, red or dark brown. These remnants were sealed *in situ* by Phase B erosion and collapse deposits. An example of a mud brick wall was cleaned and examined in detail. It formed the edge of building [427] where it abutted a later circular building [561]. The mud bricks were found to be regularly lain with coarse white plaster or gypsum mortar between each brick (Fig. 8). Courses of mud bricks were also separated by white plaster or gypsum mortar. Due to erosion, the individual sizes of the mud bricks differ, but on average they measure $0.33\ \text{m} \times 0.20\ \text{m} \times 0.10\ \text{m}$ and may show a standardisation in the production of mud bricks. A plastered floor [648] and a perpendicular mud brick abutment to the wall display an angular corner which represents a feature such as a door/threshold between the two buildings. The plaster surface on which the buildings are constructed was solid and clearly was repaired and re-plastered. In some places, the heavier foundation stones have compacted the surface. Internally, in several of the buildings, the plaster surface was removed or worn away, leaving a circle of the underlying deposits exposed. The circumference of the circle marks the line of the internal wall face.

After 10,000 years, however, the surface retains its function; it still has load bearing capacity, rain water runs off it and it is simple to sweep it clean.

The surface and settlement is built on a shallow natural red-brown soil overlying limestone bedrock. In areas where the archaeological deposits are deeper, inside the ditch and in the north-western corner of the excavation area, extensive post-holes were uncovered. Some of these are contemporaneous with the standing buildings of Phase C and some with the building material production activity of Phase A. They appear to form internal and external supports or porches in some buildings. In two buildings, entrances seem to be distinguishable, with a possible stone door/threshold or steps.

The ditch

The main focus in the 2004–2005 and 2010–2011 seasons was the identification and excavation of deposits from the large ditch running east-west across the southern edge of the excavated area. The buildings of Phase C follow the line of the ditch. Stratigraphic excavation of the ditch deposits determined the southern wall of one building [427] had slumped into and onto the accumulating deposits within the ditch, as part of the Phase B erosion, collapse or abandonment. These deposits of wall

Figure 8 Exposed mud brick wall with plaster or gypsum mortar.

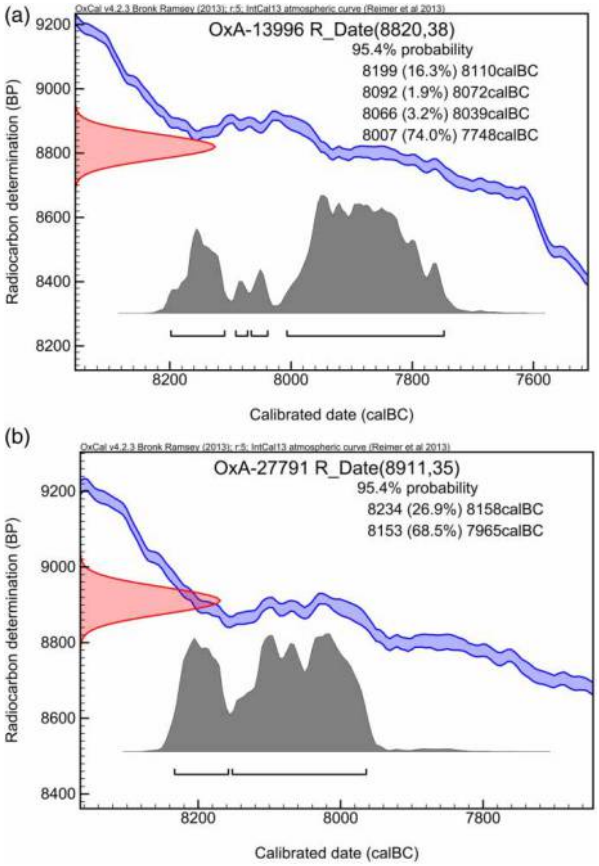

Figure 9 Radiocarbon graphs, *Akanthou* Phase B (a) and Phase E (b).

materials are more consistent with abandonment than rapid demolition, as the long sequence of deposits of mud brick and large stone collapse are interspersed and separated stratigraphically by rubbish deposits and erosion layers which must have accumulated over some time. The extent of these mud brick deposits along the length of the ditch is indicative of a wall lining its northern edge that collapsed and eroded into the ditch.

