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**Post-Capsian occupation in the eastern Maghreb:  
implications of a revised chronological assessment for the  
adult burial at Aïn Mistehyia**

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## **Abstract**

The 1973-6 excavations at Aïn Misteheyia, a Capsian site in eastern Algeria, revealed an archaeological sequence dated between 9500 and 6000 calBP with evidence for technological and subsistence change coeval with what we now know to be the 8200 event. A human burial from the lowest levels at the site which are dated on land snail shell to at least 9000 calBP, is dated twice on collagen, run 30 years apart by different laboratories using different methods, to 5000 calBP. New TL/OSL dates on fired clay and quartz grains from land snail shell fillings from the upper 50cm of the deposits, show that this burial is contemporaneous with those upper levels and is therefore intrusive, despite any stratigraphic proof. The burial provides clear evidence for post-Capsian use of the site and for previously undocumented mid-Holocene (Neolithic?) groups in the region, suggesting a need to reassess the cultural sequence for the history of human occupation in the eastern Maghreb.

## **Resumé**

Les fouilles de 1973-6 dans le gisement Capsien de Aïn Misteheyia, en Algérie orientale, ont fourni une séquence archéologique datée entre 9500 et 6000 calBP mettant en évidence des changements de technologie et de subsistance synchrones de l'événement climatique de 8200 calBP. Une inhumation dans les niveaux les plus profonds, datés à partir de coquilles d'escargot d'au moins au 9000 calBP, a fait l'objet d'une nouvelle datation à partir du collagène des ossements. Le nouveau résultat remonte à 5000 calBP au moins. Ce résultat survient 30 ans après la première datation à partir du collagène et les deux datations a été obtenu par différents laboratoires fonctionnant avec différentes méthodes. Les nouvelles analyses de TL/OSL sur des fragments d'argile cuite et sur des grains de quartz contenus à l'intérieur des coquilles d'escargot provenant des dépôts supérieurs (50cm), prouvent que cette inhumation est contemporaine de ces niveaux supérieurs, elle est donc intrusive, en dépit de l'absence de preuve stratigraphique. L'inhumation prouve de façon incontestable l'usage post-Capsien de l'emplacement durant l'Holocène moyen, période qui n'était encore pas documentée (néolithique ?) dans la région. Le besoin de réévaluer la séquence culturelle s'impose pour comprendre l'histoire de l'occupation humaine dans cette région du Maghreb oriental.

## Introduction

New research on, and recent reviews of, the Neolithic in the Maghreb show that we know a great deal more about what happened in some areas than in others. The earlier work in Morocco of Gilman (1975) has now been expanded and elaborated upon (Linstädter 2008, Manen *et al.* 2007 both with extensive references), whereas Roubet's pioneering work in the Aurès region of Algeria (1979, 2006) has not led to much in the way of further investigation. We know more about what happened to the south in the Sahara than in eastern Algeria and southern Tunisia (e.g. Aumassip 2006).

We have a reasonably good understanding of Capsian settlement and subsistence patterns between about 9000 and 6000 calBP (e.g. Lubell 2001). We know that the 8200 cold event (Alley & Ágústsdóttir 2005) had effects on the environment and, therefore, potentially on human populations in the Maghreb (e.g. Jackes & Lubell 2008) although this is not clear in all types of data (e.g. Zielhofer and Linstädter 2006). However, detailed knowledge regarding succeeding occupations in the eastern Maghreb (usually called the Neolithic of Capsian Tradition, see Roubet 2001) is limited to a single site, Grotte Capéletti. There is a dearth of well controlled archaeological data for post-Capsian occupations – the situation is summarized by Linstädter 2008: 58):

Around 5 ka calBC, the Capsian transforms into the so-called Neolithic with Capsian Tradition (NTI) [sic.]. This transition takes place under the influence of the neighbouring Neolithic cultures, the Mediterranean Neolithic in the northwest and the Saharan Neolithic in the south. How this process developed in detail needs further investigation.

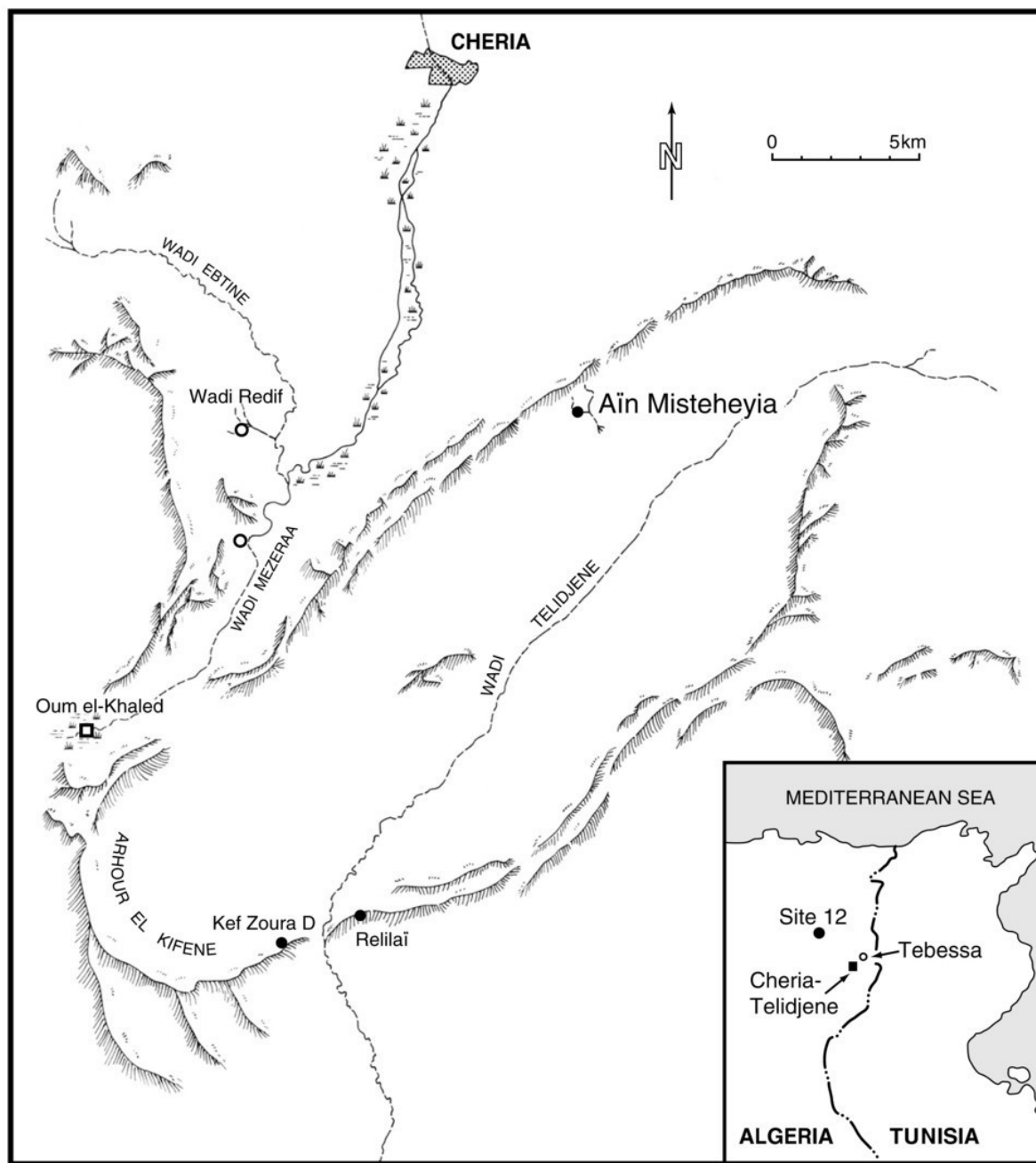
In this paper we make a small contribution towards better understanding the mid to late Holocene prehistory of the eastern Maghreb. The data we present here are unfortunately less than adequate for a full picture, but they do provide the basis for a preliminary view.

