## Abstract

Different emphases on ideological, socio-economic and technological changes have been brought to bear on the cultural variability made materially manifest in pre-Iron Age Saharan pastoral societies. The models have ranged from limited or no complexity before iron production to transient mobile elites across the Sahara, to socially complex communities from the mid-Holocene onwards in the Central Libyan Sahara, and to permanent elites with complex social structures. Here, ethnographic cultural variability is stressed, previous models detailed, and data for the Eastern and Central Sahara summarised and analysed. The emerging picture is of a mosaic of population movements, clustering and experimentation resulting in transient peaks of wealth and the potential for incipient social complexity to become temporarily or permanently manifest. Saharan social diversity serves as a warning against linear models and highlights the importance of an explanatory framework for investigating the evolution of social structures outside of permanently settled communities for North Africa.

## Keywords

Pastoralism, Sahara, mobile elites, social complexity, North Africa.

## Introduction

For the past 40 years in North African archaeology, debates over cultural variability have been central to research into the origins and manifestations of pastoralist activities, burials and settlements (Smith 1986, 1992, 2002; Gautier 1987; Wendorf & Schild 1994; MacDonald 1998b; Blench & MacDonald 2000; Wendorf *et al*. 2001; di Lernia & Manzi 2002; Lenssen-Erz *et al*. 2002; Brooks 2006; di Lernia 2006, 2013; Kuper & Kröpelin 2006; Riemer 2007; Sereno *et al*. 2008; Kobusiewicz *et al.* 2010; Linseele 2010, 2013; Garcea 2013; Stock & Gifford-Gonzalez 2013; Barich *et al*. 2014; Manning & Timpson 2014; Brass 2015, 2016, 2018; McDonald 2016), the origins of the first West African towns (McIntosh 1994, 1999b), complexity of pre-Iron Age Saharan pastoral communities (McIntosh & McIntosh 1988; McIntosh 1998; Magnavita 2004; Brass 2007; di Lernia 2013) and the first manifestations of social elites amongst early pastoral societies (Paris 1995, 1997; MacDonald 1998b; Biagetti & di Lernia 2013; di Lernia & Tafuri 2013; di Lernia *et al.* 2013).

Here, a summary overview is presented on the existing state of research into the social organization of early Saharan pastoralists. To date, the focus of archaeological expeditions has been on the Egyptian, Libyan and western Sahara. The primary focus is on Nabta Playa and the Central Sahara (Fig.1). Variations in the difference between, the occurrence of exotic goods from long distant sources, cumulative inheritance systems and evidence of internal and external ethnic divisions are expressed through a framework of relations in continually reconstituted and shaped landscapes (Wynne-Jones & Kohring, 2007; Wynne-Jones & Fleisher, 2015). I argue that the appearance of fixed focal loci in the landscape, together with items of prestige goods with distant origins serving as social currency in particular circumstances (MacDonald 2011a), correlates with the shift from *Bos* to human burial tumuli around 4000 BC, and marks the first signs of a separation between political and religious leadership through vertical hierarchical differentiation. Such instances, which were not uniform but variable in different parts of the Sahara, were socially mediated activities involved in the validation of the social, ritual and symbolic importance of multi-layered social systems involving surplus production, elitist privileges and delayed reciprocity.

**Figure 1**. The Mid-Holocene North African pastoral regions covered. *Adapted from* (MacDonald 1998b, 36)*.*

### 1.1 Background

Early to Middle Holocene North Africa has previously been stereotyped as a monolithic culture in two hypotheses: the African Aqualithic (Sutton 1974, 1977) and the *Néolitique de Tradition Soudanaise* (Camps 1974). Lithic diversity was ignored in favour of a broad-based cultural tradition defined by remains from aquatic activities and by the supposed observance of wavy-line and dotted wavy-line pottery. However, objections have been raised. A reanalysis of Saharan pottery concluded that wavy-line pottery constitutes a pottery mode-tradition rather than a horizon style, thus restricting the value and applicability of the Khartoum Horizon Style to the dotted wavy-line component only for the Sahara-Sahel Belt (Mohammed-Ali & Khabir 2003). The dotted wavy-line motifs frequently appear with other motifs on the sherds, reducing their diagnostic value and highlighting the cultural variability of the region in the early Holocene. A more fundamental issue lies in the typological classificatory systems employed: there was and remains primacy placed upon the appearance of motifs rather than the tools which made them, thereby undermining classification by elements of technical style, involving identification of the tools, their corresponding motor actions and their single and co-occurrences, which is normally a more reliable indicator of social boundaries (Haour et al. 2010; MacDonald 2011b; Brass 2016, 28-70). This approach seriously questions the diagnostic utility of such pottery classifications and too-broad interpretations arising from them.

Susan Keech McIntosh and Roderick McIntosh (1988) have previously argued there was no social complexity in West and Saharan Africa before the advent of iron production. Influenced by the ferrocentric tenets of *Technology, Tradition and the State in Africa* (Goody 1971), they dismissed early Saharan pastoralists as the progenitors of social complexity and downplayed the importance of Late Stone Age Dhar Tichitt (Mauritania) (McIntosh & McIntosh 1988, 101-2).

Roderick McIntosh (1993, 1998) has subsequently argued there was no social complexity before corporate diversification (non-hierarchical, kinship-based, specialist communities living in symbiotic relationships) around 2000 BC, termed the Pulse Model. Ultimately, the Pulse Model rests on the principle of a heterarchical rather than a hierarchical mode of socio-political organisation. Its theoretical foundations lie in diverse but not very socially differentiated groups of people migrating out of a drying Sahara and establishing complex co-dependency relationships.

Subsequently, MacDonald (1998a) approached the issue differently. He proposed early Saharan pastoral complexity as the harbinger of sedentary West African states. His economic model of “mobile elites” relied heavily on the same data. However, it also incorporated Francois Paris’ (1996) work in Niger using tumulus fields as social and boundary markers, and evaluated the applicability of potential currency using ethnographic analogies. Tracking the presence of polished stone rings and hachettes (defined as small axes under six centimeters), he hypothesized a tandem spread of the items after the initial adoption of pastoralism across the Sahara and their use as mediums of exchange. He modelled that the spread was complete throughout the Sahara-Sahel by 1800 BC. This chronologically distributed pattern, stressing long-distance mediums of exchange with cattle serving as their repositories of wealth, was taken as indicative of incipient social complexity arising ca. 4000 BC with transitory leadership positions; these transitory peaks eventually took hold and developed into complex, hierarchical societies such as seen at Dhar Tichitt (Mauritania) (Munson 1971; Holl 1993, 1998a; MacDonald 2011b) and Kerma (Sudan) (Bonnet 1992; Bradley 1992; Bonnet & Valbelle 2005; Honeggar *et al*. 2013).

MacDonald’s hypothesis has been incorporated by Andrew Smith (2004) into a model of population movement claimed to be depicted in the rock art of the Tassili N’Ajjer. Smith (1993) relates the white-face rock art style around 3500 BC to the appearance of Proto-Berbers, while claiming that the black-face style of pre-existing populations depicts ideological similarities to modern Fulani cultural practices. Following the results of Paris’ (1996, 1997, 2000) excavations of burials and settlements in the Aïr Mountains of Niger, and his tenuous conclusion of a migratory flow of Proto-Berbers of unknown origin bringing tumuli with them, Smith (2000) brackets these events as a package. Smith (1993) has also drawn attention to the Iheren, Tassili rock art which show deference of people to an obvious elite person or people (Kuper 1978, 424-5, 430-1). The platform cairn, making its earliest appearance ca. 3800 BC in the Central Sahara, is regarded in the model as the earliest form introduced by the Proto-Berbers, who Smith (2004) postulates originated in North-East Africa.