The ditch is cut into bedrock and has vertical sides. It is approximately 2 m deep, 4·5 m wide and extends beyond the width of the trench. Approximately 90 m^3 of deposits have been excavated and removed from the ditch, consisting of 700 or more identified contexts. These consist of numerous deliberate dumps of rubbish or waste deposits interspersed with washed-in erosion deposits from both sides of the ditch. In places, rain-water had formed gullies cutting these fills, and some deposit surfaces were compacted, suggesting that the ditch filled slowly and that as it filled the ditch was exposed to the elements and trampled by the inhabitants/livestock. This is also supported by the presence of a few hearths and pits dug into these surfaces. Throughout the deposits, small mud 'cocoons' were observed. These are consistent with the artefacts of earthworm aestivation. Indeed the upper ditch deposits contained a living earthworm population which were found in aestivation during summer excavation. The presence of earthworms explains layers of stones within the ditch deposits, which are an artefact of bio-turbative worm action filtering stones into layers, rather than a placement or construction. There is also evidence of numerous land snail shells in these sealed deposits, some recovered with an intact calcareous epiphragm, which is also indicative of aestivation. The lowest layers of the ditch were washed deposits with limestone inclusions and fewer artefacts. These are consistent with inundated soils washing into an empty ditch by rain action after its construction. Tool marks and cracks were found in the floor of the ditch, which may relate to its construction. These were filled with fine silt, which together with truncated pits cutting the ditch floor and a trampled soil layer suggest the ditch may have been cleaned on at least one occasion. This may equate to Phase C activity before the ditch was allowed to fill with rubbish and other deposits during Phase B abandonment. To sum up, it is clear from the archaeological evidence that the ditch deposits accumulated over a considerable amount of time. That period came to an end when the ditch was completely filled and the now level area was used for settlement and building material production activities during Phase A.

Some of the ditch deposits, which appear to have been dumped both from the north and the south sides of the ditch and accumulated centrally, were ashy and mixed. These are consistent with the redeposition of debris and rubbish from hearths or occupational contexts. They contained numerous fragmented and burnt bones, chert and obsidian blades. Numerous artefacts including obsidian have been recovered from these upper ditch fills, and the faunal assemblage includes a much higher number of articulated turtle and fish bones when compared to occupation deposits from the buildings, pits and other settlement contexts. The artefact assemblages include dumps of chert flakes indicating stone tool production, numerous antler hafts crafted to take fine obsidian or stone blades, as well as antler picks.

Ditches are also known from other sites during the entire length of the Neolithic period. Examples include early Aceramic Neolithic Kalavassos-*Tenta* (Todd 1987, 49–50) and late Neolithic Ayios-Epiktitos-*Vrysi* (Peltenburg 1982, 55–58). In order to fully understand the function of the ditch at Akanthou, total excavation of the present ditch to the bedrock within the limits of the present trench as well as a geophysical survey with GPR will be valuable. Establishing the extent and the limits of the ditch as well as establishing the variation of deposits within it, trial trenches at intervals would also be of great importance.

Artefacts

As previously mentioned, a total of 3600 obsidian artefacts excluding flakes and chips have been recorded from the excavations. Chemical analysis carried out at University of Tübingen, and stylistic assessments indicate that their provenance links them to the Kömürcü- *Kaletepe* site in Cappadocia, which was an obsidian source in the Aceramic Neolithic. This source does not come as a surprise as it has long been identified as a major supplier of obsidian in the Neolithic of Anatolia and the Near East (Renfrew *et al*. 1966; Perlman and Yellin 1980).

Obsidian is found in other early Aceramic Neolithic sites in Cyprus. These include: 429 pieces from *Shillourokambos* early Phases A and B (8400–7500 BC) from Göllüdağ (Briois *et al*. 1997; Guilaine and Briois 2006, 170–171; Briois 2011a, 663–664; Briois 2011b, 707; Gratuze and Boucetta 2011, 721–725); 8 excavated from the wells in *Mylouthkia* (Gratuze 2003, 30–35); 42 pieces from Ais Yiorkis (Melson 2010, 61) and 35 from *Tenta* (Todd 1987, 78–79), all of which are central Anatolian in origin. These sites, when compared to Akanthou with over 4000, have considerably fewer obsidian artefacts.