## The Aïn Misteheyia burial

In 1976, we excavated an adult human burial, Aïn Misteheyia H1, in the lowest levels of an open-air Capsian site in the Télijdène Basin, eastern Algeria (Fig. 1). The skeleton was analyzed and published (Meiklejohn *et al.* 1979) as were details of the excavations (Lubell *et al.* 1975, 1976, 1982-83; Jackes & Lubell 2008)<sup>1</sup>.

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<sup>1</sup>Capsian sites are most often called *escargotières* due to the enormous quantities of land snail shells found in the deposits, but a more correct term is *rammadiya* from the Arabic for ash (*ramad*) which is actually the most abundant component (Gobert 1937). Capsian burials are common, often occurring in large numbers (e.g. Camps-Fabrer 1975; Pond *et al.* 1938) although single burials of both adults and non-adults are frequent. Burial practices varied and some included post-burial manipulation (Jackes & Lubell in prep.)



● Archaeological site ○ Geological section ■ Pollen core

**Fig. 1: Location of Aïn Misteheyia as well as other sites and localities discussed in the text.**

The site of Aïn Misteheyia is firmly dated by twelve radiocarbon analyses on land snail shell to between 9000 and 6000 bp (~10,100 to 7400 calBP: Table 1) making it equivalent to other Capsian sites such as Medjez II (Camps-Fabrer 1975), and especially to Kef Zoura D in the same valley with an almost identical archaeological sequence (Jackes & Lubell 2008). However, collagen extracted from a rib of H1, analyzed in 1977 at the National Physical Research Laboratory in Pretoria, was dated at  $5000 \pm 220$  bp (~5730 calBP: Pta-MC1225). Given the stratigraphic position of the burial in a pit dug into the sterile substrate beneath the deepest part of the deposits, this date has been deemed problematic, especially given the date of  $9130 \pm 150$  bp on land snail shell associated with the skeleton (Table 1).

In Meiklejohn *et al.* (1979: 411), we argued that Pta-MC1225 had to be considered unreliable because “the sample of rib was probably too small for an accurate date” – the analysis was a conventional one, not AMS – and the inconsistency remained unresolved. Nothing observed during excavation, or in the data coming from the extensive geoarchaeological analyses conducted afterwards, indicated that the burial was intrusive. The evidence to be presented here will suggest that the burial was indeed post-Capsian.

Following publication, we returned Aïn Misteheyia H1, along with the lithic artefacts and faunal assemblage from the excavations, to the Centre de Recherches Archéologiques, Préhistoriques et Ethnographiques (now CNRPAH, see [www.cnrpah.org](http://www.cnrpah.org)) in Algiers. However, we kept a few bone fragments for possible future analyses and in 2005, as part of a research project analyzing the stable isotopes and aDNA of early to mid-Holocene human remains from the western Mediterranean, we asked Dr. S. Garvie-Lok (Anthropology, University of Alberta) to extract a new collagen sample from another rib fragment. This collagen was dated by AMS to  $4890 \pm 80$  bp (~5600 calBP: TO-12194) and is statistically identical ( $t = 0.2208$  at  $p = .05$ ) to the Pretoria result despite having been analyzed 30 years apart, using different methods and at laboratories on different continents. The pooled mean of  $4902.85 \pm 75.18$  is equivalent to a  $1\sigma$  range of 5587-5723 calBP<sup>2</sup> or some 3500 years later than the shell dates for the levels in which the skeleton was buried.

The two collagen dates raise a number of questions: (i) Are the shell dates for Aïn Misteheyia inaccurate? (ii) Is there evidence for post-Capsian (Neolithic?) occupation at Aïn Misteheyia? (iii) Did we miss evidence for an intrusive mid-Holocene burial? (iv) Are there other Capsian sites in which there are similar situations? (v) If the Aïn Misteheyia skeleton is, indeed, mid-Holocene, what are the implications for our understanding of Capsian and post-Capsian occupation in the region?

### **Are the shell dates for Aïn Misteheyia inaccurate?**

The series of land snail shell dates for Aïn Misteheyia is for the most part internally consistent (Table 1, Fig. 2). In a site with such highly deflated and compacted deposits, in which stratigraphic distinctions were often difficult to follow (Lubell *et al.* 1982-83: 60-63), we can

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<sup>2</sup>Calculated using CALIB Rev. 5.0.1. (Reimer *et al.* 2004, Stuiver and Reimer 1993).

Sample <sup>a</sup>	Lab #	Sample material <sup>c</sup>	Years bp 5568 ½ life	1σ range years calBP	-δ <sup>14</sup> C	δ <sup>13</sup> C	δ <sup>15</sup> N
Aïn Mistehyia H1	Pta-MC1225	hc	5000 ± 200	5475-5993		-18.7	nd
Aïn Mistehyia H1	TO-12194	hc	4890 ± 80	5488-5726		-17.74	13.34
AM: J9x 40-45	I-7690	sh	7280 ± 115	7275-7480 <sup>d</sup>	596 ± 6		
AM: L9n 48-55	I-9782	sh	7640 ± 115	7580-7790 <sup>d</sup>	614 ± 6		
AM: K10w 50-60	I-9781	sh	7725 ± 120	7670-7860 <sup>d</sup>	618 ± 6		
AM: J9x 80-90	I-8378	sh	8835 ± 140	8680-9040 <sup>d</sup>	667 ± 6		
AM: M8e&n 90-100	I-9783	sh	7990 ± 125	7930-8170 <sup>d</sup>	630 ± 6		
AM: L11n 95-105	I-9784	sh	8125 ± 125	8010-8215 <sup>d</sup>	636 ± 6		
AM: J9x 125-135	I-7691	sh	9280 ± 135	9290-9560 <sup>d</sup>	685 ± 5		
AM: M10s 130-140	I-9785	sh	9430 ± 150	9480-9820 <sup>d</sup>	691 ± 6		
AM: K9x 140-145	I-9786	sh	9615 ± 155	9690-9960 <sup>d</sup>	698 ± 6		
AM: K8x140-150 (from burial)	I-9826	sh	9130 ± 150	9190-9480 <sup>d</sup>	679 ± 6		
AM: K12x 145-150	I-9824	sh	9805 ± 160	9890-10300 <sup>d</sup>	705 ± 6		
AM: K10n 150-155	I-9825	sh	9590 ± 155	9600-9940 <sup>d</sup>	697 ± 6		
Site 12: skeleton 3A-2	TO-12195	hc	7890 ± 100	8591-8973		-19.06	6.93
Site 12: skeleton 3A-7	TO-12196	hc	3090 ± 160	3069-3472		-23.99	9.02
Site 12: Trench A, Level III <sup>b</sup>	SMU-1132	ch	7330 ± 390	7753-8539		-23.8	nd
Site 12: Trench A, Level IV <sup>b</sup>	SMU-1135	ch	7780 ± 250	8385-8979		nd	nd

**Table 1: Radiocarbon dates for Aïn Mistehyia and Site 12.**

<sup>a</sup> n = north wall, s = south wall, e = south wall, w = west wall, x = during excavation

<sup>b</sup> Samples retrieved from collections held at the Logan Museum, Beloit College (Sheppard 1987: 272).

<sup>c</sup> Abbreviations for sample material: hc = human collagen, sh = land snail shell, ch = charcoal

<sup>d</sup> Calibrated after subtracting 800 years for correction (see discussion in text for references )

expect some discrepancies in the correlation of depth with radiocarbon age in different excavation units.<sup>3</sup> The shells chosen for dating were those that appeared to have been least affected by diagenesis or burning, and the samples from which they came were taken from contexts in which we could see no evidence for disturbance or redeposition by rodents – rodent burrows when present were clearly visible. Furthermore, successive deflation and compaction of the deposits (*ibid.*) makes it unlikely that there was more than minimal vertical movement of the dated materials.