Over in North-East Africa, the postulated degree of control over labour and the expression of ritual activity by Nabta Playa’s Late Neolithic (ca. 5000 BC) inhabitants for the construction of the cattle tumuli and stone structures has been heralded as the earliest material manifestation of pastoral social elites (Wendorf & Schild, 1998; Wendorf *et al*. 2001), while the emphasis on cattle symbols subsequently influenced the ideology of the Predynastic Nile Valley inhabitants (see Midant-Reynes 2000; Brass 2003; Warfe 2003; Barich *et al.* 2014; Dachy *et al.* 2018, amongst others, on the late Holocene Eastern Desert and Nilotic cultural networks).

These competing hypotheses share a common thread in recognising that socio-economic strategies are manifestations of behavioural adaptations whereby knowledge and culture are transmitted through social learning. They differ in the timing when the accumulated repertoire was materially expressed in a wide diversity of situations through socially mediated responses to internal or external stimuli. By now, however, the data upon which they drew has been significantly advanced by further excavations in the Central Sahara in particular.

## 2. Forms cultural organisation and the implications for prehistoric pastoral studies

The framing of archaeological research was dominated until the 1980s by a tendency to downplay the full range of social diversity while focusing on high-level society as the epitome of social formation through the development of over-arching models. These approaches have their conceptual origins in the old Enlightenment ladder of social progress. In the twentieth century, this evolutionary ladder was reworked by Elman Service (1958, 1962, 1971, 1975) and others to include a neo-evolutionary progression of band-tribe-(big man collectivity)-chiefdom-state (see, for example, Johnson & Earle 2000, Richerson & Boyd 2005) developed their dual inheritance theory which instead integrated ritual and social inequality into a model outlining how ritually sanctioned justification may be monopolized by high-ranking individuals to increase their lineage’s social status.

Such studies tended to remain rooted within a social evolutionary paradigm that conflated individual agency, identity, diverse power structures and interactions, and mechanisms of economic and social control (Wynne-Jones & Kohring 2007). The characteristics of many societies described in ethnographic studies are too variable for social and political evolution to be condensed and categorised into a three or four or five-fold sequence. Recognition of the perception and reality of variability was largely unaddressed by the Saxe-Binford paradigm. Demarcated areas are both arenas and agents for appropriation and delineation of cultural phenomena. Within them, social actions are performed which are context and historically specific. They transform the environment through their repetition and stylised actions which are effectively rule bounded performances merging the past with the present (Robb 2007). This is acknowledged in Yoffee (2005) and others’ (e.g. Chapman 2003a, b; Pauketat 2007) attempts to move beyond punctuated changes in socio-political and economic entities by focusing on developing appropriate models of social complexity at a regional scale.

Meanwhile, outside of the Anglo-American stream of archaeological thought, in Spain, Lull (2000) argued that organisation and control of behaviour should be approached through focus on social labour and social relations of production, i.e. through comparison with everyday activities, evidence for exploitation and integration with settlement patterns. Such arguments can, however, shift social representation and malleability of behaviour at an individual or sub-group level to the periphery. Consequently, drawing upon Althusser’s (1977) definition of ideology, societal beliefs function as a window through which their relationship with the world is perceived as reality (“lived relation”). At the core of the inter-dependent relations which make-up social practices are issues of dominance, influence and power. How these principles are structured delineates and shapes the behaviour of individuals, groups and communities. Although certain behaviours are legitimated by the actions of one or more dominant sectors of the society, potentially creating a mirage of independence, there are countertrends and push-backs by less dominant peoples or subversives which also form part of the inter-woven cultural fabric (Abu-Lughod 1991; Keesing 1994, 303; Reid & Lane 2004).

While acknowledging that there have been problems in its theoretical and practical application (see Brightman 1995 for an analysis), barriers or “relatively impermeable boundaries” do not form part of the standard anthropological cultural construct (Keesing 1981, 68). In this context and in this paper, culture is therefore regarded as an evolutionary process with a vibrant, inherently socio-economically variable system incorporating behaviours with impacts spanning the range from positive to negative (Castro & Toro 2004). This illustrates how culture is underwritten by a shared value system rooted in symbolic learning (Hodder 1992). Cultural structures, a higher abstraction level resting upon social organizational principles, are inherently vested with the trappings of power symbolism. This power symbolism has been defined as “a complex of thoughts, rules and practices…which describe and explain the functioning meaning and goal of a social group” (Skalnik 1996, 86).

The incorporation of symbols into the ideological trappings of political power raises questions on the integration of these processes with the continual re-negotiations of social power in social hierarchies. Delineations are required between centralized states and stateless segmentary lineage systems. In the latter, ritual and political influence have contrasting spheres of control: ritual activities in the peripheral areas are in constant flux, while the seat of political authority is centered on the core domains of the territory held in place by checks and balances of ritual sanction and institutionalized interdependence (Southall 1988b). The Nanumba political structure of northern Ghana is an example of a society whose power does not rest on the formalized structure of a state, but whose different groups and institutions function interdependently through a shared symbolic/cognitive manifestation of ritual, tradition and authority as the source of legitimation (Skalnik 1996).

Kept together by indispensable ritual needs, which require a separate system dependent upon age and physical organization, the effect of kinship units within clan and segmentary lineages is to accept subordination without coercive pressure being exerted (Bonte *et al*. 1977; Southall 1988a). Among the modern Afro-Asiatic pastoralists, the kinship unit is also the production unit, which bars access to pasture land outside units, and whose reproduction replicates the community’s inter-kinship relations (Bonte *et al*. 1977). Muller (1996) has highlighted the intertwined political and ideological groupings of the Dii and Gbaya in Cameroon as examples of different political entities. The Dii chief undergoes a series of induction rites upon his succession which are seen to legitimise his rule and provide him with the strength, knowledge and humility to govern. Through this process, the right of rulership is based on contracts between the institution of the chief, who is also the chief priest, and those who are ruled. The Gbaya are a population living to the south of the Dii. While they too are organised into clans, the difference between them and the Dii is that the Gbaya have no formalised hereditary leadership; their ideology of egalitarianism promotes a tendency to form splinter groups (Muller 1996).

Further illustration of political fluidity within and between societies with pastoral components is found in the politically stratified Eastern Tuareg of the Saharan Ahagger and in the Aïr Tuareg of Niger. They accumulate wealth in cattle, with reinvestment and its consequent work affecting the social and economic fabric of the relevant cultural unit. Their system of production relies upon a division of labour between social classes, arising from exploiting the trans-Saharan caravan trade in pre-colonial times (Saenz 1991). Tribute collection favoured conditions in which tendencies for stratification rose and flourished.

### 2.1 Detecting Complexity

Diffeential evolution and material manifestations of social complexity occur through a combination of indigenous stimuli and variables (Fried 1967). Pastoralism places opposing forces upon societal structures, for

“conflicts [are] built into a pastoralist ecology. As an important food resource, stock keeping requires a high degree of co-operation and reciprocity. But as a form of wealth, stock serves as a vehicle for articulating individual autonomy and independence. Because of this conflict, pastoralist traditions, which are otherwise variable, all feature strong concepts of authority at one level which are contradicted by strong concepts of individualism at another level.” (Meeker 1989, xii)

Constructs of societal nexus are generally orientated towards identifying either power symbols in polities such as emerging state societies (Bard 2017) or to identify the use of symbolic constructs and their usages in the formations of mortuary and political contexts (Conrad & Frank 1995; Stevenson 2009, 2016). Recently, di Lernia (2004; di Lernia & Tafuri 2013) has investigated ritual as a force for stability and change in the central Sahara.

Social complexity in modern pastoral societies is based on interacting lineages, some of whom could be engaged in specialised production activities (Southall 1988b, 185; Sadr 1991). While positions of high status are limited, with control of “spheres of exchange”, no simplistic equation can be drawn between the possession of prestige items and control of either the resource base or their distribution (Wynne-Jones & Fleisher 2015). Instead, pastoral access to status and the resource base is based on age, gender, and kinship criteria which are well defined, as are the land boundaries in which the lineages move (Southall 1988b; Hutchinson 1996).