It seems likely that obsidian was imported as bladelets, as there is little evidence of core debris, and more than 95% of the obsidian is in the form of bladelets and not raw material or pre-formed cores (Fig. 7d–f). There is no evidence to date of core production on the site itself. This fits very well with what is known from Kömürcü-*Kaletepe*, where no bladelets have been found but all the stages of the core production are present (Balkan-Atlı and Binder 2000). This is consistent with bladelet production at Kömürcü-*Kaletepe*, with finished products being brought to Cyprus across the sea, either though trade or through the settlement population travelling some distance. The technique used to produce the *Akanthou* bladelets are also specialised, produced from a specific type of core which, up to now, has only been found in the Kömürcü-*Kaletepe* area. The *Akanthou* settlement may have had an important role as a point of import and distribution for obsidian.

The raw material for the production of flint tools come from different sources. Flint seems to have been chosen for its colour, and there are finely worked blades of fine brown, caramel, 'pink' and white flint. Sickle sheen is present on several pieces. A grey-pink flint chert forms the majority of flint flakes and blades and appears to have been knapped on site. The flint comes from local sources in the Kyrenia Mountains and is present as blades, scrapers and a few possible points. Obsidian and flint are present in all the early Aceramic Neolithic phases of the site. A number of polished stone axes have been found, as well as chisels made from picrolite, which would have most likely have been sourced from the Trodos Mountains.

Several fragments and almost complete querns have been found, as well as rubbers, one of which seems to have been used to smooth plaster. Smoothed pieces of pumice stone have also been recovered. Pounding and hammer-stones are also common. Fragments of stone bowls have been found in Phase C occupation contexts, one of which shows repair (drilled holes). A 'hollowed' stone was also recovered from a wall partition that contained pigment, and may have been used to mix paint. Small blocks of red ochre have also been recovered which are worn from abrasion. These may represent sources of pigment for the paint found on the fine wall plaster fragments recovered from deposits of collapse in Phase B.

Other small finds that are under study include, bone tools such as fishhooks, pins, awls and needles (Figs. 7h and 8i); beads, made from both shell and stone; incised picrolite thimbles (Fig. 7c), rings and round stone tokens (Fig. 7a); possible human figure pendants (Fig. 7b) and pumice. Two pumice artefacts, one in a shape of a small axe and another with abrasion on one side, are materials commonly found in volcanic areas, such as the region from which obsidian was brought into Cyprus. They can be also collected in Cyprus especially along the coast of Kormakiti, clearly washed on the beach from a volcanic source in the Mediterranean, perhaps Thera. However, it is also possible (further analysis will determine this) that these two artefacts were transported with obsidian as they both occur at the same source. From their size and abraded surface their uses can be explained for smoothing surfaces like plaster, bone tools and even perhaps as a tool for the preparation of animal skins. Further artefact studies will throw light on this material.

Faunal and human remains

Interestingly, a number of individual disarticulated human bones and bone fragments have been found in the ditch fills. These comprised exclusively of teeth, cranial and mandibular fragments, vertebrae and the smaller bones of the hands and feet. Several were from sub-adults. These skeletal elements are typical of what can be left when a buried body is moved or collected after decay of soft tissues is completed. They were found in both erosion and domestic rubbish deposits. Many were located in deposits immediately to the south of the building [427], which sits on the northern edge of the ditch. The remains were both in erosion deposits and dumps of domestic rubbish which spread along the whole length of the ditch. The assemblage represents selective parts of

the skeleton and its distribution is spatially limited in depth, being present in the upper half of the ditch. No human remains have been found anywhere else, such as under internal building floors or occupation layers. Whether this marks out building [427] or this area of the ditch for some charnel purpose cannot be determined with any certainty, as there are no intact structural or artefactual indicators within the building or elsewhere in the excavated area to indicate this. The lack of graves at *Akanthou* is similar to findings at *Shillourokambos* (Le Mort *et al.* 2011); however, less than 5% of the Akanthou site has been excavated. Further data are necessary to comment on general attitudes towards disposal of the dead in Cyprus during this period.

The faunal remains have undergone a very preliminary assessment, based on analysis of the faunal assemblage from 26 contexts across the phases. Most of the bones analysed from the plough soil (90%) are too fragmented to be identified. Their preservation in other contexts was reasonable. Each bone was fully assessed and recorded, and where possible the taxon, body part, age, measurements, pathologies and taphonomic information were recorded, so that complete statistical and intra-phase and context analyses could be further undertaken. Species present include fallow deer, cattle, sheep/goat, pig, dog, fox, cat, turtle, fish (including large deep-sea fish), and small mammals such as mice (Frame 2002).

