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First chronological indications on the Aterian in the Libyan Sahara

Geo-archeological research in south-western Fezzan (Libya)

Recent systematic surveys were carried out in the Tadrart Acacus mountain range and surroundings, which covered an area of approximately 8,000 square kilometres. More than fifty sites (Fig. 1) could be attributed to the Stone Age: 29 sites of the Early Stone Age/Middle and Late Acheulean phases, 15 sites of the Middle Stone Age/Mousterian, and 14 sites of the Middle Stone Age/Aterian phases (Cremaschi and Di Lernia 1996; in press). The Aterian phase, in particular, with the increase of formal tools, mostly tanged artefacts, burins and end-scrapers, holds an important role: its exact chronological collocation is crucial to comprehend in this region the relations with both the Middle Stone Age cultures (Mousterian) and the earliest Holocene occupation ("Early Acacus" or "Epipalaeolithic"). The regional approach to the study of human past in the Acacus and surroundings, led us to isolate two main items, as regards Pleistocene archaeology, which need to be further investigated (Cremaschi and Di Lernia, 1996; in press):

1. The absence of an Upper Palaeolithic lithic industry, *sensu strictu*;
2. The presence of a defined Aterian phase in this area of the Sahara, which has to be considered the last Pleistocene human occupation, before the onset of hyperarid climatic conditions.

The excavations at Uan Tabu and Uan Afuda, two sites located in the central Tadrart Acacus, provide detailed information as regards lithic organisation: the lack of organic matter led us to have OSL and TL analyses undertaken on the sand (Martini et al., in press), which constitute the first chronological indications for the Aterian phase in the Central Sahara (Cremaschi, Di Lernia and Garcea, in press).

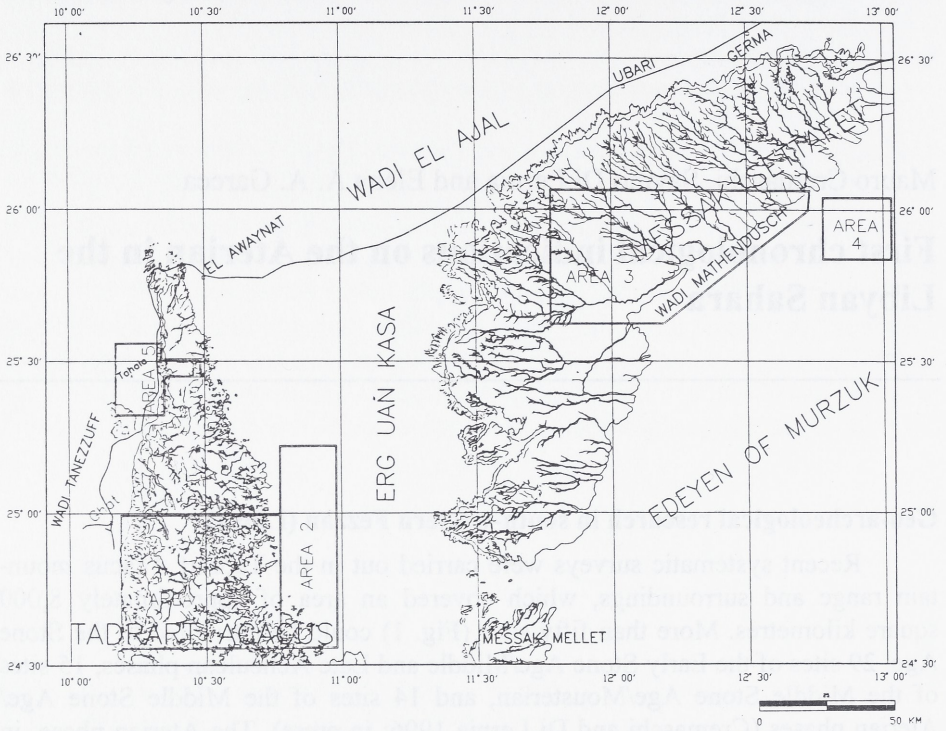


Fig. 1.

