Round Heads

Round Heads:
The Earliest Rock Paintings in the Sahara

By

Jitka Soukopova

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LIST OF ABBREVIATIONS

AMS	Accelerator Mass Spectrometry
BP	Before Present
calBP	Calibrated age before present
T. L.	Thermoluminescence
14C	Uncalibrated radiocarbon age

CHAPTER ONE

CENTRAL SAHARA: CLIMATE AND ARCHAEOLOGY

The Central Sahara is a huge "gallery" of rock art containing several thousand paintings and engravings from various periods stretching from prehistory until the recent historical era. However, no exhaustive inventory has yet been established and apparently not all rock art sites have been discovered, since new images have been reported each year. This book focuses on the "Round Head" art which is generally considered the earliest painted rock art in the Central Sahara. This corpus of paintings, so called for the way in which the human face is represented, is thought to belong to groups of hunter-gatherers who produced their images in a relatively limited area of the Algerian Tassili n'Ajjer, in the Algerian Tadrart and in the Libyan mountains of the Tadrart Acacus[1], and probably also in the adjacent mountains of Djado in Northern Niger (Hallier & Hallier 1999) (Fig.1-1).

Since the first discoveries of rock art by Europeans in the nineteenth century, research in this inhospitable region has been hasty and precarious, often made by amateur researchers or accidental travellers rather than by academics. As a result, after several decades of intermittent and often poor quality research, we still have relatively little scientific knowledge of both the art and archaeology in this area. Very little in the way of excavation has been carried out in the region due to the difficult working conditions in the desert as well as the problematic politics associated with different universities and national permissions. Thus, there is no clear dating for this rock art, nor has it been reliably associated with a stratified material culture. This negative picture is compounded by key sites being divided between different colonial spheres of influence, namely French and Italian, with little collaboration between respective scholars. Post-colonial research has been similarly hampered in both countries, worsened by little or no interest on the part of the Algerian and Libyan academics.

1. The Tassili n'Ajjer will be also called Tassili, and the Tadrart Acacus will be called Acacus.

Fig. 1-1 Map of the Central Saharan mountains

The situation is further complicated by the fact that over the millennia the aeolian erosion in this dry environment has completely removed the prehistoric soil deposition in many places, thus mixing the stratigraphic record. This has resulted in an enormous quantity of lithics and pottery being dispersed and exposed on these palaeo-surfaces. The dates of these artefacts extend over many thousands of years, so that Acheulean lithics are lying, on the same level, next to Epipalaeolithic microliths and Neolithic ceramics (Barich 1987; Cremaschi & Di Lernia 1998; Aumassip 2004). However, many rock shelters with intact stratigraphic archaeological deposits offer significant potential for information about the past. There is therefore an urgent need to excavate, especially when there is rock art present.

The results presented here are based on a critical evaluation of existing literature and on fieldwork undertaken by the author between 2005 and 2008 in the key Central Saharan mountainous regions: the Tassili n'Ajjer, the adjacent Algerian Tadrart and Libyan Tadrart Acacus which constitute the study area of this research. More than seventy sites were investigated which represent a sample of several hundred paintings. However, various limitations occurred in the collection of data. Many rock art sites in both Algeria and Libya lie within military zones where access to the public is denied, and limitations of time and finances permitted only a basic research programme at each site. Despite these problems the sample of collected data is large enough to be significant and is representative enough to make a number of meaningful statements concerning the Round Head art.

The method of research presented here has not been previously applied to the rock art in the Central Sahara. Except for the Libyan Round Heads (Barich 1990; Cremaschi & Di Lernia 1999; Mori 2000), the research in other regions mainly involved the mere observation of paintings. Assuming that the images themselves cannot provide all the necessary information, this book considers not only the paintings but also, with equal importance, their physical environment, namely the rock shelters and their larger surroundings. Equally important is the evaluation of data from other related disciplines, such as climatology, archaeology, comparative studies and ethnography. This research shows that if the inter-disciplinary methods are applied we do actually possess the keys for explaining some aspects of the earliest Saharan rock art.

History of the research

The local Touareg groups who lived on the Tassili Plateau until the 1970s, and seasonally inhabited the painted shelters, have always known about the Saharan engravings and paintings. They were aware of the great age of these images and they considered Round Head paintings the work of the ancient black population who previously lived there. Thanks to local people, Europeans first "discovered" Central Saharan rock art in the nineteenth century. In 1850 the German explorer Heinrich Barth recorded engravings in south-eastern Libya (Barth 1857) and several years later the French explorers Henri Duveyrier and Fernand Foureau were told about the existence of engravings respectively in the Tadrart Acacus and in Wadi Djerat in the Northern Tassili. These early discoveries were isolated and rather incidental. From 1902 the French colonizers were firmly established in southern Algeria and many rock art sites were reported by military officers, such as Captain Cortier or Lieutenant Gardel. In 1933 Lieutenant Brenans discovered and documented a large number of engravings in Wadi Djerat and between 1933-1940 he also revealed and sketched many paintings on the Tassili Plateau.