Fallow deer appear to be the most common species, followed by sheep/goat. These three species comprise 79% of the mammal bones (Table 1). Pig bones are fairly common and cattle bones are rare (Frame 2004).

The fallow deer are represented by individuals of all ages, but with a majority of sub-adult and adult specimens. Hunting tends to preferentially select the largest, adult animals. Sheep and goat are mostly juvenile, culled just about when they were attaining full size, indicative of patterns seen in domestic herd assemblages. These patterns may suggest that sheep and goat were domesticated animals, while the fallow deer were hunted.

Initial indications at present are that the sheep at *Akanthou* are related to the modern Cypriot mouflon. It seems therefore that the settlement herded animals similar to mouflon as well as goats, cattle and probably pigs. At the same time, they relied heavily on hunted resources including fallow deer, turtle and fish to supplement their diet.

Radiocarbon dates of Akanthou/Tatlısu

In 2012 excavation season, among the carbonised botanical remains discovered at *Akanthou* of probably the oldest known olive stone (*Olea europaea)* found on the island has also been identified by Andrea Pares. The olive stone was dated by the Oxford Radiocarbon Accelerator Unit to 8234–7965 cal BC (8911 ± 35 BP, OxA-27791; Fig. 9). Together with the date range provided by carbonised pistachio (*Pistacia terebinthus*) seeds from Phase B, the date range for the earliest settlement phases of the site sits firmly in the early Aceramic Neolithic period, being 8234–7748 cal BC (8911–8820 BP).

Table 1 Relative number of mammalian taxa by percentage (after Frame (2004))

	% DZs	%NISP
Cattle	3.5	2.2
Fallow deer	39.5	45.0
Pig	14.2	17.0
Sheep/goat	21.6	26.9
Sheep	16.5	6.2
Goat	2.2	0.9
Dog	1.3	0.6
Fox	1.1	1.1

Conclusion

The Akanthou site is extremely rich in architectural structures, surfaces, installations and artefacts, revealed through stratigraphic excavation. It is exceptional in Cyprus in terms of the breadth of types and numbers of early Aceramic Neolithic artefacts and the quality of surviving plaster and mud brick structures. The excavation of the ditch has further demonstrated the richness of this site as a unique early Aceramic Neolithic coastal settlement within the Eastern Mediterranean region. The radiocarbon dates so far obtained are contemporary with *Shillourokambos*, phase Ancien B and C (Guilaine 2011, 580). The first radiocarbon dates place the settlement firmly in the early Aceramic Neolithic Period.

Analysis of the samples of mud brick, plaster, ash and soils has yet to be completed, but demonstrate exploitation of plant crops and foods. Initial analysis of the faunal remains has also been initiated with the preliminary results showing domestication and exploitation of wild food sources both marine and from the land.

The Anatolian origin of the obsidian confirms the inhabitants of the island in the ninth millennium had open avenues of supply. That worked obsidian appears to have been transported as a finished product from available sources across the sea to the island indicates active exchange networks and/or the ability to travel extensively. The quantity and the pervasive presence of obsidian in contexts of all phases indicate consistent availability over time.

The other site contemporary with Akanthou, *Shillourokambos*, presents similar evidence for another early Cypriot Aceramic Neolithic settlement, from ritual to industries to animal and plant domestication. Akanthou and *Shillourokambos* have

similarities in artefact types such as picrolite tokens and obsidian, but there are also differences, which mean that comparison between the sites may contribute further to our understanding of the PPNB or early Aceramic Neolithic life in the ninth millennium BC Cyprus. The ongoing protection and investigation of Akanthou by further defining the surviving settlement and the surrounding landscape is a priority, as is the continuing analysis of the artefacts and samples to further define the unique status of the site as part of the Cypriot heritage.