The Tadrart Acacus and Messak Settafet mountain ranges. Numbers indicate the survey areas.

Uan Tabu

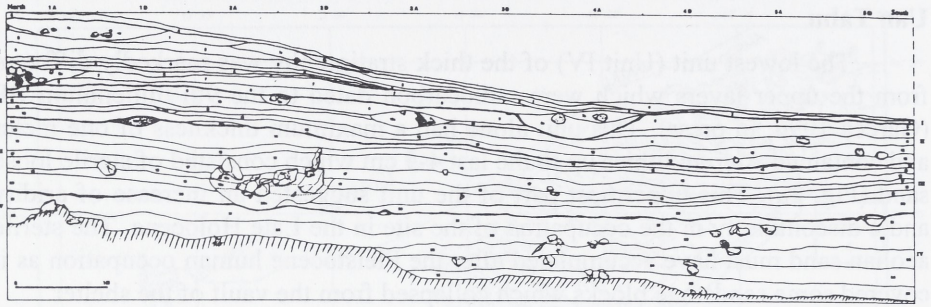
The lowest unit (Unit IV) of the thick stratigraphy was markedly different from the upper layers which were radiocarbon dated to the 9th millennium BP (Garcea 1996; in press). This unit alone had a maximum thickness of one meter and contained Aterian lithics up to the last 4-5 cm which consisted of sterile loose sand (Fig. 2a). This uppermost part of the unit suggested an increase of aridity and a discontinuity in the occupation of the site in the Late Holocene. The sterile aeolian sand must have accumulated after the Pleistocene human occupation as it covered some sandstone blocks which collapsed from the vault of the shelter.

The archaeological unit contained a considerable quantity (3109 pieces) of flaked stones with several Aterian tools but no organic matter. Levallois flakes, blades and points made up 62.6% of the tool-kit (Fig. 3). Side-scrapers (7.1%) were much more frequent than end-scrapers (0.7%). Tanged pieces were of different types but represented only 3.6% of the tool-kit. The high frequency of modified pieces including 9.04% of retouched tools and 24.57% of cores, suggested that intensive knapping activities were taking place on the spot. The deposit was dated by OSL to $61,000 \pm 10,000$ years BP.