Even if we apply corrections of either 800 or 1000 years, following the now accepted offsets for land snail shell which were recognized long after the dates were processed (Evin *et al.* 1980; Goodfriend 1987; Mastronuzzi & Romaniello 2008; Quarta *et al.* 2007; Romaniello *et al.* 2008), we still cannot resolve the difference between the two collagen dates for Aïn Misteheyia H1 and the land snail shell dates for the deposits from which it was excavated.

But are land snail shell dates necessarily inaccurate? Two paired samples of shell and charcoal from other sites in the region provide a basis for discussion regarding the accuracy of snail shell dates.

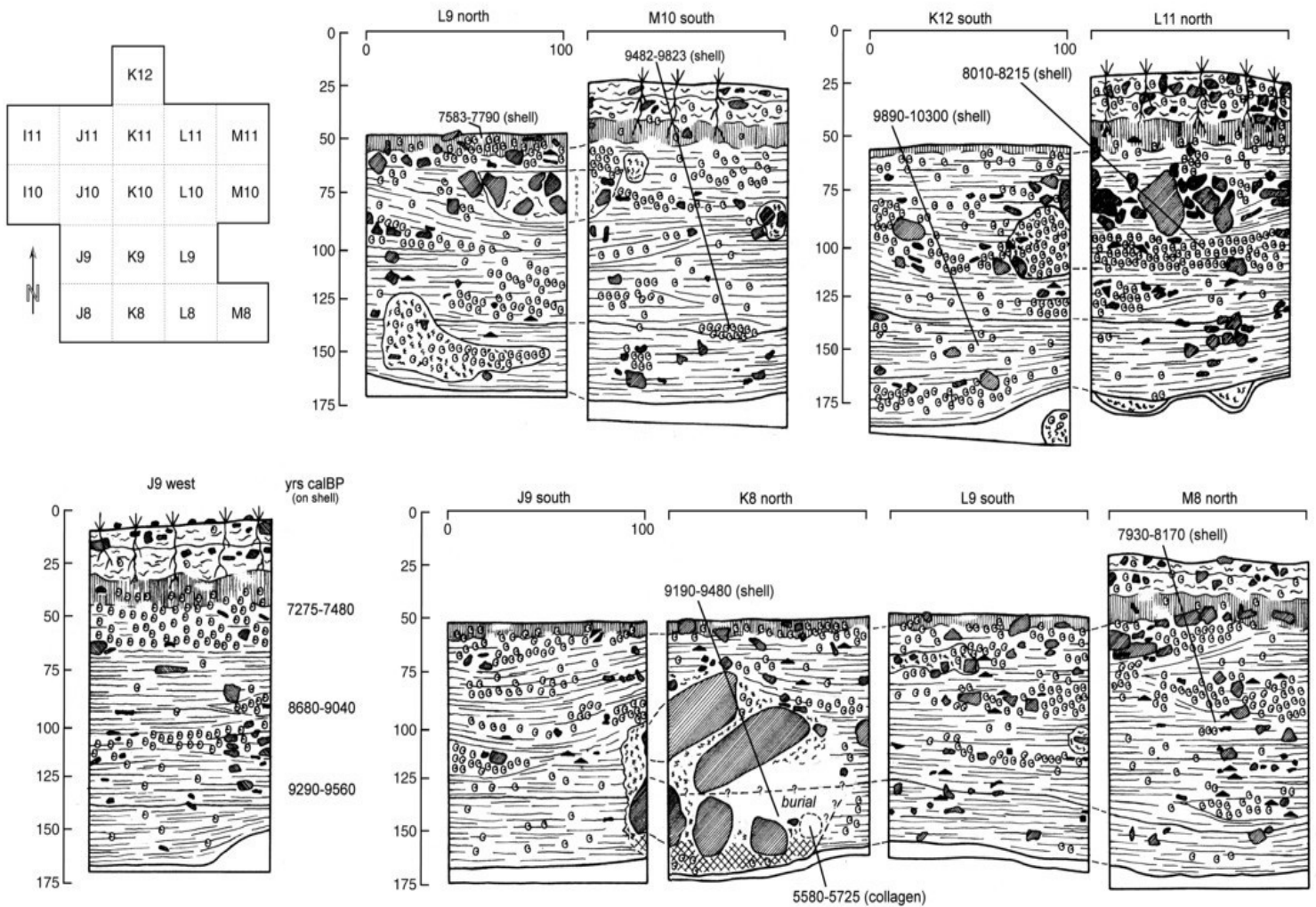
One pair was collected in 1973 from a Capsian site that had been undercut by erosion, re-deposited *en bloc*, and then exposed in section in the Wadi Redif in the Télijdjène Basin (Lubell *et al.* 1975: 65). The shell and charcoal were collected from exactly the same stratigraphic position in the section. The shell was cleaned and then washed with acid to remove 45% of the outer material. The dates were  $7690 \pm 120$  bp for the shell (I-7692,  $-\delta^{14}\text{C} = 616 \pm 6$  and not corrected for  $\delta^{13}\text{C}$ ) and  $7340 \pm 115$  bp for the charcoal (I-7694,  $-\delta^{14}\text{C} = 599 \pm 6$ ). These results are significantly different ( $t = 4.434$  at  $p = .05$ ).

The other pair was collected during the 1978 excavations at Kef Zoura D from the 270-280 cm level in the  $1\text{m}^2$  excavation unit called T20-5 (Lubell *et al.* 1982-83; Jackes & Lubell 2008). The results were  $9100 \pm 130$  bp for the shell (SMU-1108,  $\delta^{13}\text{C} = -8.3\text{‰}$ ) and  $9390 \pm 130$  bp for the charcoal (SMU-712). These results are not significantly different ( $t = 2.488$  at  $p = .05$ ).

We conclude that while the shell dates for Aïn Misteheyia could be giving us ages that are up to 1000 years too old with reference to a calibrated time frame, there is absolutely no reason to suspect they are giving ages that are 3500 to 4000 years too old.