In 1950 and 1951 a Swiss ethnologist Yolande Tschudi explored and documented numerous paintings of several sites on the Tassili Plateau (Tschudi 1955). She took photographs and made colour copies of the paintings which she published in 1955. Her book was the first monograph with a systematic description of the Tassilian paintings and also the first attempt at a chronological classification of these paintings. In the same year, Fabrizio Mori began to study rock art and systematically excavated within the region of the Tadrart Acacus (Mori 1956). At the end of the

1950s the Italo-Libyan Joint Mission, directed by Mori, was formed and it has been carrying out research until the present day. In the 1954 the French geologist Jean-Michel Freulon documented an important painted shelter in the Algerian Tadrart, named after him, Abri Freulon (Freulon 1954).

Between the 1956 and 1957 France organised the largest "rock-paintings-mission" to the Tassili Plateau, headed by the ethnographer Henri Lhote, however his team had no members specialising in either archaeology or rock-art (Lhote 1958). The purpose of the expedition, guided by a local Touareg Machar Jebrine ag Mohamed, was to find as many prehistoric paintings as possible and make coloured life-size copies of them. The working technique involved the direct copying of the paintings onto tracing paper attached on the rock wall. As the team found out, paintings were much more visible if moist, so that every image was washed with a wet sponge. This set a precedent for future recorders and guides and as a result within a few decades much of the pigment had been washed away. In a number of cases paintings have almost completely disappeared. Moreover, some members of the mission painted several "fakes" in shelters so credibly that they were reproduced and discussed in books of Saharan rock art until the 1990s as genuine prehistoric paintings (Keenan 2003; Fouilleux 2005). It was this mission that gave the name Round Heads to the artistic complex and it was adopted by all successive scholars.

As evident from this brief historical overview the exploration of the Central Sahara was made on strong colonial basis, the Tassili and the Algerian Tadrart being in the sphere of French and the Tadrart Acacus being dominated by Italians. These two countries appropriated non-written rights to the research in their ex colonies and the denial of access to academics of other countries has been an on-going problem ever since. A further negative impact of this division is that archaeological research in the two countries resulted in quite divergent outcomes. Whereas in the Acacus the study of the rock-art has been accompanied by systematic excavations, in the Tassili, exclusive attention has been paid to the rock-art. In 1956, Lhote carried out several non-professional excavations but the unearthed material not only disappeared into private collections but also the work has never been properly published. The publications resulting from the Lhote's work in the Tassili are essentially non-scientific narratives (Lhote 1958, 1976). No systematic excavation has ever been undertaken on the Tassili Plateau where there is the greatest concentration

of the Round Head paintings, which is a grave omission considering there is a potentially undisturbed stratigraphic sequence of deposits.

Since both the rock art and archaeology in the study area have, for over the fifty years, been dominated by French and Italian scholars (and only in a few cases have local academics, Algerian or Libyan, been involved in the archaeological research and publishing), the majority of the publications have been written in French and Italian. Only a few of them have been translated into English which has further limited the knowledge of the Central Saharan rock art and archaeology for those scholars whose access to sources is only done through English.

Regarding the earliest paintings and particularly the Round Heads, only three publications dealing exclusively with them have been published. The first book entirely dedicated to Round Heads was published in 1994 by Sansoni. He developed elaborate typological tables of head-shapes, masks and body decoration motifs in 34 sites in the Tassili n'Ajjer and the Acacus. These styles are arranged in the chronological order into the archaic, medium, medium-evolved and evolved phase. The chronology is assessed in terms of both superimpositions and the presumed order in which figures were executed on the various parts of the wall, considering that figures in the central part are older, and peripheral ones are younger.

Soleilhavoup published the stylistic and chronological assessment of the Round Head paintings and in some cases he also gives description of places and records their photographs (Soleilhavoup 2007). He is one of the rare authors who also dared to interpret these paintings using shamanism as the main interpretative theory. Presumed early forms of the Round Heads in the Djado mountains in Niger have been studied and published by Hallier and Hallier who hypothesize that the Djado Round Heads were the original forms of the Round Heads in the Tassili (Hallier & Hallier 1999). Contrary to the general opinion (Muzzolini 1995a) that Round Heads are only painted, the Halliers state that in the Djado they are both painted and engraved.