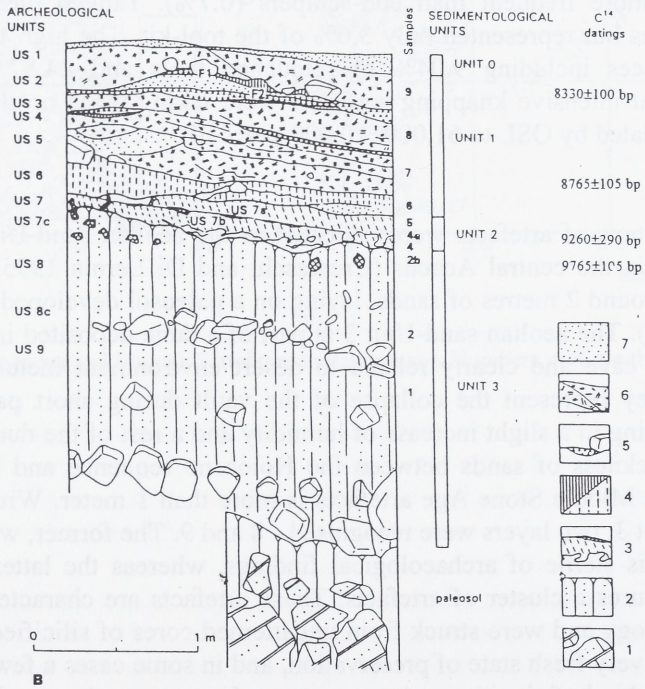
Uan Afuda

Some tens of artefacts were collected in the aeolian sand-Unit 3 at Uan Afuda cave, in the central Acacus (Cremaschi and Di Lernia 1995). This Unit consists of around 2 metres of sands, laying on a paleosol developed on the bedrock (Fig. 2b). The aeolian sand-Unit 3 is part of a dune deposited into the large porch of the cave and clearly related to desert environment including several boulders. They represent the collapse of the vault during short pauses of the aridity, resulting in a slight increase of humidity and a rest of the dune progradation. The thickness of sands between the Holocene sequence and the collapse overlying the Middle Stone Age artefacts is more than 1 meter. Within the aeolian sand-Unit 3, two layers were recognised - 8 and 9. The former, which lays on the collapse is sterile of archaeological findings, whereas the latter, under the collapse, features a cluster of artefacts. These artefacts are characterised by archaic technology and were struck from unpatterned cores of silicified sandstone. They show a very fresh state of preservation, and in some cases a few flakes refit (Fig. 4). This kind of situation points to a very short occupation, probably linked to specialised functions. No organic matter was found.

TL and OSL datings were performed on the sands laying on the collapse, giving consistent results: TL analysis gave $70,000 \pm 9,500$ and $73,000 \pm 10,000$ years BP; OSL gave $69,000 \pm 7,000$ years BP. These dates provide a *terminus ante quem* for the Middle Stone Age artefacts. An OSL determination was also obtained for the sands below the lithics, with a result of $90,000 \pm 10,000$ years BP.



A



B

Fig. 2. a: Section from Uan Tabu. Fig. 2b: Section from Uan Afuda.

1: collapsed blocks with gypsum concretions; 2: Unit 3, aeolian sand, weathered at the top, including bioturbation pedotubules; 3: Unit 2, colluviated sand including gypsum concretions; 4: Unit 1, loose sand rich in charcoal and organic matter; 5: Unit 1, ash lenses and stones related to hearths; 6: Unit 1, lenses of undecomposed plant remains; 7: Unit 0, aeolian loose sand.

Therefore, Middle Stone Age artefacts were left in the Uan Afuda cave between 69,000 and 90,000 years BP.

Unfortunately, no diagnostic Aterian tools (i.e. tanged tools) were unearthed at Uan Afuda, and the attribution of these Middle Stone Age artefacts to the Aterian horizon is speculative. Nevertheless, Uan Afuda shares with Uan Tabu stratigraphic position and technological organisation of the lithic industry: the difference of around 10,000 years between the two dates referred to Uan Afuda and Uan Tabu could be related either to intrinsic technical reason in the dating method or to different phases of occupation of the Aterian groups. Furthermore, the stratigraphic section of Uan Afuda cave no doubt shows a hiatus between the Middle Stone Age occupation and the Holocene occupation, which is dated at Uan Afuda from $9,765 \pm 105$ BP (GX-20750) up to $8,000 \pm 100$ years BP (GX-18104). This hiatus is documented by 1 meter of sterile aeolian sand, whose top was weathered at the end of Pleistocene (Cremaschi and Di Lernia 1995).

Discussion

Based on radiocarbon datings, Aterian was thought to have an age older than $>40,000$ and to last until $20,000$ years BP. However, it has recently been observed that not only was the method applied inappropriate but also the dated materials were of questionable reliability and/or from uncertain contexts. In addition many deposits with Aterian lithics contained no organic matter which could be dated by the C14 methods.

The stratigraphic evidence from Uan Tabu and Uan Afuda sites shows an impressive hiatus between the Middle Stone Age occupation and the earliest Holocene occupation. This hiatus is also confirmed by the extensive survey performed in the 1991-1996 field seasons: no Upper Palaeolithic sites were found. A recent study on travertine formations in the Acacus reveals an early onset of wet conditions, probably as early as $14,000$ years BP (Cremaschi and Di Lernia 1996; in press).

Although there is evidence for earlier Acheulean and Mousterian occupations, the first well documented phase is the Aterian, now dated around $90,000$ - $60,000$ years BP. It is characterised by a moderately arid climate, as indicated by the rest of dune progradation at Uan Afuda and Uan Tabu. The following phase shows severely dry climatic conditions and high deflation, and occurs during the Final Pleistocene, when no human occupation is documented: this phase should correspond to the expansion of the desert ($60,000$ - $15,000$ years BP). A phase of more intensive occupation of the region dates from the beginning of the Holocene ($10,000$ - $3,500$ years BP).