Acknowledgments

We would like to dedicate this article to the memory of our valued team member, Lothar Herling, who undertook the lithics analysis and who will always be missed. We are much indebted to the editor for her patience, and to the referees for their input. Initial rescue excavations were funded and supported by the Eastern Mediterranean University, whose archaeology students were trained on the excavation to support the assessment. The backbone of the team consisted of Joe Partridge, Peter Moore and Sarah Porteus who contributed tremendously to the supervision, interpretation, training of students and reporting. We cannot thank them enough, along with all volunteers who have supported the project. Many thanks to John Martin for his technical support for the wet sieving process. Special thanks go to colleagues and friends Dr David S. Neal, Ahmet Alemdar, and Thomas Sagory who produced supporting figures for this article. Our thanks due to Dr Rıza Tuncel for reading through the text and making valuable comments and corrections. The mayor of Tatlisu (Akanthou) Mr Hayri Orcan provided considerable logistic support for the work, including buildings used for the excavation and post-excavation work. In 2010–2013, funding was received for further research on Akanthou from TÜBİTAK (The Scientific and Technological Research Council of Turkey) and supported by the Centre for Archaeology, Cultural Heritage and Conservation at the Cyprus International University.

References

Ammerman, A. J. 2010. The first argonauts: towards the study of the earliest seafaring in the Mediterranean, pp. 81–92 in Anderson, A., Barret, J. H. and Boyle, K. V. (eds.), *The Global Origins and Development of Seafaring*. Cambridge: McDonald Institute for Archaeological Research.

Ammerman, A. J., Flourenzos, P., McCartney, C., Noller, J., Sorabji, D. 2006. The new early sites on Cyprus. *Report of the Department of Antiquities*, Cyprus, 1–22.

Balkan-Atlı, N., Binder D. 2000. L'attelier neolithique de Kömürcü-Kaletepe: fouilles de 1999. *Anatolia Antiqua* **VIII**, 199–214.

Briois, F. 2011a. Les industries lithique du néolithique précéramique, Shillourokambos, pp. 663–687 in Guilaine, J., Briois, F. and Vigne, J.-D. (eds.), *Un établissement néolithique pré-céramique à Chypre*. Paris: Éditions Errance, Ecole Française d'Athènes.

Briois, F. 2011b. Les industrie en obsidienne de la phase ancien du Secteur 1., Shillourokambos, pp. 707–743 in Guilaine, J., Briois, F. and Vigne, J.-D. (eds.), *Un établissement néolithique pré-céramique à Chypre*. Paris: Éditions Errance, Ecole Française d'Athènes.

Briois, F., Gratuze, B., Guilaine, J. 1997. Obsidiennes du site néolithique précéramique de Shillourokambos (Chypre). *Paléorient* **23**(1), 95–112.

Chazelles, C.-A. 2011. Etude et interpretations des fragments de constructions en terre crue recueillis dans le secteur 1, pp. 649–662 in Guilaine, J., Briois, F. and Vigne, J.-D. (eds.), *Un établissement néolithique pré-céramique à Chypre*. Paris: Éditions Errance, Ecole Française d'Athènes.

Dikaios, P. 1953. *Khirokitia*. Monograph of the Department of Antiquities, Government of Cyprus, 1. London: Oxford University Press.

Dikaios, P. 1962. The Stone Age, pp. 1–204 in Dikaios, P. and Stewart, J. R. (eds.), *Swedish Cyprus Expedition* IV:IA: Lund.

Frame, S. 2002. Island Neolithics: animal exploitation in the Aceramic Neolithic of Cyprus, pp. 233–238 in Waldren, W. H. and Enseyat, J. A. (eds.), *World Islands in Prehistory, International Insular Investigations, V Deia International Conference of Prehistory*. British Archaeolological Reports, International Series 1095, Archeopress, Oxford England.

Frame, S. 2004. Animal Bones, Preliminary Result 2004: Report on Tatlısu/Akanthou Rescue Excavations 2004 Season. Unpublished Report.

Frierman, J. D. 1971. Lime burning as the precursor of fired ceramics. *Israel Exploration Journal* **21**, 212–216.

Garfinkel, Y. 1987. Burnt lime products and social implications in the Pre-Pottery Neolithic B villages of the Near East. *Paleorient* **13/1**, 69–76.

Gratuze, B. 2003. Provenance study of eight obsidian artefacts excavated from wells, pp. 30–35 in Peltenbug, E. J. (ed.), *The Colonisation and Settlement of Cyprus: Investigations at Kissonerga-Mylouthkia, 1976–1996*, Studies in Mediterranean Archaeology, 70:4. Sävedalen: Paul Åströms Förlag.