This book aims to bring information about some aspects neglected in previous studies, mainly the analysis of sites and the chronological assessment of paintings in terms of climatic and archaeological data. Moreover, new topics are presented, namely the interpretation of painted compositions and painted sites using comparative and ethnographic studies.

Climatic changes in the Central Sahara

Over the last 20,000 years, the Sahara passed through various climatic events, ranging from very arid conditions to a humid climate with abundant precipitations, which were of critical importance for the development of Saharan societies (Barich 1998a). This book focuses mainly on the period of transition between the Late Pleistocene and the Early Holocene as it is the crucial phase in the origin and evolution of the Round Head paintings.

Tassili n'Ajjer is a 1500–2100 m high Plateau, extending over 800 km and covering 80,000 km^2. It is composed largely of sandstone which has been subjected to millennia of erosion resulting in natural rock arches, shelters, canyons and other singular landforms being formed. The range forms an escarpment in the central-western part whereas in the north-west, east and south it dips gradually. To the south, the intra-Tassili fault separates the Tassili n'Ajjer from the Algerian Tadrart which forms a continuous mountain range with the Tadrart Acacus in Libya, both massifs being divided by a political border. They are sandstone Plateaus reaching 1300 m of height; Acacus on the east and Algerian Tadrart on the south slope becoming less and less marked with isolated small massifs surrounded by sandy desert. Ancient riverbeds called wadies cut across the Plateaus; they are filled with sandy and silty fluvial sediments including archaeological material (Cremaschi & Trombino 1998).

Most studies of Saharan rock art deal with climatic changes (e.g. Sansoni 1994; Muzzolini 1995a; Barich 1998a; Jelinek 2004; Le Quellec 2006b). Authors agree with the incidence of a very long arid phase occurring between the Late Pleistocene and Early Holocene, from about 20,000 to 10,000 years BP. Called a hyper-arid period, it was considered an extremely dry phase present in the whole territory of the Sahara for ten thousand years, followed by a humid Holocene phase. Indeed, excavations in the Acacus (Barich 1987; Cremaschi & Di Lernia 1995) and in the Tassili (Aumassip 1980-1) confirm a Late Pleistocene arid stage, identified as a layer of sterile aeolian sand. Pleistocene fossil dunes were found as far south as 12-14°N (Hachid 1998), confirming that the Sahara extended up to 450 km southwards into the Sahel.

The succession of dry and wet climatic phases throughout the Quaternary led to the widespread conviction that the impact of such changes had been homogeneous throughout the Sahara, causing it to become by turns, favourable and densely populated, or hyperarid and uninhabited.

According to this scenario, the Sahara would have acted as a "pump", pushing human and animal populations towards its borders during the arid periods and drawing them inwards again at the onset of each humid fluctuation. The general belief had long been that during the Late Pleistocene hyper-arid phase the Sahara was an empty area, repopulated only with the beginning of the Holocene around 10,000 BP.

Further and more detailed studies of the palaeoclimate, palaeo-environment and palaeohydrology in recent years (Cremaschi & Di Lernia 1999; Gasse 2000, 2006; Maley 2004) have shown that the sequence of climatic fluctuations was considerably more complex. However, climate information in the Sahara still suffers geographical and methodological gaps. The climatic evolution of some regions is still poorly documented and most records are undermined by low time resolution (Gasse 2000). According to Vernet (2002) little progress will be made in the knowledge of the evolution of human settlements in the Sahara until we are able to reach a century-level of precision in the climatic resolution, or ideally a quarter of a century level of precision–that is, the level of a human generation. While radiocarbon age determinations may provide satisfactory measures of acute dry episodes, they do not give much information about the intermediary stages. As a result, the arid and humid periods appear to have lasted for up to one or even several thousand years without any oscillation.

The main deficit in the past studies of the climatic changes relating to the Saharan rock art was the fact that no distinctions between lowlands and mountains were made, except for the Acacus (Cremaschi & Di Lernia 1998), and climates of various regions were not considered or challenged. Instead, equal conditions were applied to the whole Sahara even though it has been shown that various and often neighbouring regions at the same time could have experienced very different climates (Cremaschi & Di Lernia 1999; Gasse 2006; Maley 2004). Differences between regional climates have not been considered in the rock art studies, particularly in the study of the origins of the earliest rock art, its distribution throughout the Sahara and its chronological assessment. Although we do not possess detailed climatic data for the whole Central Sahara, the data available suggests which areas may have been suitable for living in a certain period and indicates probable human movements.

Regional climate is closely related to human occupation and also to lifestyle and cultural development. Climatic events hold consequences for

ecosystems in terms of the quality, amount and distribution of water and food resources, and cause modifications to the landscape, which may result in cultural changes in one or several groups. The impact of a change in one region inevitably spread, triggering a range of cultural developments in a large area (Hassan 2002:327). A brief incident may be absorbed with no major consequences, whilst a series of climatic crises spread over a generation is likely to push human groups into moving in search of less hostile conditions, or to modify significantly their mode of adaptation to the ecosystem (Vernet 2002).