Relations between Mousterian and Aterian phases are still unclear, and we can hardly say when and how a transition took place. From a stratigraphic point

of view it can be said that both Mousterian and Aterian artefacts were included in the "red fossil dune formation", mainly in the area of the central Acacus and is also attested in the stratigraphic contexts of Uan Tabu and Uan Afuda (Cremaschi in press). The deposits including Aterian artefacts were dated between 90,000 and 61,000 years BP. No datings are available for the Mousterian contexts: therefore, relationships between Mousterian and Aterian "phases" need to be further investigated, since for the most part they tend to share similar technological and typological organisation. Site distribution of the Aterian finds show the use of a large territory and diversified environments. Such behaviour points to high mobility of these groups, which may be related to a severer environment and probably drier climate. Based on the present evidence from the Sahara, Aterian people probably lived during a subarid episode which can hardly be referred to the hyperarid period dated between 65,000 and 15,000 BP. They must have occupied the previous phase dated between around 90,000 and 65,000 years BP. The dating 90,000-61,000 BP could be related to an earlier phase of the MSA/Aterian, according also to the evidence from the Nile Valley (Wendorf and Schild 1992) and the oasis in the Western Desert (Kleindienst et al. 1996).

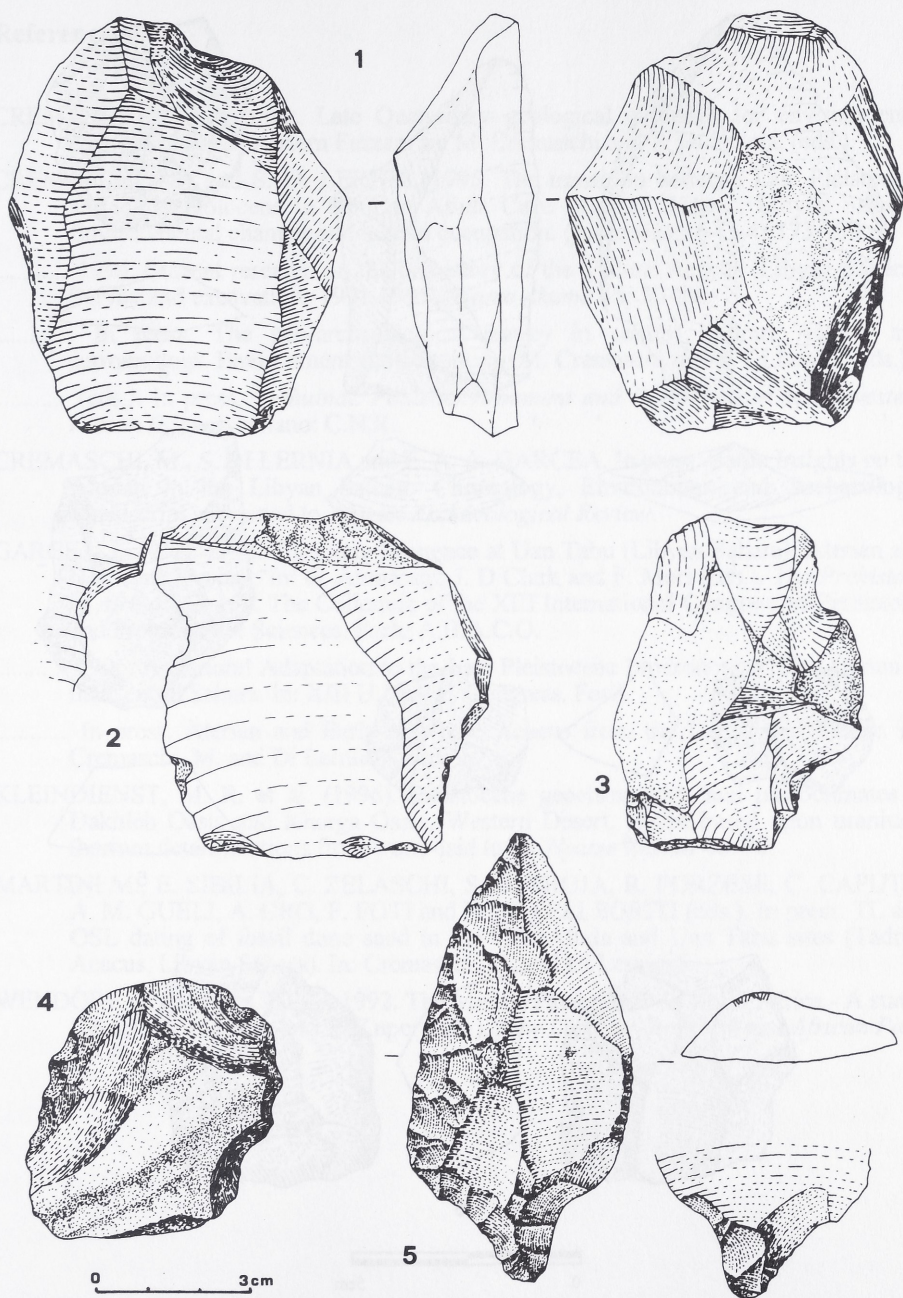


Fig. 3. Uan Tabu: 1. backed knife; 2-4. tanged points; 5. *hachereu*.