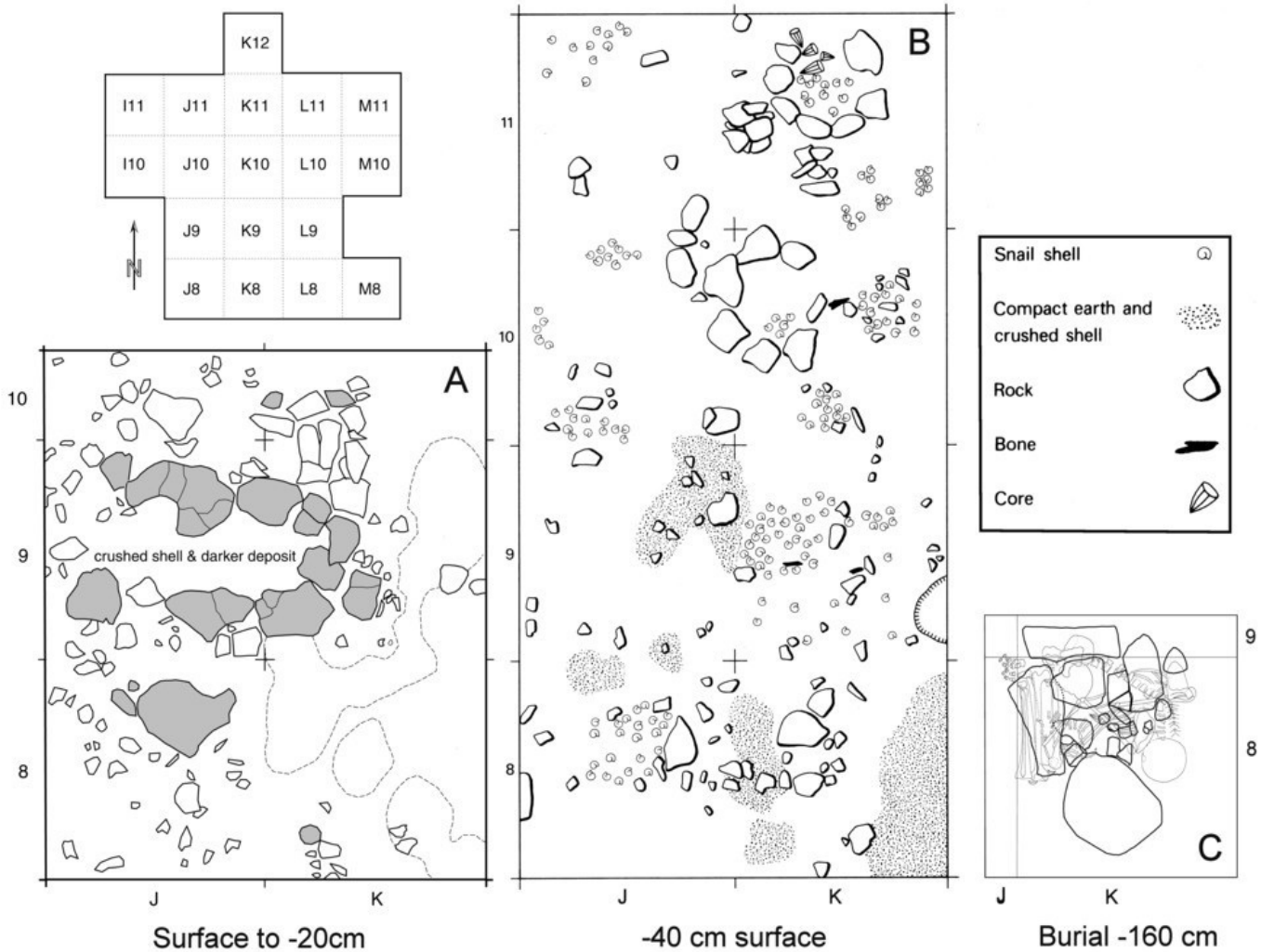
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<sup>3</sup> This point has been made more effectively by Mlekuž *et al.* (2008) using much better methodology than was available to us in the 1970s.



**Fig. 2: Selected sections and radiocarbon dates expressed as  $1\sigma$  ranges in years calBP. All samples, with the exception of those noted as collagen for the burial were land snail shell and those were corrected by subtracting 800 years before being calibrated using CALIB 5.0.1. The samples for J9 were run using a different set of protocols to those for the other squares but the results are similar. The line at ca. 130cm which is shown in all sections represents a change in the nature of the deposits and the presence of an hiatus in the sequence. Note that to enter the skeleton must have required cutting through this division but there is nothing in the sections to show where the burial pit began.**





**Fig. 3 (A) Surface to -20cm showing the oval structure of large rocks; those tinted grey are breccia (see text) and the dotted line indicates areas of dense land snail shell. (B) The surface at -40cm exposed in 1973, showing circular stone arrangements (possible hearths), artefacts and other materials. The legend refers to this section of the figure. (C) The burial with overlying rocks that was found in 1976, beginning at -140cm.**

### **Is there evidence for post-Capsian occupation at Aïn Misteheyia?**

Three, admittedly inconclusive, pieces of evidence – several “ceramic” fragments, one bifacial lanceolate, and a U-shaped arrangement of stones on the surface – suggest use of Aïn Misteheyia by a post-Capsian group, perhaps one linked to some variant of the Neolithic of Capsian Tradition.<sup>4</sup>

<sup>4</sup>For characteristics of the Neolithic of Capsian Tradition see Aumassip (2001: 150-158), Linstädter (2008) and Roubet (2001: 197-219).

## *The fired clay fragments*

In 1973, we exposed a surface beginning at -40cm on which there were two intact and two destroyed stone circles (Figs. 3B and 7).<sup>5</sup> We interpreted these as hearths despite the absence of anomalously large amounts of charcoal, ash or burnt earth. Several of the rocks which compose the circle in K10 were noted as “reddened” or “fire-cracked” by the excavator, Pamela Willoughby. Rocks which had been exposed to heat occurred throughout the deposits – a characteristic of Capsian sites (Gobert 1937) – so in the absence of other evidence we could not be certain the circles functioned as hearths. We did note that the highest frequency of artefacts exposed to heat in this level came from the two squares containing the intact circles (Lubell et al. 1975: 83).

Within the circle in K10, at a depth of 35-40cm below datum, we found six fragments of fired clay that appeared to have originally been part of a single piece (Fig. 4). The paste contains many crushed shell fragments and the outer surface has been smoothed while the inner surface is rough. They were described by Ginette Aumassip in Lubell *et al.* (1975: 86-87). However, because that description was based on an imperfect translation from French to English which was not edited prior to publication, we include a more accurate version here:

The fragments vary in size from about 40 x 25 mm for the two largest to 10 x 5 mm for the three smallest. All are very thin, with an irregular thickness that varies from 2 to 4 or, at most, 5mm. They are almost flat, although the largest does have a slight curvature. However, because of its small size we are unable to determine whether this represents an actual curvature (and therefore a vessel) or merely an irregularity in manufacture.

Examination with the naked eye suggests that these fragments have split longitudinally, but this is a false impression. Under magnification and oblique light, one can see that the outer surface has been carefully smoothed while the inner surface remains irregular. This is contrary to what one normally observes on North African pottery. The smoothing is the result of burnishing using plant material (grasses?) that have left impressions. This external surface is also covered by an extensive network of cracks.

On the irregular internal surface one can see the imprint of woven fibers, each of which is 2 to 3mm wide. It appears, therefore, that the moist clay/shell mixture was applied on some form of basketry prior to being hardened. The sherds are hard, suggesting firing rather than sun-drying but this has not been tested. A manufacturing method consisting of pressing onto a basketry “mold” is confirmed by the distribution of the shell tempering particles which frequently protrude, either perpendicularly or obliquely, from the inner surface. This can therefore be described as a *poterie poussée*.

An hypothesis that these fragments were part of a vessel is further suggested by one of the smallest fragments which appears to be a rim sherd with an ogival lip, the outer surface of which has been smoothed but of which the inner surface still bears traces of woven fibers. Although this and the larger sherd which is slightly curved do suggest a vessel, we stress that it is impossible to prove these are not merely fragments of clayey matrix from the site deposits which were impressed by straw matting and accidentally fired.

The paste is very hard and has a coarse texture which is sometimes interrupted by laminated platelets. These are subparallel to the inner surface and occur in those zones with the highest density of tempering particles. The most abundant tempering material is crushed land snail shell (greater than one third). The paste is a uniform brick-red colour (2.5 YR 5/8) which

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<sup>5</sup>Such structures were noted many years ago in other Capsian sites at which horizontal exposures were excavated (Pond et al. 1938: 125) and more recently by Amara *et al.* (nd).

indicates firing under even oxidation.

Whatever object has been manufactured or repaired, we have here a method that has not been previously identified either in North Africa or in the Sahara.



**Fig. 4** The exterior (*Top*) and interior (*Bottom*) surfaces of the sherds found within the stone circle in K10 shown in Fig.3 (B). The two at the top left (one in three pieces) were used for the OSL date.