Climatic changes may therefore provoke cultural adaptations; several abrupt and severe dry episodes may have stimulated a variety of responses, such as demographic shuffle; dispersal or aggregation; adoption or creation of technological innovations; development of a variety of food producing modes; evolution and transformation of social and political organizational arrangements; or the instigation of certain ideological beliefs and ritual practices (Hassan 2002:11). After an arid phase, a humid climate with its abundance of water and food resources probably altered the settlement patterns, tools, social structures and population dynamics. Climatic and consequential environmental changes may have been a potent stimulation of ideology affecting religious behaviour, and may have represented the input for the origin, spread and evolution of Round Head art.

The period starting about 20,000 BP was relatively dry throughout North Africa, with a maximum peak of dryness around 19,000 BP. After this period the climatic evolution was very different region by region and drier or more humid conditions were seldom experienced simultaneously over the entire region, showing that the Sahara did not behave as a unitary climatological system (Table 1-1).

Except for the Acacus, the region is not very well documented from the climatic point of view. No detailed studies were done in the Tassili nor in the Algerian Tadrart, they are however, situated between the Acacus and the Hoggar for which we possess some climatic data. These mountainous ranges form one geographical region with similar features, so that their global palaeoclimatic and palaeoenvironmental conditions may be reconstructed. The period around 20,000 BP was rather dry in the Hoggar but wetter conditions are attested between 19,000 and 16,000 BP (Street & Gasse 1981). From approximately 15,000 years BP Hoggar experienced a cold humid climate with continuous rainfall and probably snowfall in high altitudes. At 10,200 BP lakes in the lowlands were fed by wadies running

off the Hoggar and at 4,000 BP Hoggar still fed the underlying hydrological network (Vernet 2002).

The Acacus followed a very similar pattern. There is a frequent occurrence of travertine, mainly inside shelters, which appears to be related to the emergence of springs. The U/Th dating indicates that the travertine formed from 15,600 to 9,700 BP and since the travertine formation is related to an important increase in precipitation Cremachi (1998) suggests that this was the wettest period in the Acacus. Dating of travertine yielded no date younger than 9,000 BP, indicating that in the highlands precipitation decreased around this time. However, dating of lake sediments indicates that open water bodies were widespread in the adjacent dune fields between 9,000 and 8,000 BP. The humid phase was interrupted by a period of aridity lasting several centuries, from around 8,000 to 7,500 BP, followed by another humid phase. The massif indicates a progressive desiccation from around 5,000 BP whereas the wadi Tanezzuft between the Acacus and the Tassili escaped desertification for further millennia and was fed by a large river (Cremaschi 1998; Cremaschi & Di Lernia 2001).

Whilst the humid period in the Acacus Mountains is certainly attested at 15,600 BP, the underlying plains seem to have experienced arid conditions for at least five more millennia. Though there have been extensive dating and archaeological studies of palaeolake deposits in lowlands around the Acacus, none of these lakes appear to be older than 10,000 BP and their levels were at their highest between 9,500 and 7,000 BP. Lake sedimentation was interrupted between 8,000 BP and 7,300 BP, coinciding with the arid phase in the Acacus Mountains. Lakes high-stand was attested around 6,600 BP but it reached a minimum between 5,500 and 4,000 BP. The lakes still existed in the 6th millennium BP, but their levels were dropping at this time (Cremaschi 1998).

The Tibesti Mountains, situated on the South-East of the Hoggar-Tassili-Acacus region, present very similar climatic conditions. Important lacustrine formations developed during the Late Pleistocene between 20,000 and 15,500 BP, and also between 15,000 and 12,500 BP, and attained very high levels associated with both important precipitations and a reduced evaporation linked to lower temperatures (Street & Gasse1981; Maley 2004). The temperatures between 20,000 and 15,000 BP were circa 10°C lower than today, so that most of the precipitation was probably in the form of snow and the vegetation was restricted to lower altitudes or to

sheltered areas. Pollen analyses indicate a wet atmosphere associated with a regional development of fog occurring near large lakes during a large part of the year. After 15,000 BP the temperature increased considerably. The existence of lakes was continuous during the Early Holocene, however with several short regressive phases; the last lacustrine formation occurred circa between 7,100 and 6,500 BP (Petit-Maire et al. 1991; Maley 2004). From about 5,000 BP conditions began to deteriorate irregularly; the lakes started to dry up, although some re-expanded slightly around 3,500 BP.