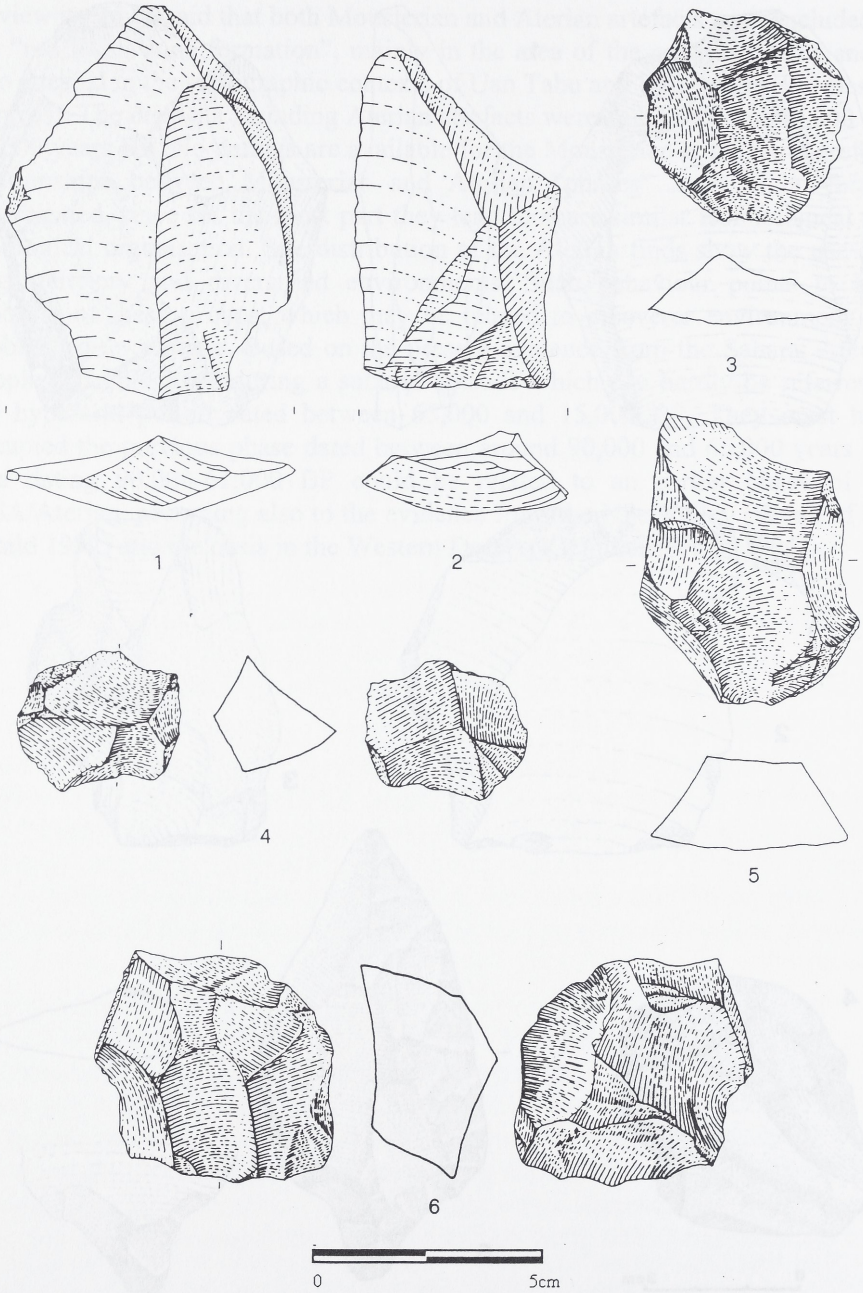


Fig. 4. Uan Afuda: 1-2: pseudo-Levallois flake (refit).

References

- CREMASCHI, M. In press. Late Quaternary geological evidence for environmental changes in south-western Fezzan. In: M. Cremaschi and S. Di Lernia. (eds.).
- CREMASCHI, M., and S. DI LERNIA. 1995. The transition between Late Pleistocene and Early Holocene in the Uan Afuda Cave (Tadrart Acacus, Libyan Sahara). Environmental changes and human occupation. *Quaternaire* 6 (3-4):173-189.
- 1996. Current research on the prehistory of the Tadrart Acacus (Libyan Sahara). Survey and excavations 1991-1995. *Nyame Akuma* 45: 50-59.
- In press. The geo-archaeological survey in central Tadrart Acacus and surroundings. Environment and culture. In: M. Cremaschi and S. Di Lernia (eds.).
- (eds.). In press. *Teshuinat. Palaeoenvironment and Prehistory in south-western Fezzan (Libya)*. Milano: C.N.R..
- CREMASCHI, M., S. DI LERNIA and E. A. A. GARCEA. In press. Some Insights on the Aterian in the Libyan Sahara: Chronology, Environment and Archaeology. Manuscript submitted to *African Archaeological Review*.