The control over redistribution by the lineage elites involves a form of economic integration where goods accumulated by the elite, who form the center of the society, are redistributed outwards to the lower ranking members. Southall (1988b) adds that reciprocal exchanges of surpluses occur at important ritual celebrations. With the chief, who is imbued with sacred powers, monopolizing the role of feast giver and host, these rituals assume a greater importance for the health and well-being of the society (Muller 1996). Ritual leadership roles, which overlap to a degree, are present but they are primarily divorced from political structures (Skalnik 1996), with the gods being ancestors and shrines constructed for local deities. Structures in the landscape, however, are not just shrines for deities but can also be monuments for the dead which serve as an active presence in the landscape by acting as route and memory markers and memorials which influence how people identify with each other and with their social space (Saxe 1971; Renfrew 1976; McHugh 1999; Crossland 2014; Brass 2016)

### 2.2 Relations of power through landscape formations

The Saharan landscape was and remains a social space where pastoralists organized, validated and reproduced multi-layered social systems through networks of kinship, mutual reciprocity, everyday friendships and expedient alliances. As such, parts of the landscape would have been entwined with the various groups’ heritage. Moreover, places of aggregation served and serve as focal points for exchange and marriage transactions which imbue the spatial arena with social, ritual and symbolic importance (Holl 2004). These conclusions arise out of a long tradition of megalithic studies in Africa (Sivilli 2002) and Europe (Chapman 1995), with the former investigations frequently drawing upon the theoretical models developed for the latter (di Lernia & Manzi 2002).

Consequently, and keeping in mind that material expression of social structure is not necessarily a direct reflection of hierarchy amongst the living and can be manipulated for the purposes of social and ideological standing, such a social space provides avenues for competing for social recognition through display.

The actions comprising the socio-ideological construction and placement or deposition of artefacts therefore necessitate the attempt to reconstruct an appropriate framework of social processes in which it operated. For example, outside of the Sahara, MacDonald (1998a) has invoked ethnographic studies to bring additional data to bear on other possible reasons for the form and function of West African tumuli as well as on their contents. Using the concept of *N’*y*avvatyegi* (“the place where one disposes of things of the dead”), he has argued for this practice as one interpretation for the first millennium BC of the Middle Niger. For example, the large tumuli field of Zampia (Southern Gourma region) is aligned due north-south, indicative of a degree of planning over time and of social and/or ideological control. Moreover, the deposition of livestock and artefacts of the deceased demonstrate the wealth of the descendants through being able to dispose of the items without adverse effects on their own wealth, thus enhancing social status (MacDonald 1998b). This perspective centres on culture and social relations, political power and issues surrounding identity manifested in the landscape of this region.

As such, landscape refers to land forms and the objects in and experiences derived from it. Landscape is thus a mesh of unceasing activity, continually being reconstituted and shaped by humans (artificial) and nature (natural). The components comprising the totality of activities or society are not undertaken in isolation but through attention and communication of meaning (Ingold & Thomas, 2000). Society and social elites will derive differential but non-mutually intertwined meanings, cementing their idealized or ideological resonance in a relational feedback between the terrain and the “natural order” represented by the social structure. The physical and symbolic aspects would interact in a framework of relations in everyday contact, adding also the issues of identity highlighted elsewhere (Meskell 2001).

## 3. Material expressions of pastoral wealth

Inferences can be drawn on the socio-technological and ideological composition through examining the culture’s shared value systems. The procurement, distribution and consumption of resources are socially mediated through the decision-making processes available. Differing structures will result in patterned divisions, with implications for the socio-economic systems. Moreover, pastoral transhumance plays an important social function, being interwoven with rites of passage, such as with the Baxtyari (Digard 1981).

MacDonald (1998a) has proposed that polished stone rings and hachettes did not serve a functional purpose, as advocated by other scholars for hachettes (Smith 1974; Amblard 1983; Vernet 1993), but as a primitive medium of exchange between pastoral societies across the Sahara and Sahel. Drawing on ethnographic examples of the value of hachettes and stone rings, MacDonald constructed a model in which the objects were used as a means of resolving cattle wealth inequality in clan lineages. Cattle are used today in West Africa as a medium of exchange for payments like bride wealth and in trade. However, cattle herds can be drastically reduced through raiding, drought or pestilence, and there are difficulties inherent in attempting to insure wealth amidst the myriad of diverse socio-economic cultures across the Sahara and Sahel. The stone rings and hachettes are viewed as media of exchange and “insurance” to add stability to this system.

The first hachettes are known from Merimde where they occur without stone rings, ca. 5000 BC (Hoffman 1993; Midant-Reynes 2000). The two object categories are first found in tandem ca. 4500 BC at Adrar Bous (Niger) (Fig.2) and Meniet (Algeria). MacDonald (1998a, 77) claims that “their spread seems to follow the expansion of the pastoral way of life, arriving throughout Sahelo-Sudanic Africa by ca. 1200 BC”.

**Figure 2**. The sites in and around the Air Mountains, Niger. (1) Gobero. (2) Adrar Bous and Agoras in Tast. (3) Talak-Timersoi. (4) Iwelen

The dates given for the Saharan appearance of the objects are diverse, suggestive to MacDonald of transitory peaks of wealth but are not in themselves indicative. Rather, they were widely though discontinuously used in stone areas across the Sahara to work against the advent of crises by giving a durable means of storing wealth and “obligation”. Their presence is viewed as a symptom of a system of socio-economic stability, not as a proof of differential wealth. Instead, MacDonald (1998a) would see monumental tumuli as evidence of inequality.

By contrast to the appearance of tumuli, Holl (1993) has argued for the use of spatial patterns both within and between settlements for understanding the emergence of social complexity, through markers such as the structure of domestic space, the structure of the site layout, settlement patterns, and regional settlement relationships.

Ultimately, there have been different arguments over theoretical and practical issues surrounding the timing and causes of cultural trajectories against a backdrop of changing Holocene climatic conditions. Micro-analyses depend upon the availability of representative sets of high-quality radiocarbon dates from secure and well-defined stratigraphic contexts. The cultural responses to these changing conditions may include rapid technological innovation to enhance subsistence activities, diversification of the food base, demographic and socio-economic re-organisation, and abandonment.

di Lernia (2004) has outlined the problems faced by Saharan archaeology due to currently small numbers of radiometric dates outside a handful of localities, resulting from the necessity to date the normally small organic fragments preserved in Saharan remains via costly AMS methods. These factors impact on the micro-level resolution needed to discern intra- and inter-site and regional changes and the processes involved.

The importance in resolving these problems is highlighted particularly by the appearance of cattle tumuli at Nabta Playa by around 5400 BC, and two cattle tumuli from Adrar Bous (Site AB S1) dated to ca. 5200 +/- 300 and 5100 +/- 270 BC respectively (Paris 2000; Roset 1987; Wendorf *et al*. 2001). di Lernia (2004) hypothesises a spread of the African Cattle Complex from Nabta Playa across the desert to at least the Central Sahara within a relatively short period. He has questioned the temporal viability of “leap-frog”, small demographic shifts in early pastoral movement (Hassan 2000) to solely account for the Complex’s diffusion.

Contrary to di Lernia’s view of cattle tumuli spreading from the Bir Kiseiba-Nabta Playa region to the Central Sahara through a population movement westwards, the ceramics of the Central Sahara have been taken by others (Caneva & Marks, 1990; Mohammed-Ali & Khabir, 2003) to indicate Central Saharan influences on pottery decoration and cultural traditions of the Eastern Saharan and Nilotic cultures. Garcea (2001) believes a climatic deterioration, seen particularly in the Libyan Saharan site of Uan Telocat, would have forced a population movement eastwards. However, these hypotheses do not consider whether the manifestations in the central Sahara were instead the product of local evolutionary processes and the hypothesis of dotted wavy-line pottery in the Sahara pre-dating the Nile Valley has been challenged by contemporary dates at Al Khiday just south of Khartoum (Salvatori 2012). This does not mean that there were not movements or cultural links between the regions but rather that it cannot be reduced to simplistic equations.