In the mountains of southern Sahara (Air and Adrar Bous in Niger) and eastern Sahara (Jebel Marra in Sudan) similar lacustrine and fluviatile formations have existed during the same period. The Jebel Marra, situated to the South-East of the Tibesti, also experienced humid conditions during the Late Pleistocene and lacustrine deposits are dated from about 20,000 BP (Maley 2004). The Red Sea Hills in the eastern Egypt also follow a similar climatic pattern. Between about 20,000 and 12,500 BP the eastern bank of the Nile was very active, confirming a large watercourse flowing from the Red Sea Hills. However, the western bank of the Nile had almost no discharge during the same period and the return to wetter conditions in this region occurred only around 12,500 BP (Harvey & Grove 1982; Maley 2004).

It is evident from this overview that the Central Saharan mountainous regions did not suffer a hyper-arid climate during the Late Pleistocene, between 20,000 and 10,000 BP. On the contrary, these regions experienced very wet climatic conditions during the whole Late Pleistocene, throughout the Early Holocene and until the Middle Holocene, although interrupted by several short dry events. As mentioned above, the literature dealing with the Saharan rock art indicates a long dry period preceding the Early Holocene and causing the complete depopulation of the whole Sahara (Muzzolini 1995a,b; Barich 1998a). The hyperarid climate did exist in the Sahara during the Late Pleistocene but only in the low altitude regions, which are presented in the next paragraph.

In the Saharan lowlands the Late Pleistocene is characterised by a long arid phase. Eastern Saharan lowlands in Sudan and Egypt experienced hyper-aridity with intense aeolian erosion. The climate switched to semi-arid about 10,000 BP and a sequence of three wet phases has been recognised from about 10,000 to 8,200 BP, from 8,100 to 7,900 BP and from about 7,700 to 4,600 BP (Vance Haynes 2001; Linstadter & Kropelin

2004). Between approximately 8,000 and 7,000 BP, a reduction in humidity is recorded by a drop in the flooding levels of the Nile. This dry spell during a general period of humid conditions is also registered in eastern Africa, western Sahara, the Sahel and sub-equatorial Africa. A warm dry phase between 7,000 and 6,800 BP in Egypt is coincident with the Mesolithic-Neolithic transition. These conditions appear to continue until circa 4,500–4,000 BP, when the present arid to hyper-arid conditions commenced (Lario et al. 1997).

From 20,000 to 13,000 BP a severe arid phase called the *Kanemien* occurred in the Chad Basin, causing a regression of Palaeolake Chad which did not, however, completely dry up (Maley 2004). The return of humidity at around 13,000 BP started the first palustro-lacustrine stage with a limited expansion of the Lake Chad. A second palustro-lacustrine stage at about 11,300 BP had a larger extent, and a third and still more important stage occurred at about 10,600 to 10,300 BP. After a short regression at around 9,800 BP substantial lake formations occur from 9,500 to 8,500 BP in the whole basin (Durand & Lang 1991). Lake levels remain high from 8,500 to 5,500 BP interrupted by three intermediate short-term dry out periods around 8,300; 7,100 and 6,500 BP (Ghienne et al.t 2002).

The existence of the Holocene Palaeolake Chad, called also Mega-Chad, was related to climate change that was mainly expressed by increased river influx from the humid tropics to the South, and from the northern rivers flowing off Air, Hoggar and Tibesti. These Saharan influxes were of minor importance as shown by the persistence of the lake after these rivers almost disappeared (Durand & Lang 1991). The river flows were at their maximum between circa 8,500 and 6,500 BP. The onset of higher temperatures from this period signalled the beginning of a slow, non-linear decline to present arid conditions. Temperature increases created unfavourable evaporation, and rainfall in the Sahel and Southern Sahara became more episodic. As a result, streams that once flowed year-round became increasingly seasonal and temporary and a general regression of lake levels occurred at 4,500–3,500 BP. Humid episodes at circa 3,500–3,000 BP were of short duration and by 2,000 BP the Sahara and Sahel were as dry or drier than today (McIntosh 1983).

The Western part of the Saharan lowlands also experienced arid climatic conditions in the Late Pleistocene. Taoudenni in Northern Mali is an area of ancient palaeolakes where the Holocene wet phase began only

after 9,000 BP. The return to arid conditions was effective by 4,500 BP, which is 1,000– 1,500 years earlier than 100–500 km to the south (Fabre & Petit-Maire 1988). The lacustrine and paludal deposits of the Ine Sakane sand sea, near to Taoudenni to the south-east, indicate that the end of the Pleistocene was an arid period. This was followed by an early Holocene lacustrine episode between 9,500 and 6,500 BP. The lakes dried up between 6,500 and 5,500 BP, although the water table remained close to the ground surface. After a second lacustrine episode dated between 5,500 and 4,500 BP, arid conditions developed (Hillaire-Marcel et al. 1983). A severe dry phase between 20,000 and 12,500 BP also occurred in the Niger Delta in the Southern Mali.