Gratuze, B. and Boucetta, S. 2011. etude Diachronique de L'approvisionnement en Obsidienne au cours de la Phase D'occupation Ancienne (Secteur 1), pp. 721–725 in Guilaine, J., Briois, F. and Vigne, J.-D. (eds.), *Shillourokambos Un établissement néolithique pré-céramique à Chypre*. Paris: Éditions Errance, Ecole française d'Athènes.

Guilaine, J. 2011. Shillourokambos: Les datations radiocarbon du sector 1, pp. 579–582 in Guilaine, J., Briois, F. and Vigne, J.-D. (eds.), *Shillourokambos Un établissement néolithique pré-céramique à Chypre*. Paris: Éditions Errance, Ecole française d'Athènes.

Guilaine, J. and Briois, F. 2006. Shillourokambos and the Neolithisation of Cyprus: some reflections. *Eurasian Prehistory*, Harvard, **4**(1–2), 159–175.

Guilaine, J., Briois, F. and Vigne, J.-D. 2011. *Shillourokambos Un établissement néolithique pré-céramique à Chypre*. Paris: Éditions Errance, Ecole française d'Athènes.

Hauptmann, A. and Yalçın, Ü. 2001. Lime plaster, cement and the first puzzolanic reaction. *Paleorient* **26/2**, 61–68.

Knapp, A. B. 2010. Cyprus's earliest prehistory: seafarers, foragers and settlers. *Journal of World Prehistory* **23**, 79–120.

Knapp, A. B. 2013. *The Archaeology of Cyprus. From Earliest Prehistory through the Bronze Age.* Cambridge World Archaeology. New York, USA: Cambridge University Press.

Le Brun, A. 2001. At the other end of the sequence: the Cypriot Aceramic Neolithic as seen from Khirikitia, pp. 109–118 in Swiny, S. (ed.), *The Earliest Prehistory of Cyprus: From Colonisation t Exploitation*. Cyprus American Archaeological Research Institute Monograph 2. American Schools of Oriental Research, Boston, MA.

Le Mort, F., Duchesne, S., Crubézy, E. 2011. Les Pratiques Funeraries, pp. 1093–1118 in Guilaine, J., Briois, F. and Vigne, J.-D. (eds.), *Un établissement néolithique pré-céramique à Chypre*. Paris: Éditions Errance, Ecole Française d'Athènes.

Manning, S. W., McCartney, C., Kromer, B., and Stewart, S. T. 2010. The Earlier Neolithic in Cyprus: recognition and dating of a Pre-Pottery Neolithic A occupation. *Antiquity* **84**, 693–706.

McCartney, C., Manning, S. W., Sewell, D.A. and Stewart, S. T. 2006. Elaborating Early Neolithic Cyprus (EENC), *Report of the Department of Antiquities*, Cyprus, 39–62.

Melson, M. M. 2010. *Trade and exchange in the Neolithic Near East: Implications of obsidian remains from Ais Yiorkis, Cyprus*. UNLV Theses/Dissertations Paper 873. Las Vegas.

Moore, P. 2005. Tatlısu Excavation Season 2005: Interim Report. Unpublished report.

Museum of London Archaeology Service 1994. *Archaeological Site Manual* (3rd edn). London: Museum of London.

Peltenburg, E. 1979. Troulli reconsidered, pp. 28–55 in Karageorgis, V. et al. (eds.), *Studies Presented in Memory of Porphyros Dikaios* XIII. Nicosia: Lion's Club of Nicosia (Cosmopolitan).

Peltenburg, E. 1982. *Vrysi: A Subterranean Settlement in Cyprus*. Warminister: Aeis and Philips.

Peltenburg, E. 2012. East Mediterranean water wells of the 9th–7th millennium BC, pp. 69–82 in Klimscha, F., Eichmann, R., Schuler, C. and Fahlbusch, H. (eds.), *Wasserwirtschaftliche Innovationen im archaologischen Kontext. Von den prahistorischen Anfangen bis zu den Metropolen der Antike*. Forschungscluster 2. Innovationen: technisch, sozial. Rahden/Westf.: Leidorf.

Perlman, I. and Yellin, J. 1980. The provenience of obsidian from Neolithic sites in Israel. *Israel Exploration Journal* **30**, 83–88.