## 4. The appearance of early cattle tumuli

At the northern end of the Nabta basin lies a cluster of nine tumuli, seven of which have been excavated (Applegate *et al*. 2001) (tables 1, 2). . The famous articulated cow tumulus of Site E-94-1N, bracketed by the excavators at ca. 5400 BC (its radiocarbon date of 6480 +/- 270 bp has a wide one sigma error range of 5976 – 4835 cal. BC) with its burial pit and hypothesised wooden roof, is an example of the former; the latter comprises of disarticulated cattle tumuli (E-94-1S, E-96-4, E-97-4, E-97-6, E-97-16). No body part is represented in a statistically significant greater number. Potentially significant is the presence of a human burial within the ceremonial complex at E-97-5, as the other human remains come from the settlement areas. E-97-5 contained no associated animal remains and the lack of a cranium is suggestive of removal.

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| **Region** | **Site** | **Cattle-associated tumuli** | **Formal human burials** |
| Central Sahara |  |  |  |
|  | Adrar Bous (Air) | 5200 BC |  |
|  | Agoras in Tast (Air) | 4600 BC |  |
|  | In Habeter (Messak Settafet) |  | From start of 4th millennium |
|  | Gobero |  | From late 6th millennium for the Middle Holocene occupation |
|  | Wadi Bedis and Wadi Tin Einessnius (Messak Settafet) | From late 6th millennium BC |  |
|  | Wadi Tanezzuft (Acacus Mountains) |  | From mid-late 4th millennium |
| Eastern Sahara |  |  |  |
|  | Nabta Playa | Mid-late 6th millennium BC | Ru’at El Baqar |
|  | Bir Murr 1 | Mid-late 6th millennium BC |  |

**Table 1**. Earliest appearance of tumuli associated with cattle remains and formal human burials in the Central and Eastern Sahara.

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| El Adam Humid Interphase | 8 600 – 7800 BC |
| Post-El Adam Arid Phase | 7700 – 7600 BC |
| El Ghorab Humid Interphase | 7600 – 7200 BC |
| Post-El Ghorab Arid Phase | 7200 – 7050 BC |
| El Nabta / Al Jerar Maximum  Humid Interphase | 7050 – 6150 BC |
| Post-Al Jerar Arid Phase | 6100 – 5900 BC |
| Ru’at El Ghanam | 5900 – 5500 BC |
| Post-Ru’at El Ghanam Arid Phase | 5500 – 5400 BC |
| Ru’at El Baqar Humid Interphase | 5400 – 4650 BC |
| Post-Ru’at El Baqar Arid Phase | 4650 – 4500 BC |
| Bunat El Ansam Humid Interphase | 4500 – 3300 BC |
| Modern phase of hyper-aridity | A brief C-Group occupation in  the early 2nd milennium BC |

**Table 2**. Chronology of the Holocene Nabta Playa chronological phases. Compiled from data in (Wendorf *et al.* 2001)

Additionally, complex structures are present at Site E-96-1, Nabta Playa. Occurring in two groups, structures A-E share similar features such as being constructed two to four metres above a table-rock (Wendorf & Krolik 2001). Structure A contains the famously claimed sculptured stone whose reworking on the one end is claimed to be representative of anything from a cow to a spirit. Structure E has an associated C14 date of 3600 BC (Wendorf and Krolik, 2001). The more weathered pit walls are suggestive of structures A and B being older, with the Late Neolithic Interphase identified as the best candidate. Three explanations have been proposed for these structures: Firstly, that they served as memorials for prominent dead individuals, secondly as cenotaphs for gods, and thirdly as astronomical alignments.

No astronomical alignments can be determined due to placement in the landscape, rendering this option the weakest. The lack of ethnographic consistency in the meanings behind, coupled with the variety of, modern shrines makes the task harder (Seligman & Seligman 1932). The clustering of and relationship between the structures, together with size variations, is taken as representing incipient, temporary and possibly horizontal rank within fluid lineages at a time of aggregation where various political, socio-economic and ideological alliances and beliefs were reinforced and renewed (Wendorf & Krolik 2001). How seriously this suggestion can be taken is tempered significantly by the fact that the site developed over a long period of time, with only one or more structures likely being active at a particular point.

There are also potential animal tumuli at Bir Murr 1 (75 km north-west of Bir Kiseiba), where three stone structures have been located (Connor 1984). The structures reportedly have similarities to the Nabta tumuli and are dated to ca. 5250 BC (Applegate *et al*. 2001). Additional cattle remains found in pits, not tumuli, and dating from the third millennium BC were found at Djabarona 84/13 in northern Sudan. Animal graves exist for the Badarian, Nagada and Maadi-Buto periods in the Nile Valley (Friedman 1996; Flores 1999; Adams 2000; Brass 2003), while Applegate *et al*. (2001) provide a good summary catalogue of these and later period occurrences.

This focus on cattle in mortuary remains is remarkable considering that ovicaprines outnumber cattle at Nabta Playa during both the Middle and Late Neolithic by 344 to 131 identified specimens (using Table 23.1 in Gautier *et al*. 2001)). By comparison with the Libyan Sahara, it has been stated that the latter’s cattle outnumbered ovicaprines in the Middle Pastoral but that ovicaprines predominated in the Late Pastoral (di Lernia 2002, 2013).

The reasons behind this discrepancy in livestock composition may lie in a shift to a dryer savannah environment at the start of the Middle Pastoral, with two transhumance patterns evolving. The first saw winter occupation both in the Acacus mountains (ovicaprines) and lowlands (cattle), introducing a unique form of east-west transhumance (di Lernia & Manzi, 2002; di Lernia *et al*., 2013) (Fig. 3) (Table 3). With the postulated accompanying demographic growth, specialized lowland sites and systematic, targeted exploitation of raw material resources during the Middle Pastoral, it is perhaps not unexpected that the first cattle tumuli in the Acacus region appear not in the mountains but on the Messak Settafet plateau. The second involved Middle Pastoral groups primarily situated on Edeyen of Murzuq, to the south of the Messak Settafet, during the rainy season from where they migrated to the Messak Settafet for the dry months (di Lernia 2013).

**Figure 3**. Acacus Moutains and surrounds, Libyan Sahara. (1) Wadi Tanezzuft. (2) In Habeter (Messak Settafet). (3) Erg Uan Kasa. (4, 5) Wadi Bedis and Wadi Tin Einessnius (Messak Settafet). (6) Wadi Takarkori. (7) Imenennaden. (8) Muhuggiag. (9) Fozziagiaren

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| Early Acacus period | 9300 – 8000 BC | Small, specialised lowland sites, mountainous base  camps |
| Specialised hunting and cultural control of Barbary  sheep (*Ammotragus lervia*)kept in cave  enclosures |
| Late Acacus period | 8000 - 6300 BC | More diversified resource base |
| Cultural control of Barbary sheep kept in cave  enclosures |
| Mountains home to the primary sites |
| Dotted Wavy Line pottery |
| Early Pastoral period | 6300 – 5400 BC | Occupation of Acacus mountains, lowlands and  Messak Settafet, with seasonal herding rounds |
| Middle Pastoral  period | 5000 – 3750 BC | Possible Saharan influence on Nilotic pottery  techniques |
| Integrated pastoral and hunting economy |
| Specialised workshops in lowlands |
| Vertical transhumance: majority of ovicaprines  herded into the mountains during the dry season |
| Late Pastoral period | 3750 – 1800 BC | Discontinuous usage of shelters |
| Cattle remains few, virtual exclusive herding of  ovicaprines |
| North-East African elements present – materials  and tools |
| Final Pastoral period | 1800 – 830 BC | Only preliminarily delineated |

**Table 3**. Defined cultural periods in the Acacus Mountains and surrounds, with a summary of their salient features. Compiled from data in (Biagetti *et al*. 2004; di Lernia and Manzi 1998; di Lernia 2013).