Two of these fragments (Fig. 4) and a small sample of the <2mm fraction of sediment from within the K10 circle, were analyzed using TL/OSL by Feathers. The date obtained for the sherds is  $4230 \pm 370$  bp (UW1875) (Table 2). While having only the <2 mm fraction of the sediment might overestimate the dose rate, we do not think it would affect the age estimate by much more than 200-300 years.<sup>6</sup> This is the first direct date on fired clay from this region and strongly implies the existence of a hitherto undated and almost unknown post-Capsian occupation in the eastern Algeria/southern Tunisia part of the Maghreb.

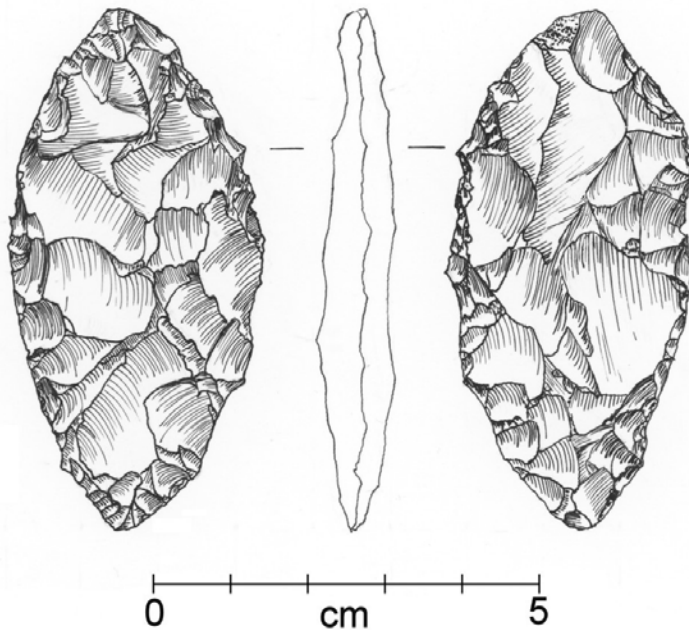
#### *The bifacial lanceolate*

In 1976, a small biface was found on the site surface beyond the area of the excavations. It measures 67 x 34 x 10 mm (Fig. 5) and is unlike any other lithic artefact in the assemblage from the site although it does appear to be made on the same light brown Eocene flint which is so common throughout Capsian assemblages in this area. It is completely unpatinated and resembles several specimens illustrated for a “neolithic” industry called the Sbaikien found nearby

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<sup>6</sup>The full report is available on request from [jim@u.washington.edu](mailto:jim@u.washington.edu). See Feathers (2003) for details on the methods used.

in both Algeria and Tunisia (Balout 1955: 454-458; Camps 1974: 294).



**Fig. 5 The bifacial lanceolate found on the surface in 1976.**

The term Sbaïkien was created by Reygasse (unjustifiably according to Camps 1974: 294), based on selective and unsystematic collecting, by his paid informants and fossil hunters, of several thousand pieces in the region around Bir Sbaïkia, about 50km in a straight line southeast of the Téli djène Basin. Originally described by Reygasse (1922) as Palaeolithic, these materials have since been re-assigned by all Francophone prehistorians writing on the Maghreb to a Neolithic – i.e. post-Capsian – age on techno-typological grounds with no indication whatsoever as to the nature of the economy practised by the groups who made these artefacts.<sup>7</sup> Almost a decade before Reygasse’s paper, in a publication of which he must have been aware, Gobert had described what appear to have been very similar assemblages near Gafsa in southern Tunisia that he designated as Néolithique C and with which “j’ai quelquefois recueilli des petits fragments de poteries poussées” (Gobert 1914: 42 as quoted in Gruet and Diard 1953: 312). Unfortunately, there are no radiocarbon dates for Sbaïkien assemblages (Aumassip 2001: 159) and, in fact, there are no well documented sites. The piece found at Aïn Misteheyia resembles pieces illustrated by Gobert (1952: 237, Fig. 8) as representative of the Sbaïkien at Bled Oguila, and by Gruet and Diard (1953: 318) for the Neolithic in the Gafsa region, both in southern Tunisia. It is unlike any of the lithics described for Damous el Ahmar, a well documented Neolithic of Capsian Tradition assemblage in the eastern Algerian region (Roubet 1968).

Jean Morel (1981: 193), in discussing the hypothesis (Lubell *et al.* 1976) that the occupation of Capsian sites such as Aïn Misteheyia was made up of multiple short-duration episodes during spring, summer and early autumn, and that Capsian groups most likely moved seasonally, remarked:

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<sup>7</sup>We cannot entirely dismiss Reygasse’s idea. The piece resembles in both size and shape Aterian artefacts from a well-stratified context at Oued Djebbana, Algeria (R.N.E. Barton, pers. comm) and could thus date many thousands of years before the Capsian (Barton *et al.* 2009).

*Où les Capsiens passaient-ils hiver? Vraisemblablement pas au nord de Tébessa où la densité des gisements capsiens décroît brusquement: peut-être au sud de la cuvette d'El-Ma-el-Abiod, entre S'Baïkia et Négrine, où il y a encore des escargotières qui diffèrent de celles de la région d'El-Ma-el-Abiod et de Chéria par leur pauvreté en coquilles et en cendres ainsi que par les caractéristiques de leur industrie; elles y sont toutefois beaucoup moins nombreuses.*

Morel's suggestion that Capsian groups may have moved south seasonally to the area around Négrine, coupled with Gobert's observation on material in the Gafsa region, leads to the possibility that at least one of the groups using Aïn Misteheyia was post-Capsian. It is, of course, clearly possible that in the course of moving around, a Capsian individual picked up the bifacial piece (as a curiosity? to reuse?) and dropped it at Aïn Misteheyia. But since this piece, if it is Aterian, could date as early as 110,000 years (Barton et al. 2009), or if not perhaps as late as 5000 years, it is unfortunately of little diagnostic value here.

### *The U-shaped stone arrangement*

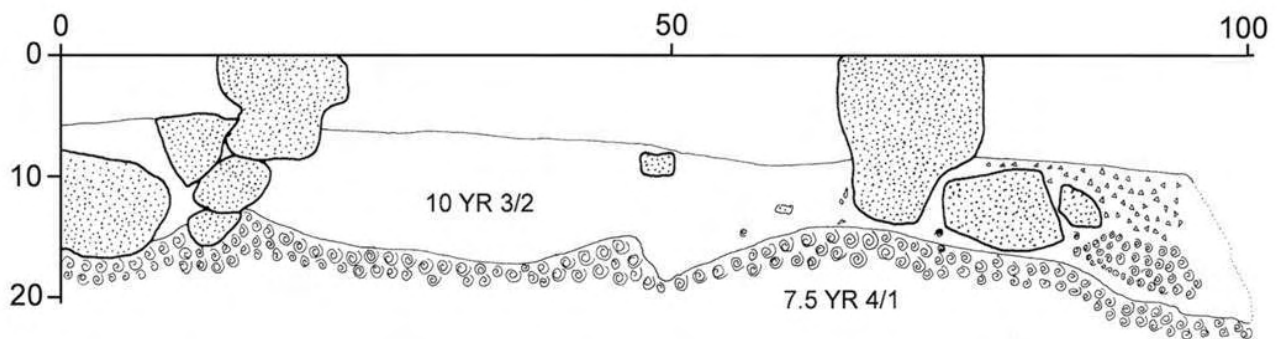
When we began work at Aïn Misteheyia in September 1973, there was a U-shaped arrangement of large stones visible on the surface, measuring ~1.5 x 1 m, oriented east-west, which covered most of the surface of J9 and K9 and was associated with a large boulder in J8 (Figs. 3A and 6). The deposit within the oval contained abundant crushed shell and was darker (10YR 3/2) than the surface deposits outside it (7.5YR 4/2) which were equivalent to the colour of the underlying deposits (7.5YR 4/1). The area to the southeast in K8 and to the east in K9 contained dense concentrations of snail shells and, as is normal for these sites, many smaller pieces of what we interpreted as fire-cracked rock.