The climatic record from these different geographical areas demonstrates that between circa 20,000 and 13,000 BP the Saharan mountains experienced significantly wetter conditions than the lowlands, resulting in substantial differences in environments. Whilst high altitude regions had significant rainfall causing the creation of lakes, they were surrounded by extremely dry lowlands where the aridity was at its maximum. Different regional climates clearly show that at a given time and in a given region, hydrological balances may differ widely depending on local factors, such as the topography, altitude and morphology (Fontes & Gasse 1991). This evidence proves that the general statement about a long hyper-arid Late Pleistocene period affecting the whole Sahara and causing it to become completely devoid of life is no longer sustainable.

The climatic data suggest that human occupation may have been possible in certain areas of the Central Sahara between 20,000 and 10,000 BP. The assumption that the whole Sahara was empty of life during a long hyperarid period was supported by the fact that the excavations did not reveal human occupation in the Late Pleistocene (Aumassip 1980-1; Barich 1987; Cremaschi & Di Lernia 1995; Mori 2000). However, these conclusions were made from only ten excavations in a limited area of the Acacus and Tassili, completely leaving aside thousands of unexplored square kilometres of the Central Sahara. Travertine deposits in the Acacus shelters suggest that they were not suitable for human occupation during the period of maximum humidity between 15,600 to 9,700 BP because they were too wet. All over the Sahara, there are a huge amount of lithic tools outside shelters, lying on the surface without stratigraphy, and therefore impossible to date. Hachid (1998) and Aumassip (2004) noticed that the Pleistocene Aterian culture is mainly found in the open air near lakes or near mountain rivers, indicating that shelters were not always a

preferred place for human habitation.

Table 1-1 Climatic conditions in some Saharan mountains and lowlands (dates are 14C not calibrated).

Years BP	Hoggar	Acacus	Tibesti	Eastern Sahara	Chad Basin	Western Sahara
20,000-19,000	dry	dry	increasing wet	dry	dry	dry
19,000-16,000	increasing wet	dry	wet	dry	dry	dry
16,000-13,000	wet	wet	wet	dry	dry	dry
13,000-10,000	wet	wet	wet	dry	wet	dry
10,000-8,000	wet	wet	wet	wet	wet	increasing wet
8,000 - 7,000	drier	drier	drier	dry	dry	dry
7,000 - 6,000	wet	wet	wet	wet	wet	wet
5,000 - 3,500	wet	increasing dry	increasing dry	wet	wet	increasing dry
3,000	dry	dry	dry	dry	dry	dry

Yet, the same excavations prove that there was also a human frequentation of these territories during arid phases. The oldest stratigraphic unit at the base of the sequences of the Uan Afuda and Uan Tabu caves in the Acacus, consists of reddish aeolian sand which can be correlated with remnants of fossil dunes existing locally outside the caves (Cremaschi 1998). Both in the Uan Afuda and the Uan Tabu, this unit includes middle Palaeolithic tools which are attributed to the Aterian culture and are dated to the Late Pleistocene between 90,000 and 60,000 BP (Garcea 1998; Cremaschi & Di Lernia 1995). According to Cremaschi (1998), these sand deposits have to be interpreted as evidence of a general desert expansion during the Late Pleistocene, however, as indicated by collapsed blocks and artefacts inside the sequences, the climate may have

had some moist oscillations during an arid phase.

Given the great regional variability of the climate, in a limited area the aeolian sand layer is unlikely to indicate a totally dry climate in the whole Sahara. The presence of lithic tools inside sand layers suggests that an ecological niche suitable for living had to exist within walking distance of the sand dunes, or that human groups adopted adaptive strategies in an arid environment. Eroded artefacts were also found in the lowlands of the Gobero area, north-west of Chad Basin, suggesting that there were transient hunter-gatherers during the dry phase between 16,000–10,000 BP (Sereno et al. 2008).

As evident from the climatic data, mountainous regions had enough humidity for people, animals and vegetation to survive in the Late Pleistocene. Since these ranges are more than 1000 m high, they were probably covered by snow during winter, at least at the highest points. In lower altitudes the precipitations probably occurred in the form of rain, which is attested by the presence of lakes. Thus, the borders of central Saharan massifs, with water available during the whole Late Pleistocene, may have served as refuges for hunter-gatherers.