Site 301, on the right bank of Wadi Tin Einessnis in the Messak Settafet, dates to 5000 +/ 130 BC and contains two unused stone axes (without stone rings being present), the deposition of which can only be guessed at (di Lernia 2004). A clue may lie in the four hearths where burnt faunal remains were accumulated. Four ovicaprines and two cattle have been identified, out of over 5000 fragmentary pieces, which could have provided a substantial amount of food for any burial ceremony which occurred. What remains unknown from the available data to date, however, is whether this was a single event or an accumulation of ceremonies. In the north of Messak Settafet, 22 structures have been found dating to between 5200 – 3800 BC in Wadi Bedis (di Lernia *et al*. 2013). The oldest of the latter structures is from Site 00/31, contains both cattle and ovicaprine remains, and is dated to 5216 – 4797 BC.

Additionally, Messak Settafet Site 556 is also placed in the Middle Pastoral period because radiometric determinations and the rocket plan zigzag ceramic patterns present. A stone platform is enclosed by standing stones, with one slab in the circle being engraved with ovicaprines and two cattle engraved representations at another slab south-east of the structure. Faunal remains from the platform and the pit of the engraved slab were of cattle, with some of the cranium and axial skeleton from the latter not present due to a priorremoval. The remains from the platform also lack in complete representation. This led di Lernia (2004), influenced by the hearths from Site 301, to propose the deliberate slaughter and burial of a cow.

Further early cattle remains are found in other parts of the Central Sahara. These include the articulated cattle remains reported in the middle and late 1970s from south of Talak-Timersoi in Western Aïr, Niger (Lhote 1979) and Agoras in Tast, Adrar Bous (Carter & Clark 1976). The status of the latter *Bos* “burial” (ca. 4600 BC) in the Aïr mountainous region is disputed as the way the skeleton was bowed suggests the animal died during a drought with bowing due to contraction of the skin as it dries out (as seen under modern drought conditions). The Talak animal burials were located outside the settlements, with human inhumations nearby. *Contra* Lhote, who regarded the animals as having been killed by a fierce drought and swiftly buried by sand, Paris (2000) points to their easterly orientation as an argument for intentional inhumation. Whether this has any ceremonial significance is an aspect not considered by Paris.

A more promising find in the Aïr region comes from a small stone tumulus excavated in 1981 at Site AB S 1, which contained the burnt remains of a *Bos* right forequarter. A second tumulus was also excavated by Paris (2000) in 1989, with charred cattle bones and dated to 5100 +/- 270 BC. A third cattle tumulus was dug in 1985, with an age of ca. 5200 +/- 300 BC (Roset 1987). Two human burials were uncovered at the site but they date to around 2000 years later. Paris (1997, 2000) recognises the issue of intentionality surrounding the burials, as the bones were in stone-surrounded pits, but queries whether they were waste disposal with the stones serving as plugs.

Tumuli have also been found by the Anglo-Italian geoarchaeological expedition in the “free zone” of Western Sahara (Brooks *et al*., 2003). Apart from rock art bearing relations to the Bubalin and Early Pastoral styles, the settlement sites have pastoralist fireplaces similar to those discussed earlier. The Late Neolithic ceramic decorations have similar impressions to the Central Sahara (Cremaschi & di Lernia 2001; Garfinkel & Miller 2002; Brooks et al., 2003). The architecture and typology of the tumuli vary, located on top or at the base of escarpments or mesas. Using the dry-stone technique, the most frequent tumulus type was the conical tumulus (Brooks *et al*. 2003), which first appears in Niger around 3750 BC (Milburn 1996). The Western Saharan stone monuments, particularly Site SP1, also show linkages with the Mediterranean coast. Despite this, there has been a general reluctance to intensively examine the tumuli all along the Western Atlantic coast of Mauritania as many are likely to be Protohistoric Berber.

Despite these occurrences, tumuli are not ubiquitous. For example, cattle remains have been found at the Erg In Sakane, Erg Jmeya and Hassi el Abiod regions of the Malian Sahara, dating collectively from 5800 – 3500 BC; yet no tumuli were associated with these sites (Holl 1998b; Petit-Maire & Riser 1983). Spatial analysis has also been applied to the *Nécropole de la Frontière* cemetery (Mali/Algeria), which contains twenty stone tumuli from ca. 3515 +/- 103 BC (Holl 1998b). The only excavated tumuli contained a human burial and no livestock remains were recovered from it. The variation in site structures and content have led Holl to conclude that habitation sites, ceremonial gatherings, burials and rock art constitute different but interacting constituent components of the social territories. However, the fact that Berbers still construct tumuli means that these conclusions must remain tentative.

di Lernia’s (2004) contention that the cattle phenomenon originated at and spread outwards from the Bir Kiseiba-Nabta Playa area is therefore based entirely on the spatial spread of radiometric dates. However, the point of origin at Nabta Playa possesses a very wide error range. The spread may thus be more to do with the social nature of early pastoral societies than any one diffusionistic feature.

It has been claimed that *Bos* bones will outnumber those of other livestock when feasts occur as part of the ceremonies and this leaves an archaeo-zoological footprint (Gramly 1975). The faunal components from Nabta Playa match this prediction, contrary to the greater number of *Bos* in the Middle Pastoral of the Acacus region. However, in both regions it is cattle which are central to postulated ceremonial locales. Part of the reason that greater prestige was attached to cattle could be due to their greater economic value in supplying more calories, up to three and a half times greater than sheep.

Ethnographically, African pastoral ceremonial locales (Rigby 1977) differ from Nabta Playa in that the latter have burials. This discrepancy prompted Applegate *et al*. (2001) to propose a hybrid solution, drawing upon the Sudanese Dinka and Nuer’s political and spiritual importance attached to shrines. The Dinka hold sacrifices for cultivation and rain, while important Nuer religious figures may have shrines dedicated to them over buried sacrificial livestock (Johnson1990). Applegate *et al*. (2001) believed that the Nabta Playa tumuli served a similar purpose, with artefacts indicating frequent usage of the area. The articulated cow is classified as a reproductive female and the ability of the society to afford its loss is highlighted. The disarticulated remains were placed haphazardly, but the internment of four *Bos* within one tumulus is taken as a guide towards a large aggregation group. However, the mere presence of cattle burials cannot be indemonstrably equated with societies that were hierarchical in socio-economic structure.

## 5. Regional cultural trajectories from 4000 BC

There is an in-built tension between terming Nabta Playa a Late Neolithic regional ceremonial complex and stating,

“With this much chronological spread [between the articulated cow burial, the postulated “calendar circle” at 5000 BC and Structure E], and without multiple measurements, it is not known if the alignments [Site E-75-8, speculatively dated by Malville to 4800 – 4000 BC (Wendorf, Malville, *et al.* 2001, 502)], the cow burials, the calendar circle and the complex structures were part of a single ceremonial system, or if they represent elements in a system that was changing through time.” (Wendorf, Malville, *et al.* 2001, 489)

Furthermore, contrary to the underlying premise of social control, it remains unclear why the stones could not have been brought to the site sporadically over a period of time by pastoralists whose social organization was comprised of loose clan lineages with transitory, horizontal leadership. Such a scenario would imply a weaker and more temporary form of incipient social control than recognized by the excavators to date, and acknowledges that the presence of large structures does not necessarily imply institutionalized or formal social hierarchy.