- GARCEA, E. A. A. 1996. The Long Sequence at Uan Tabu (Libyan Sahara): Aterian and Holocene Deposit. In: G. Aumassip, J. D Clark and F. Mori (eds.), *The Prehistory of Africa*:183-193. The Colloquia of the XIII International Congress of Prehistoric and Protohistoric Sciences. Forli: A.B.A.C.O.
- 1996. A Cultural Adaptation to the Late Pleistocene Environment: The Aterian in the Central Sahara. In: XIII U.I.S.P.P. Congress. Forli.
- In press. Aterian and Early and Late Acacus from the Uan Tabu Shelter. In: Cremaschi, M. and Di Lernia, S. (eds.).
- KLEINDIENST, M. R. et al. (1996). Pleistocene geochronology and paleoclimates at Dakhleh Oasis and Kharga Oasis, Western Desert, Egypt based upon uranium-thorium determinations from water-laid tufas. *Nyame Akuma* 46: 96.
- MARTINI M., E. SIBILIA, C. ZELASCHI, S. O. TROJA, R. FORZESE, C. CAPUTA, A. M. GUELI, A. CRO, F. FOTI and M. G. PELLEGRITI (eds.). In press. TL and OSL dating of fossil dune sand in the Uan Afuda and Uan Tabu sites (Tadrart Acacus, Libyan Sahara). In: Cremaschi, M. and Di Lernia, S.
- WENDORF, F. and R. SCHILD. 1992. The Middle Palaeolithic of North Africa - A status Report. In: F. Klees and R. Kuper (eds.), *New Light on the Northeast African Past*: 39-78. Cologne.