Porteus, S. 2010. *Interm Report on the Tatlısu-Çiftlikdüzü Excavation Season 2010*. Unpublished report.

Renfrew, C., Dixon L., Cann, J. 1966. Obsidian and early cultural contact in the Near East. *Proceedings of the Prehistoric Society* **32**, 30–72.

Sevketoglu, M. 2000. *Archaeological Field Survey of the Neolithic and Chalcolithic Settlements Sites in Kyrenia District, North Cyprus*. BAR International Series 834. Oxford: John and Erica Hedges Ltd.

Sevketoglu, M. 2006. Anatolia and Cyprus relations in the 9th Millenium B.C. Akanthou (Tatlısu) Rescue Excavation. *Anadolu/Anatolia* **30**, 119–136.

Sevketoglu, M. 2008. Early Settlements and procurement of Raw Materials. New Evidence based on research at Akanthou-*Arkosykos* (Tatlisu-*Ciftlikduzu*), Northern Cyprus. *TUBA-AR, Turkish Academy of Sciences Journal of Archaeology*, **XI**, 63–72.

Sevketoglu, M., Hanson, I. and Partridge, J. 2004. *2004 and 2005 Report on Excavations at the Pre-Ceramic Neolithic Settlement Site of Akanthou-Arkosyko/Tatlısu-Ciftlikduzu*, Cyprus. Unpublished Report.

Simmons, A. 1996. Preliminary report on multidisciplinary investigations at Neolithic Kholetria *Ortos*, Paphos district. *Report of the Department of Antiquities*, Cyprus, 29–44.

Simmons, A. H. 1999. *Faunal Extinction in an Island Society: Pygmy Hippopotamus Hunters of Cyprus*. International Contributions to Archaeology. New York: Kluwer Academic Plenium.

Simmons, A. H. 2005. Ais Yorkis, an upland Aceramic Neolithic site in Western Cyprus: progress report of the 2003 excavations. *Report of the Department of Antiquities*, Cyprus, 23–30.

Simmons, A. H. and Mandel, R. 2007. Not such a new light: a response to Ammerman and Noller. *World Archaeology* **39**, 475–482.

Stanley Price, N. P. 1979. *Early Prehistoric Settlements in Cyprus. A Review and Gazeteer of Sites, c.6500-3000 B.C*. British Archaeological Reports, International Series 65, Oxford.

Todd, I. A. 1987. *Excavations at Kalavassos-Tenta I, Vasilikos Valley Project 6*. Studies in Mediterranean Archaeology, 71(6), Göteborg, Sweden: Paul Aströms Förlag.

Todd, I. A. 2005. *Excavations at Kalavassos-Tenta. Vassilikos Valley Project 7*. Studies in Mediterranean Archaeology 71(7). Savedalen, Sweden: Paul Aströms Förlag.

Vigne, J.-D., Briois, F., Zazzo, A., Carrere, I. Daujat, J. and Guilaine, J. A. 2011. New early Pre-Pottery Neolithic site in Cyprus: Ayios Tychonas-*Klimonas* (ca. 8700 cal B.C.). *Neo-Lithics* **1/11**, 3–18.

Vigne, J.-D., Briois, F., Zazzo, A., Willcox, G., Cucchi, T., Thiebault, S., Carrere, I., Franel, Y., Touquet, R., Martin, C., Moreau, C., Comby, C., Guilaine, J. 2012. First wave of cultivators spread to Cyprus at least 10,600 y ago. *PNAS* **109**(22), 8445–8449.

Vigne, J.-D., and Cucci, T. 2005. Premieres navigations au Prosche-Orient: les informations indirectes de Chypre. *Paleorient* **31**(1), 186–194.

Vigne, J. D., Zazo, A., Cucchi, T., Carrere, I., Briois, F. and Guilaine, J. 2014. The Transportation of mammals to Cyprus sheds light on early voyaging and boats in the Mediterranean Sea. *Eurasian Prehistory* **10**(1–2), 157–176.

Yalçın, Ü. and Pernicka, E. 1999. Frühneolithische Metallurgie von Aşıklı Höyük, pp. 45–54 in Hauptman, A., Pernicka, E., Rehen, T., Yalçın, Ü. (eds.), *The Beginnings of Metallurgy*. Bochum: Der Anschnitta.