Recognition of the expression of distinctive cultural styles requires a non-random distribution of material culture in homogenous settings (Wiessner 1983). This produces a framework of culture historical entities bounded spatially and temporally, with artefacts classified in relatively rigid typologies. Unfortunately, such endeavors can potentially obscure cultural processes. Variation is produced by a number of culturally and historically situated contexts within social life and practices. Different elements in societies produce different, and often contradictory, worldviews (Kemp 1989; Hall 1993; Stevenson 2009, 2016). The notion of developmental material expressions from segmented socio-economic systems, of variable ideological manifestations, is expressed by MacDonald's (1998a) model of trans-Saharan mobile elites. His model is made problematic by yet undocumented networks of raw material sources and how these distributions may have impacted upon trade networks and on the internal mechanics of social control and redistribution. There is also no postulated relationship between the spread of the proposed exchange items, forms of tumuli and specific population movements. However, it could still be argued that the appearances of stone rings and hachettes were due to specific, regionalized economic/environmental events potentially leading to social complexity.

While recognizing that many cultures across the Sahara and Sahel must have regarded the stone rings and hachettes as valuable, due to their widespread appearance, distance from their raw material sources and being found in funerary contexts from Jebel Moya in south-central Sudan (Addison 1949; Gerharz 1994; Brass 2016) to Afunfun in Niger (Paris 1984), to the Tilemsi Valley (Mali) and to the *Nécropole de la Frontière in* Mali/Algeria (Smith 1974), questions remain. As further excavations are conducted in the Acacus mountains and surrounding areas, it becomes clear that such items do not constitute a portion of the excavated grave goods from the Late Pastoral of Libya, precisely when their first occurrence is predicted by MacDonald’s model. Instead of forming an overarching medium of exchange, overlain on socio-economic diversity, it appears that such accumulatory practices were instead part of a myriad of early locally evolving expressions of inter-regional contact and developing complexity.

## 6. Neolithic human skeletal morphology patterns

MacDonald (1998b) has provided a comprehensive review of the physical anthropology literature for Early and Mid-Holocene North and West Africa, where three classes of anatomical groups had formerly been proposed based on cranial and post-cranial morphologies, using antiquated and deeply fraught terminologies: Mechtoids, Proto-Mediterraneans or Proto-Berbers and Sudanese. The use of such terminologies here is as short-hand only, given the limited dataset for Late Pleistocene and Early-Mid Holocene morphology and the lack of any integrated modern programme of research to re-evaluate all the extant human skeletal remains. In this short section, additional light is shed on population make-ups in the Central and Eastern Sahara by briefly summarising remains from the Tadrart Acacus (Fig. 3) - Fozziagiaren I, Imenennaden, Uan Muhuggiag and the Takarkori rock shelter – and Nabta Playa, as this is where the published human skeletal data for the Sahara attempting to describe or assign population affinities mostly derive from.

The skeletal material from Fozziagiaren is from the pre-Pastoral, with a date of ca. 6900 BC (Mori 1965); the burials consisted of two children and four adults. Imenennaden is a rock shelter with Late Pastoral and indeterminate engravings and one burial containing three contemporary individuals (Mori 1965). A Middle Pastoral stone structure, believed to be a calf fence, was dated to ca. 4500 BC (di Lernia & Manzi 1998). The burial, however, is dated earlier with a minimum age of 5700 BC.

The poorly preserved skeleton of Muhuggiag 2 (UMG.H2) was unearthed in 1991 from beneath a line of stones, which places the burial before 6700 – 6300 BC in the Late Acacus period (Minozzi *et al*. 2003; di Lernia & Manzi 1992, 1998). Two sandstone slabs were placed over the body, the weight of one disfiguring the face and dislocating it in relation to the cranium. Despite this, the robustness and dimensions of the skeleton show affinities to the so-called Mechtoid type, with the teeth closer in dimension to Mesolithic Nubians. However, it is the mummified body of a two and a half year-old child, Muhuggiag 1 (UMG.H1), which is the most informative (Mori & Ascenzi 1959). Dated to ca. 4225 +/- 190 BC, from the antelope skin it was wrapped in, there was an ostrich eggshell necklace and grind stone fragments in association.

Irish (2001) has examined burials from Nabta Playa sites E-97-17 (probably El Baqar but could also be Al Jerar), E-00-1 (El Baqar) and Area B of E-91-1 (in association with an Al Jerar settlement). E-97-17 is one hundred kilometres southeast of the “calendar circle” (ca. 5000 BC) (Applegate & Zedeno 2001). A deliberate, partially burned inhumation enabled the preservation of 75-80% of the young adult from E-91-1, sex indeterminate. No dental pathological conditions are evident on any of the teeth. Analyses of dental and osseous non-metric traits exhibit both sub-Saharan and North African linkages (Irish 2001). Cranial morphologies yielded a similar result. Given the pastoral lifestyle and the position of Nabta Playa, these indeterminate results are taken by Irish to be indicative of population contact and inter-mixing.

These mixed morphological results seem to correlate with the ceramic evidence, discussed earlier, of population variability, movement and inter-relationships across the Sahara. These skeletal findings and the relationship across space needs work on ancient DNA, but the problem to date is that the genomic material is currently unavailable due to issues of preservation in semi-arid and arid environments. As discussed in more detail in the next section incorporating data from Adrar Bous and Gobero, whilst maintaining local cultural trajectories, particularly notable in burial patterns, such population variability and potential intermixing may have laid the foundations for the later emergence of mobile elites.

## 7. Changing burial patterns and social implications

The rare known pre-Pastoral and Middle Pastoral human burials of Saharan Libya were either inside caves or, as with Muhuggiag 2, in the wadi outside. In Wadi Takarkori (Tadrart Acacus), isolated stone structures have been dated from the start of the Middle Pastoral, with more formalized delineated areas from the Late Pastoral (di Lernia & Tafuri 2013). A total of 15 individuals have been analysed from the Wadi and the Takarkori Cave. Of these, five derive from the Wadi outside the cave and comprise of adult males, juveniles and infants. From a delineated area inside the cave, there are adult females, juveniles and infants but no adult males. The former’s burials are multi-phased: One infant from the Late Acacus, nine individuals from the Early Pastoral, two females from the Middle Pastoral, and one infant and one juvenile from the Late Pastoral (di Lernia & Tafuri 2013, Table 1). A tumulus without human remains was constructed at the start of the Late Pastoral in the rock shelter, which, together with structure T6 H1 in the Wadi containing a juvenile, di Lernia and Tafuri (2013) correctly interpret as marking a shift from burials inside areas also used as shelters to marking the wider landscape through human internment.

The tumuli of the Middle Pastoral were reserved for cattle rituals and burials. There is an overlap in the Messak Settafet between the last cattle burials and a shift towards funerary monuments for humans, at the transition to the Late Pastoral (di Lernia 2002). By the time the first stone structures appear in the Wadi Tanezzuft and Wadi Takarkori in the early Late Pastoral, the transition was complete. However, expressions of cattle-involved burial rites continued in the Aïr mountains, with a mid-second millennium BC date from Iwelen (Paris 2000). A minimalist view is that the Acacus Late Pastoral tumuli builders have little connection with the earlier pre-Pastoral and Pastoral peoples (Baistrocchi 1987). Baistrocchi also questions whether any tumuli without burial remains should be considered not as part of burial customs or territorial markers honouring important individuals, but as propitiation rites.

The earliest human burials in tumuli occur at In Habeter (Messak Settafet) dated to between 4041 – 3661 BC, Tumulus 6 at Wadi Takakori (Acacus) 3348 – 2938 BC and Site 97/5 in the Wadi In Aghelachen (Wadi Tanezzuft region) 3326 – 2580 BC. The Wadi Tanezzuft acts as a corridor between the Acacus mountains and the Tassili. Tumulus 1 (Site 97/5) is larger than the average Tanezzuft tumuli and dominates the eastern portion of the flatiron in the Wadi In Aghelachen (di Lernia & Manzi 2002). With an average date possibly pushed back to ca. 3200 BC due to uncertainty over the effects of speculites, Tumulus 1 is the oldest structure in Wadi Tanezzuft and contains no grave goods, bar the ostrich eggshell bead found outside the stone ring in the tumulus. Collective labour would have been required to import both the wadi sand from one kilometre distant and the >100 kg stones used for the lithic cist and stone platform (di Lernia *et al*. 2002). The individual must have been socially important, interpreted here as either a transitory leader within a dominant lineage or an important ritual leader. His burial was three kilometres away from the nearest settlement and dominated the entrance to an important trade route through the Acacus, something not seen before. Like other Wadi Tanezzuft Phase 1 tumuli (ca. 3800 – 2500 BC), it is therefore isolated and appears to have not only a ceremonial function (di Lernia *et al*. 2002) but a status and economic use as well. Perhaps providing a fitting memorial conveyed prestige and power among the ruling lineages and families able to afford and proclaim their wealth and dominance through permanent markers in the landscape.