Hachid (1998) suggests that the ground water stayed near the surface for a long time even when the area had become arid. According to Barich (1987) the morphological and especially hydrogeological conditions of the Acacus massif have favoured human occupation, particularly during the Pleistocene and Holocene times of limited aridity. The groundwater resources which accumulated during the moisture-rich phases remained over long periods of time and released slowly, thus favouring the existence of vegetation and the survival of fauna and people. This determines the formation of micro-climates (such as local precipitations and greater atmospheric humidity), especially in the most protected areas within the massif.

Furthermore, little is known about the way in which water tables evolve. Scholars are more and more inclined to believe that modest variations in the level of a water table may have a significant effect on existing open water fields; they can make them disappear or make new ones appear (Vernet 2002). According to Vernet (2002:49) changes in the ecosystem may have occurred without any great variations in the level of precipitation and a semi-arid Sahara could possibly have hosted prosperous human societies. We also know little of the vegetation and

fauna's capacity to resist a dry episode and to regenerate itself, which is crucial for a full understanding of the evolution of human settlements. Lezine (2009) states, that although man closely depends upon access to natural resources, he is, nevertheless, able to adapt to the extreme conditions of deserts. A continuous human occupation of certain regions of the Central Sahara between 20,000 and 10,000 BP cannot therefore be excluded.

Archaeology in the Central Sahara

The archaeology of the period between 20,000 and 10,000 BP in the Central Sahara suffers substantial gaps. The lack of excavations and the impossibility of dating surface material mean that we still do not know which cultures occupied this region in the Late Pleistocene. The period before 20,000 BP in the Sahara was preceded by a humid or semiarid period during which a so called Aterian culture existed (Tillet 1997; Garcea 1998). The Aterian industry is considered typically African (Hachid 1998) and it is diffused across the whole Sahara to the Mediterranean coast. The typical artefacts are tanged points and other peduncular tools. Poorly dated, the Aterian was originally thought to be associated with a humid episode between 40,000 and 20,000 BP. However, recent radiocarbon measuring have provided dates that support an age greater than 40,000, namely from 60,000 to 20,000 (Cremaschi,et al. 1998; Garcea 1998) which suggest that this culture lasted much longer than 20,000 years. The evidence from the Acacus shows that the Aterian may be earlier in the Sahara than in coastal Mediterranean Africa. Considering the wide geographical extension and its long time span, different Aterian groups exhibiting various cultural traditions and diverse adaptations must have occupied North Africa.

The final stage of the Aterian culture is not clear. Most scholars believe it ended with the arrival of the supposed hyperarid period at 20,000 BP, provoking the retreat of the Aterians to other zones outside the Sahara (Tillet 1997; Hachid 1998; Barich 1998a). According to Tillet (1997) the Aterian at Adrar Bous in Niger did not last until the Neolithic since there is, following the Aterian and after a long arid interval, a pre-Neolithic industry, called Ounanian. This represents a new cultural element that is not typologically intermediate between the Aterian and the Neolithic. There remains a blank period between 20,000 and 12,000 BP, which may be explained by the unfavourable arid climatic conditions. However, the same author points out that the Aterian at Adrar Bous dated at 18,000 BP

may indicate that life was perhaps still possible in the Sahara due to the existence of a few springs running on the mountain piedmonts. This would imply that the borders of Central Saharan massifs could have served as refuges for Aterian populations (Tillet 1997:19).

Whilst Tillet (1997) does not believe that the Aterian evolved into the Epipalaeolithic, Aumassip on the other hand, sees a certain continuity in the technology of the lithic industry from the Aterian until the Epipalaeolithic. This author also believes that human groups survived in some ecological niches until the Early Holocene, which would be confirmed by the dating of the Aterian in the wadi Saoura (northern Sahara) at 14,350 BP (Aumassip 1986; 2004). Further research is needed to support or negate the hypothesis of the continuity of human occupation in the Central Sahara in the Late Pleistocene, and the possible evolution of the Aterian to the Epipalaeolithic culture.

The period starting at about 10,000 BP is archaeologically quite well documented although the terminology for the Early Holocene Saharan prehistory is not uniform. Most of the terms used in African prehistory derive from European and Near Eastern contexts (Di Lernia & Garcea 2005). The most problematic are those contexts involving the earliest Saharan pottery, which is amongst the oldest in the world. The unfortunate archaeological consequence of a long presence of Saharan ceramics is that prehistorians have been unable to agree on how to interpret their economic significance. For Francophone scholars the mere presence of ceramics necessitates the use of the term "Neolithic" to describe the societies possessing them, even if they are not coupled with evidence for domestication or agriculture. For Anglophone scholars, on the contrary, the fact that most early ceramics are not associated with evidence of food production has disallowed any use of the term "Neolithic" and they are seen as part of the Late Stone Age.