Most of the blocks composing this arrangement, as well as the large boulder in J8, were noted as "breccia" – they had a dark grey rough upper surface with what seem from the photograph to be inclusions of snail shells and/or small gravel (Fig. 6). The other limestone blocks on the surface had a smooth upper face, as was the case for most of the smaller fire-cracked pieces throughout the deposits. The implication is that the "breccia" pieces were transported from near the spring, but they could also derive from a destroyed *croûte calcaire* which is common at many open-air Capsian sites and throughout the region in non-archaeological settings.

The base of this U-shaped arrangement was on average about 20cm below the modern surface (Fig. 6). It was underlain by what the excavator, Angela Close, described as a very thin layer of brown loam, different from the deposit enclosed by the stones which was darker and which contained abundant small pebbles and crushed shell. Beneath this brown loam was the irregular surface of the escargotière – probably an eroded surface and thus an hiatus may be present. Close concluded (excavation notes for 21.ix.73) that the structure post-dated the Capsian deposits.

A section drawn through this structure does not show any disturbance beneath it (Fig. 6), nor did a very detailed section of the west wall of J9 (Lubell et al. 1976: Fig. 5) which was excavated to over 1.5m depth in 1973 after the U-shaped arrangement was removed. There is thus no direct evidence to associate the U-shaped arrangement with the burial and, as it was not associated with any distinctive artefacts and no samples from it were dated, it cannot be assigned a definite age.



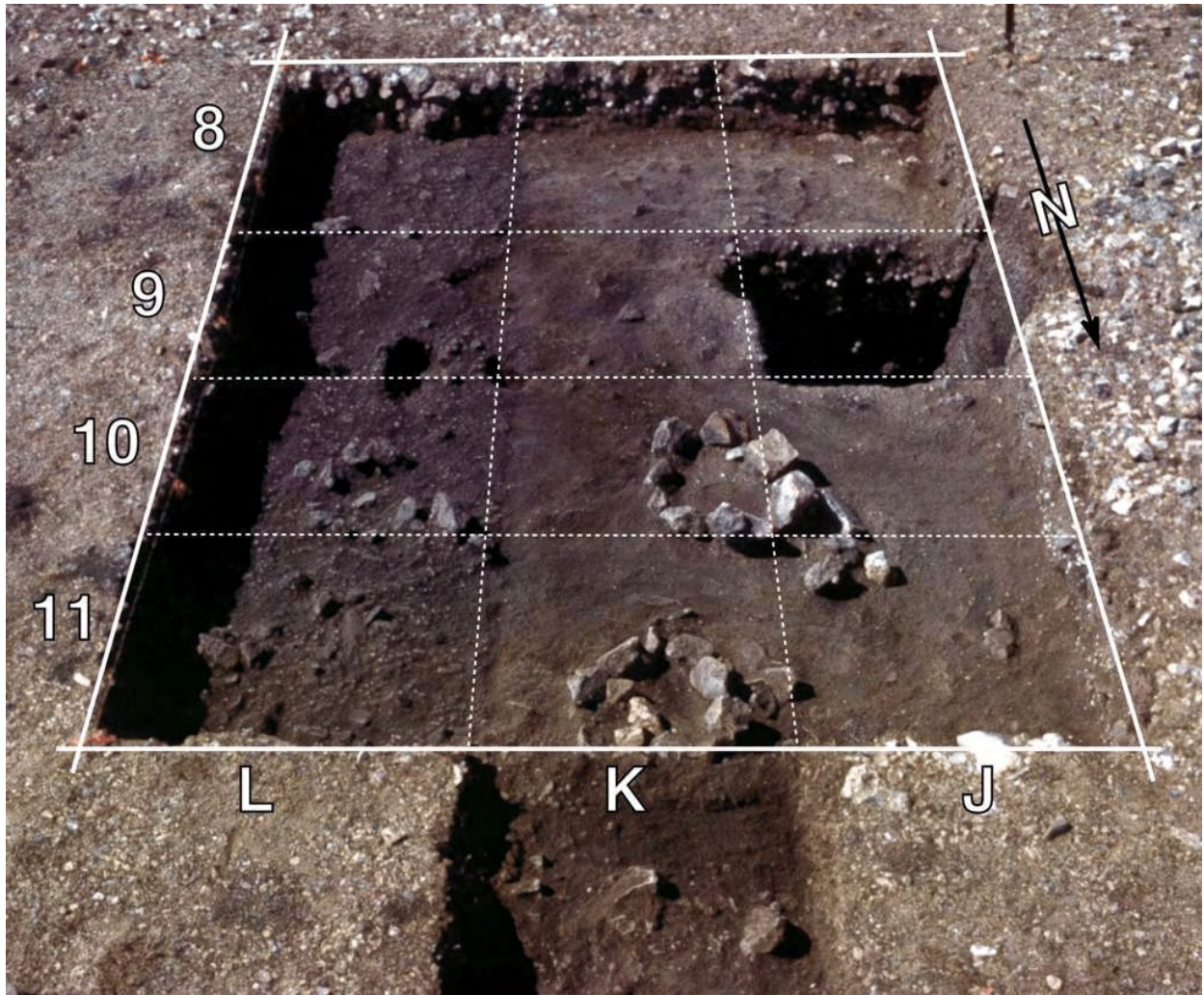


**Fig. 6** *Top:* At the start of excavation in 1973, showing the U-shaped arrangement of stones in J9-K9 and the large boulder in J8. Note the breccia-like surface of many of the stones.  
*Bottom:* Cross-section through the U-shaped stone arrangement in J9 showing that it occurred on top of the (probably) eroded surface of the Capsian deposits. The scale is in centimetres, and Munsell colours are shown for the deposit within and below the stones.