This ideological adjustment to human burials now related and fixed social groups permanently to focal points. Social differentiation of age and sex can be discerned at the site of In Habeter, Messak Settafet (di Lernia *et al*. 2002). Taken together with the tumuli of Wadi Tanezzuft, these are the first really visible signs of elite differentiation in the Central Sahara, with clan or lineage leaders ruling through the force of their personality, wealth and charisma. Drawing on this, and bringing the environmental deterioration to the fore, it can be proposed that increased resource competition provided the impetus for lineages to demarcate their territory (Chapman 1995) through permanent memorials; the social identity and memory of the individual was enshrined through the labour investment (Joyce 2005; Brass 2016).

Phase 2 of the tumuli construction in Wadi Tanezzuft is bracketed between ca. 2500 – 1800 BC (di Lernia *et al*. 2002). Alterations in social organisation manifested in typological heterogeneity, for example the presence (Site 96/129, tumuli 3 and 10) or absence (Site 00/98, Tumulus 4) of annexes, and through their placement in the landscape. Clustering occurs where land has a low carrying capacity and the tumuli are either situated closer to settlements, on slopes, or on a Pleistocene terrace. The tumuli are smaller, necessitating less labour; however, increasing site density offsets this.

Changes occurred too in the number and type of grave goods. The bone pin found over the frontal bone of burial H6a, from Tumulus 1 (Site 96/129), are an indication that the corpses of this period were tied, a hypothesis reinforced by the bone pin of the later H1 burial from the same tumulus. Red ochre fragments by the left radius and ulna may be remnants from burial rites performed. Burial goods present include ostrich eggshell, faience beads, carnelian beads and lithic artefacts such as the bifacial arrowheads of Tumulus 2 (Site 96/129).

Sexual differences are now become apparent in the burial practices. Females and children were buried in the same tumuli separate from, but adjacent to, males. The changes evident have been summarized as follows: First, persons of different ages and sexes were deposited in single structures, but later males were deposited individually. Changes are also evident in the structures, from pits covered by stone platforms to later stone cairns. di Lernia & Manzi (2002, 135-8) attribute these long durée changes to internal re-organisation from kinship lineages to high-ranked individuals marking permanent or semi-permanent elite status.

Recent studies on funerary monuments elsewhere (Holl 1998b; Milburn 1996; Paris 1996; Smith 2000; 2004) have also attempted to integrate archaeological and paleoenvironmental data to ascertain relationships between settlement and burial distribution systems through examining population dynamics. Paris’ (1984, 1997) investigations in the Aïr mountains and its surrounds, north-east Niger, revealed variability in disposal patterns: Adrar Bous burials S 1 (2990 +/- 342 BC) and N S 10 (3422 +/- 370 BC), together with later burials from Afunfun and Chin Tafidet, occur within Tenerian (ca. 3800 – 2250 BC) habitations, are not covered with stones and contrast with the formal cemeteries found during the same period.

The different Niger structures (Table 4) are believed by Paris (1984, 1997) and Smith (2000, 2004) to represent one of several migratory flows of pastoralists who differed morphologically from the Sudanese Neolithic and Mechtoid types, and who buried their dead under tumuli instead of within their settlements. *Contra* Sivilli (2002), Paris (1997) does not either postulate the migrants were Proto-Berbers or suggest that their origin is to be found in the north; what he does state is where other examples of platform cairns are to be found and suggests these areas will prove fruitful for new studies.

|  |  |
| --- | --- |
| **Structure type** | **Dates** |
| Keyhole | 4300 – 3200 BC |
| Conical | ca. 3750 BC |
| Platform | 3800 – 1200 BC |
| Crescent | 3300 – 1900 BC |
| Crater tumulus | ca. 1900 BC – start of Islamic period |
| Aligned structures | ca. 1900 BC – start of Islamic period |

**Table 4**. Dates of tumuli structures in Niger. From data in *(Milburn 1996, Paris 1995)*

The principal tumuli in the Adrar Bous region are the platform type at 71.66%, followed by conical shapes at 16.66% (Paris 1997). A conical tumulus contained charcoal and burnt cranial fragments; there was also a stone with burns from a fire, suggesting the sole burning of an individual’s body for unknown purposes. Paris (1997) states that gender burial ritual differences account for the positioning of the female from AB N2.4 on her left side, with the eleven males from Paris’ Table 3 on their right. Even granting an adequate sample size, Paris appears not to have taken into account the male from AB N7.1 (see Table 5 in Paris 1997) who was inhumed on his left side. Paris does, however, claim a similar discrepancy for Iwelen and Emi Lulu.

Discrepancies emerge in correlating population movements with the tumuli. Using Petit-Maire and Dutour’s (1987) data, it is only after 2500 BC that skeletal measurements overlap with those of North-East Africa. This is in contradiction to Smith’s advocacy of Proto-Berbers building the platform cairns, an activity seen in Adrar Bous from 3500 BC.

South of Adrar Bous, 70 burials were excavated at Gobero cemeteries G1 and G3 (Sereno *et al*. 2008; Garcea 2013). The early and middle Holocene periods were characterized by different burial patterns. The burials from the middle Holocene date to between ca. 5200 – 2400 BC. Although Garcea (2013) has designated the latter period as pastoral, only two *Bos* fragments were uncovered and there are no ovicaprines remains, and there is little evidence for mobility until arguably the end of the middle Holocene occupational phase. Radiogenic strontium isotope analysis undertaken by Christopher Stojanowski and Kelly Knudson (2014) on middle Holocene inhumations show no variability based on age, sex and distribution, with predominantly local signatures for bone and non-local for enamel. The homogeneity in the signatures is suggestive of a stable community with little practice of new comers from localities with different geological isotopic compositions, although there are five individuals (adults) with non-local enamel and bone readings. These individuals could either be new comers or have maintained a mobile lifestyle in contrast to the majority of their community who were more settled like their early Holocene predecessors. It is also a possibility that these individuals may derive from the last occupational period as the lakes were drying up, necessitating greater mobility.

Despite these hypotheses, very few of the open-air cemeteries across the Sahara have been investigated. Comparatively rare tumulus fields cannot account for all or the majority of burials of any particular culture. Furthermore, people were entering the Sahara from all directions during the Holocene (MacDonald 1998a).

## 8. Resource distributions as markers for differentiation

The solidification of political integration is manifested in the Wadi Tanezzuft locational choices of Phase 2 burials and the sexual division of labour noted through the anatomical stress markings (Arrighetti *et al*. 2002). There was a high rate of deliberate infanticide, another form of demographic control. The pooling of resources and labour provides individuals in prominent positions the opportunity of access to exotic items and resources during stressful periods. The infanticide and stress markers may be indicators that its pastoralists were more mobile than their forbearers or descendants. The presence of faience is indicative of trans-Saharan social and trade networks with North-East Africa, a hypothesis reinforced by the earlier anatomical and genetic analyses, pottery from the Bir Kiseiba-Nabta Playa region (Nelson & Associates 2002) and the pristine “predynastic” knife found near H1 in Tumulus 4, Site 00/98 (di Lernia & Manzi 2002).