This book uses the terms applied by Italian scholars as they seem to be the most appropriate for the Saharan context. For the societies with already attested food production, which is based on domesticated cattle and/or goats, the term "Pastoral" is used. The term "Pre-pastoral" is used for human groups of the Early Holocene without food production and preceding the Pastoral phase. These are hunter-gatherers who can be divided into two chronological and cultural groups, namely the Epipalaeolithic for the earliest and the Mesolithic for the more recent one (Garcea 1995; Cremaschi & Di Lernia 1996a,b).

With the onset of the humid climate in the Saharan lowlands a human presence in the whole region is abundantly attested. In the southern part of the Central Sahara the Early Holocene culture, termed the Saharo-Sudanese Neolithic, was recognised which introduces to the Sahara certain characteristics identified by Arkell in the Sudan, at a time when work on this culture was still in its infancy (Arkell 1947; Hugot 1974). The first definition of the Saharo-Sudanese Neolithic was important in having affirmed the theory of a fundamental cultural unit in both the Sahara and the Nile Valley in the Holocene period. Further research recognised two distinct cultural horizons which were previously included under this single label. In the first, at the very end of the Pleistocene, there are signs of the first steps towards the deliberate selection of plants and animals. The second, in the Middle Holocene, is characterised by the practice of pastoralism, indicating substantial economic and social change (Barich 1998a). The basis for the identification of the Saharo-Sudanese Neolithic was the presence of pottery with impressed decorative motifs called *dotted wavy line,* which was found from the Nile valley to the Tassili region (Mori 2000).

The Saharo-Sudanese Neolithic is mainly identified in the Saharan lowlands and its settlement pattern consisted of open sites located near ancient water bodies. Due to the frequent presence of sites on the shores of the palaeolakes and rivers, this same culture was also termed "Aquatic civilisation" (Sutton 1977). Indeed, during the wet phase of the Early Holocene, which started at around 9,500 BP, fishing and the exploitation of other aquatic food resources played a large part in the economy of a vast area of the central and southern Sahara from the Nile Valley to Mali. Although hunting and gathering continued, the pre-eminence of fishing allowed larger populations to remain for longer periods of time at individual sites. Bone harpoon heads and *dotted wavy line* pottery were the characteristic artefacts of this development (Haaland 1992).

Despite the basic typological similarity of the bone harpoons and the pottery over a very wide area, the associated lithic industry shows considerable variation and they appear to be rooted in distinct local traditions. It seems most satisfactory to regard these industries as representing a natural adaptation to a common economic opportunity in a humid environment, rather than to consider them as belonging to a single uniform culture.

The Middle Holocene is dominated by the Pastoralism which spread

throughout the whole territory of the Central Sahara. However, the beginning of Saharan domestication is not yet firmly established. One of the earliest dated findings of domestic animals in the Central Sahara is at Uan Muhuggiag in the Acacus, dated to 6,035±100 BP (calBP 6,914±138) (Mori 2000) but the beginning of domestication probably started at least one millennium earlier. In the Nabta Playa and Bir Kiseiba sites of Western Egyptian desert, bovid bones dated to around 9,200 BP are considered domesticated, although this is not accepted by all scholars (Gautier 1984; Smith 1992; Gifford-Gonzalez 2000). It is generally considered that domestic cattle were present in the Central Sahara as early as 7,500 BP and ovicaprids several hundred years later. Clearly identifiable domestic ovicaprids first appeared in the African continent at around 6,800 BP in Northern Libya (Cremaschi & Di Lernia 1996a). A pastoral culture of the 6th and 5th millennium BP in the Southern Sahara is called Tenerian because it is represented mainly in Ténéré, a vast region stretching from the Tassili, Air and Tibesti massifs.

Table 1-2 The oldest Saharan pottery.

NIGER	10,500±780 BP 9,370±130 BP (10,637±216 calBP)	T.L. 14C	Tagalagal (Air)
	9,350±170 BP (10,642±273 calBP)	14C	Tamaya Mellet (Air)
	10,500±750 BP	T.L.	Adrar Bous
ALGERIA	9,420±200 BP (10,726±300 calBP)	14C	Tin Hanakaten (Tassili n'Ajjer)
	9,210±115 BP (10,412±130 calBP)	14C	Abri Launay (Hoggar)
LIBYA	8,950±55 BP (10,074±109 calBP)	14C	Uan Tabu (Acacus)
	8,790±93 BP (9,873±192 calBP)	14C	Uan Afuda (Acacus)

The Central Saharan ceramics are an important cultural and chronological indicator (Table 1-2). The earliest pottery was discovered in Niger at the site of Tagalagal in the Air Mountains. The direct dating of the shards by thermoluminescence was 10,500±780 BP and 9,820±780 BP and 14C dated to 9,370±130 BP. Another site in Air, Tamaya Mellet,