## V. Did we miss evidence for an intrusive mid-Holocene burial?

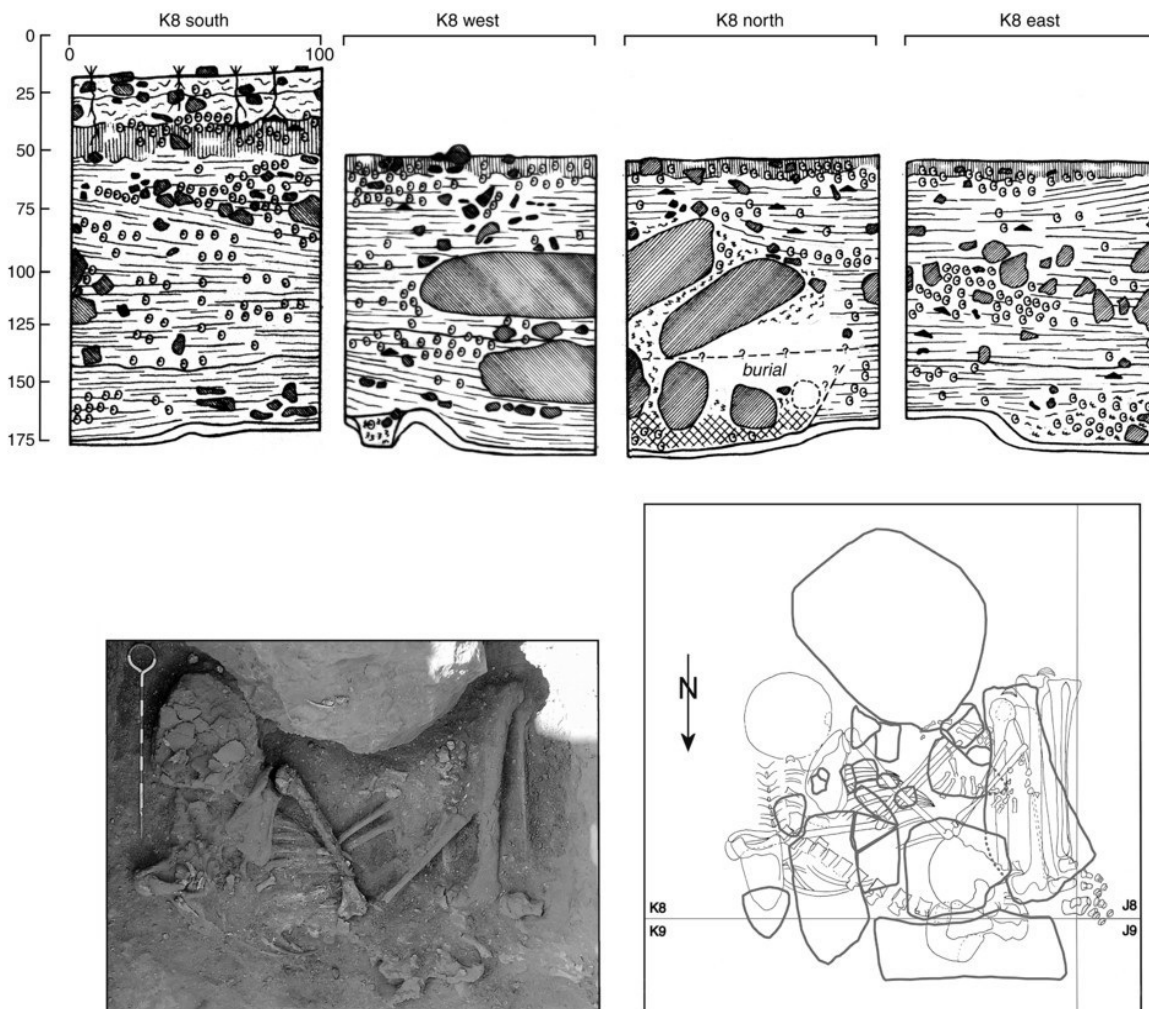
The answer must be yes.

A photograph of the excavations taken early in the 1976 season shows the surface at -50cm (Fig. 3B and Fig. 7) on which there can be seen an oval-shaped area of lighter deposit in J8 and K8 partially beneath where the U-shaped structure was, and partly overlying the area above the burial over a metre below.



**Fig. 7** The -50 surface at the start of excavations in 1976. The 2m x 4m area excavated in 1973 comprises the squares in J and K from 8 to 11. Note the oval-shaped lighter grey surface in J8 and K8 that more-or-less overlies the position of the burial located one metre below this surface. No disturbance was noted in the profiles when these squares were excavated below this (see Figs. 2 and 8). Position of the grid lines is approximate due to parallex distortion.





**Fig. 8** *Top:* The profiles of square K8 around the burial area. The large split boulder which overlay the burial is shown in section as are the looser sediments which surrounded the skeleton as well as the possible boundaries of the grave. It appears the grave must have been dug from at least the 80cm level although there was no clear indication of this during the excavation.

*Bottom left:* Photograph of Aïn Misteheyia H1 after excavation.

*Bottom right:* Reconstruction of rocks overlying skeleton.

The stratigraphic sections of K8, the unit in which most of the burial lay (Fig. 8 top), do not show any evidence for disturbance beginning at -50cm, but the two very large boulders which overlay the burial were almost certainly put there at a depth that began at no more than -80cm<sup>8</sup>. After being placed, tightly flexed and on the left side, in the burial pit that had been dug into the sterile substrate, the body was covered with a number of large rocks (Fig. 8 bottom right) and sprinkled with a quantity of red ochre. We noted (Meiklejohn *et al.* 1979: 412) that the deposits surrounding the skeleton were softer and less compacted than elsewhere in the site and that “long bone surfaces exhibit the characteristic parallel cracks of bone exposed to air for some time”. The

<sup>8</sup>These are actually a single huge stone that had either cracked or been split, with one half then flipped up over the other half, perhaps to allow excavation of the burial pit and placement of the body.



skull was crushed (Fig. 8 bottom left), most likely due to pressure of the overlying deposits and rocks, although we cannot rule out intentional smashing at the time of burial. Despite the cracks in the bone, the evidence points to primary in-flesh burial of an adult with some sort of cairn placed over the grave. There was no evidence for intentional disarticulation, cutmarks, post-mortem manipulation or dental evulsion, all of which are known for other Capsian skeletons but not, or at least not very often, for Neolithic ones (Haverkort and Lubell 1999; Humphrey and Bocaage 2008; Jackes and Lubell in prep.).

In sum, the archaeological evidence does not eliminate the possibility that Aïn Misteheyia H1 may have belonged to a group later than the one responsible for the majority of deposits at the site – deposits that can be confidently assigned to the Typical and Upper Capsian. What this later group was, and whether occupational deposits left by them have been removed by erosion (certainly a possibility given all the other evidence for destruction of sites we found in the region – see Lubell et al 1975, 1976, 1982-83; Jackes and Lubell 2008), or were in a part of the site we did not excavate, remain questions which cannot now be answered. Despite protestations from our foreman Layesh el-Rahal who lived adjacent to the site, Aïn Misteheyia was totally destroyed in 1977 by deep ploughing (>1m) and construction of terraced ditches as part of a major reforestation project in the Téli djène Basin.

<b>Provenance: cm below modern surface</b>	<b>Lab. code</b>	<b>Sample material</b>	<b>OSL date: yrs before 2008</b>	<b>Range</b>
AM 1973 K9 5-10	X3279B	quartz grains	1930 ± 295	2225 - 1635
AM 1973 K9 10-15	X3280B	quartz grains	2430 ± 290	2720 - 2140
AM 1973 K9 15-20	X3281B	quartz grains	3210 ± 240	3450 - 2970
AM 1973 K10 35-40	UW1875	fired clay	4230 ± 370	4600 - 3860
AM 1973 K10/Ib 30-35	X3282B	quartz grains	7250 ± 500	7750 - 6750

**Table 2: TL/OSL dates for fired clay and for quartz grains from fill sealed in land snail shells**

*Further data on the chronology*

Although there was nothing in the artefact assemblage, other than the sherds and possibly the lanceolate biface, to suggest a post-Capsian occupation, we now have new data for the possible age of this later occupation.

We decided to test a still experimental method under development by Schwenninger, to date individual quartz grains from the sealed compacted fill of land snail shells excavated in 1973 from upper levels near where the sherds were found. The results (Table 2) are unfortunately not easily interpreted (Fig. 9).



## **VI. Are there other Capsian sites in which there may be similar situations?**

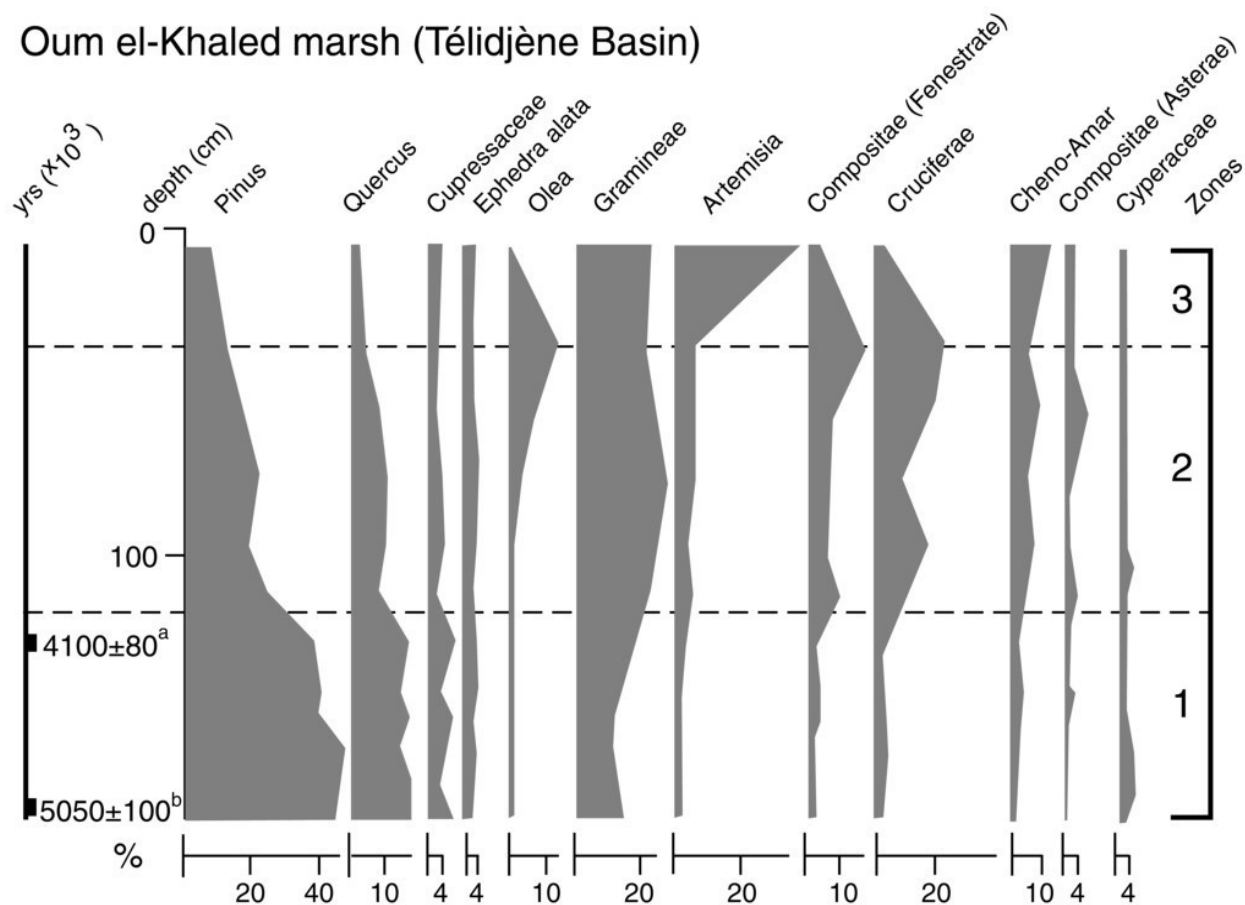
There is at least one. Site 12 (Aïoun Beriche) northwest of Aïn Beïda, was excavated in 1930 by the Logan Museum of Beloit College and the University of Minnesota (Pond et al. 1938). At least 21 skeletons were found, but only eight can now be accounted for (Haverkort and Lubell 1999; Jackes and Lubell in prep.).

Mary Jackes and I have studied the Site 12 excavation records and photographs, and have had collagen from two of the skeletons dated by AMS (Jackes and Lubell in prep.). One skeleton (3A-2) came from below the clay floor that separated Levels III and IV, the other (3A-7), came from above it. The results (Table 1) show that there is a difference of over 4000 radiocarbon years between 3A-2 and 3A-7. Despite the existence of both field records and photographs, we cannot determine if the grave in which 3A-7 was interred was dug from a much higher level, but we assume it must have been. Taken together, these data provide reliable chronological evidence for a previously undocumented and almost completely unknown prehistoric occupation of the region.

Site 12 thus provides a remarkably similar scenario to Aïn Misteheyia. At both sites the lower levels are Typical Capsian and these are overlain by Upper Capsian deposits (Rahmani 2004; Sheppard 1987, Sheppard & Lubell 1990). At Site 12, Levels III (Typical) and IV (Upper) are dated by two charcoal samples (Table 1) which mark this technological change as having occurred at about 8200 cal BP, coincident with a period of environmental change (Jackes and Lubell 2008)

Kef Zoura D is another site with a similar archaeological sequence and chronology at which there may be evidence for late Capsian burial (*ibid.*). We know that a burial was dug from a surface which dates to the Upper Capsian. The burial, which is overlain by a metre of deposit with a series of consistent charcoal dates, has to date older than 6800 calBP, perhaps as old as ~7300 calBP, and buried on a level that must be ~1000 years older. We cannot be more precise because we have been unable to obtain a sample for dating from the partial skeletal remains that we left for storage at CNRPAH in Algiers but which colleagues there have unable to relocate.

# Oum el-Khaled marsh (Télidjène Basin)



<sup>a</sup> SMU 1123: 2 sigma range = 4431-4828 calBP

<sup>b</sup> SMU 1124: 2 sigma range = 5596-5953 calBP

Source: J.C. Ritchie (1984) Analyse pollinique de sédiments Holocènes supérieurs des hauts plateaux du Maghreb oriental. *Pollen et Spores* 26: 489-496.

**Fig. 10** Pollen percentage diagram for the Oum el-Khaled marsh. Redrawn from Figure 2 in Ritchie (1984). Zone 1 is equivalent in date to the TL/OSL age determination for the sherds and thus suggests that this was a period of relatively moist conditions in the region, an interpretation further suggested by analyses of phytoliths from Aïn Misteheyia to be published separately (Shipp *et al.* nd).

## VII. Conclusion

As the recent review by Linstädter (2008) makes clear, there is a dearth of reliable information about immediately post-Capsian occupations in eastern Algeria and southern Tunisia – the regions of Constantine, Tebessa and Gafsa. As we noted in earlier publications (e.g. Lubell *et al.* 1975: 54, 64-67; 1976: 910), there has been considerable destruction of Capsian (and therefore presumably later) sites by erosion, just as there appears to have been some destruction of pre-Capsian sites leading to an apparent hiatus in occupation<sup>9</sup>. For example, at Kef Zoura D, we know that at least 50cm of upper deposits was removed, probably by erosion.

The four radiocarbon dates we now have on human skeletons from Aïn Misteheyia and Site 12, along with the TL/OSL dates for fired clay fragments and sediments from Aïn Misteheyia, suggest there must have been post-Capsian groups living in the region during the mid to late Holocene, at a time when the climate appears to have been becoming less arid than previously (e.g. Ritchie 1984 and Fig. 10). Analyses to be published separately of phytoliths extracted from the Aïn Misteheyia deposits (Shipp *et al.* nd), and of the stable isotope composition of land snail shells from both Aïn Misteheyia and Kef Zoura D (Faber *et al.* nd), will further elucidate environmental conditions of this region during the Holocene beyond what we know now. These data will help to better understand what may or may not have been happening following the post-Capsian occupation in the eastern Maghreb.

Whether or not we can say with confidence that there was a Neolithic occupation at Aïn Misteheyia remains unresolved. What we can say on the evidence available is that it appears Capsian sites first occupied thousands of years previously continued to be used by later groups, in part as places at which to bury their dead. This would seem to be a further indication of continuity during the Epipalaeolithic and succeeding periods in the Maghreb, a scenario we and others have argued to be the most probable explanation for the archaeological patterns observed.

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<sup>9</sup>Two radiocarbon dates on charcoal from hearths exposed near the base of aggradational deposits in the north section at Wadi Mezeraa studied by W.R. Farrand and colleagues (Farrand *et al.* 1982; nd.) show that there was previously undocumented – or at least very minimally documented – pre-Capsian occupation in the region. The hearths contained artifacts that unfortunately had no diagnostic value. The dates were noted (Lubell *et al.* 1991: 262) but have never been fully published. They are  $11588 \pm 99$  bp (SMU 655) and  $11870 \pm 286$  bp (SMU 738).

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