This notion of pastoral territorial permeability should be linked to settlement structure as well as the landscape distribution of tumuli. At Wadi Takarkori, the individuals interned in the tumuli in the wadi and those buried inside the rock shelter have different strontium isotope ratios (Tafuri et al., 2006; di Lernia and Tafuri 2013). The former’s signature is homogeneous and local in origin, while the latter has a more heterogeneous signature with only one (T12 H1) within the scope of the former. di Lernia and Tafuri (2013) suggest that these differential burial patterns may be linked with how communities structured their burials according to where the individuals originated from.

Spatial distinctiveness is also exhibited further south within Tenerian settlements (Clark *et al*. 1973). The blade tools were skillfully manufactured (Quéchon 1986). The quick blade production benefits a population relying to an extent on herding and the massive numbers of it as well as other artefacts may have served as exchange links through a degree of specialised production within and between highly variable Tenerian industries (Haour 2003). In addition, the chronological and numerical spread of the excavated Adrar Bous tumuli is indicative, like those of Wadi Tanezzuft, of being reserved for elite segments of society. In a departure from Wadi Tanezzuft, in addition to the differential portions of tumuli types, most of the Adrar Bous tumuli were reserved for males.

Moreover, Holl uses the placement of tumuli from the sites of Iwelen (Aïr mountains), Djebel Mazela (at 3000 – 4000 burials, the eastern Algerian Bou Nouara cemetery is the largest tumuli cemetery in North Africa) and Fabnoun (northern Tassili N’-Ajjer) to integrate them within a hypothesis proposing the existence of a two system burial strategy:

“At Iwelen and Djebel Mazela there are large long-term concentrations, probable gathering “high-places” for usually dispersed tribesmen. In the Fabnoun, tribe segments, probably at the level of clans, adopted a strategy consisting of shifting burial places for the deceased without any noticeable preferential pattern of location and clustering, Rock engravings, rock paintings, megalithic burials, and occupation sites thus appear as meaningful archaeological signposts of prehistoric nomad territories.” (Holl 1998a, 152-3)

The tumuli distribution and contents from Wadi Tanezzuft indicate that at least a third regional manifestation and trajectory was at play. The first tumuli are situated in vital resource areas, near oases, were isolated from settlements and were reserved for important individuals. This differed from the preceding burial patterns, which involved selected individuals from the communities being buried in the lived-in spaces. Later, formal burial cemeteries were constructed in designated funerary compounds and relate to the expression of a semi-sedentary but segmented pastoral society with delineated boundaries between the living and dead. The clustering within the Wadi Tanezzuft and Aïr cemeteries should be linked with elite clan or family social units who controlled access to resources and trade networks, and who were differentially buried in areas distinct from the disposal fields utilised by the general populace.

## 9. Discussion

The excavated Saharan tumuli and human burials are meaningful occurrences of symbols empowering socio-ideological settings through socially transmitted patterns. This social reproduction of culture needs to be engaged with and defined anthropologically to a greater degree than is currently done by Saharan archaeologists. The construction of the Central Saharan tumuli was probably the outcome of the interpopulation integration outlined earlier and evidenced in the rock art (Mori 1965; di Lernia 2002; di Lernia & Manzi 2002; ), under variable degrees of resource abundance, while the case for permanent hierarchy at Nabta Playa remains highly debatable. Yet whilst rightly recognising the relationship feedback between landscape, structure and society, an important avenue of this investigation has been to consider what role the act and consequence of building the tumuli had on the reproductive capabilities of the society. Designating and linking landscape systems and exchange goes some way towards explaining how social complexity arose and became institutionalised.

Increasing aridification set the ecological context in which the cultural changes to the evolving social environments operated. Architecture is a stylised manifestation of the cultural expressions. It has long been recognised that “waste energy” is an important component in explaining material-behavioural variation which utilises and stabilises population levels under the local resource carrying capacities (Wenke 1989, 1991). Environment perturbations cause resource fluctuations, which impact upon the geographic positioning of the population (Smith 1992). The nature of transhumant movement has an inherent flexibility in solving environment crises caused by micro-climatic fluctuations, distributing sites throughout the territory range to exploit the resource dynamics to the full. Such times of crises may involve the reduction of family livestock numbers, which would also have a temporary impact on the nature of inter-family and possibly inter-lineage relationships.

Such behavioural relationships may have been regulated through shared membership of a kinship-based network and this highlights the importance of identifying the spatial scale of cultural variation. As culture is meaningfully constituted, power is continually renegotiated within alternatively completing or complimentary conceptual frameworks which provides meaning. Sectional interests can be portrayed as universal interests through repetition and when relational systems are manipulated to appear fixed. Hodder’s (1992, 103) Leroghi Dorobo example shows that “particular conceptual and social dispositions may encourage particular forms of economic and cultural strategy”. Within the Sahara, it is proposed that the goals, thoughts and practices of the social groupings would have been expressed through a power symbolism legitimating ownership and power in a territory. One such early expression may be the large Uan Kasa plain sites (the Acacus lowlands), located along old water sources, which increase in number during this period between 5000 – 3900 BC (Biagetti & di Lernia 2003). This legitimation would have been ritually sanctioned, a justification which increased status and wealth.

The forms of justification would have been regionally variable. While the data presented suggests that these legitimation ceremonies centred around cattle, power is also structured through designating and linking landscape systems, control of exchange networks and regulating access to the resource base. The existence of elite tumuli fields in some regions, with the general populace likely being buried elsewhere and there being numerous unexplored tumuli of uncertain age, is indicative of differential but non-mutually intertwined meanings assigned to any division patterns between burial sites, burial sites and settlements, and intra- and inter-settlement relationships. As such, investigations in the Sahara are in their infancy. More raw data is needed both from existing regions like the Tadrart Acacus and through new investigations launched in areas known through surface surveys to contain tumuli fields and possible settlements. How settlements and burial locales such as Gobero, without tumuli, relate to other areas with tumuli remains to be comprehensively explored. This data would add considerably to the existing database of radiometric dates, morphological analyses and regional tumuli constructions, enabling more precise reconstructions of differential trajectories and cultural practices within landscape usage patterns.

Illustrating the importance of considering the population segments involved on a demographic scale in a staggering amount of publications, di Lernia’s project has reconstructed a complex evolutionary sequence for the tumuli architecture of the Libyan Sahara, proposed a chronology which overlaps yet differs substantially from Paris and Smith’s, detailed the evolution of isolated tumuli into tumuli cemeteries distinct from settlements, and placed the emergence of incipient social complexity in originally ethnically and culturally mixed populations around 4000 BC (Cremaschi & di Lernia 1999a, b; di Lernia 1999a, b; di Lernia *et al*. 2013; di Lernia 2013; di Lernia *et al.* 2001; di Lernia & Tafuri 2013). Although Smith (2000, 2004) sees a migration of what have been termed Proto-Berbers from North-East Africa into the Central Sahara after 4000 BC, bringing with them new complex social and ideological structures and the flat platform cairn evident in the Adrar Bous region, the timing and source of the proposed (problematic) migrations do not tie in with MacDonald’s data. What is evident, however, at Iheren (Tassili) are rock art painted in a “white-face style”, i.e. with pale skins, beads and long dresses, with accompanying cattle. Apart from ritual ceremonies, cattle activities, hunting and living, there are also scenes depicting elites, whether leaders or holy men (Kuper 1978, 424-5, 430-1).

The production of tumuli would have involved redistribution of resources by the elite at the accompanying ritual celebrations, while both them and the presence of elites in rock art show that there would have been a socially-mediated set of shared values, wherein the social value of a clan or lineage was affirmed and applied to individuals. The social access to status was thus widened but remained elitist and distinct disposal areas were formed in Wadi Tanezzuft (di Lernia et al., 2001). The latter served as cultural markers of vertical differentiation, or incipient complex social hierarchy, with a strong trend towards ethnic fragmentation that increased ca. 1800 – 810 BC in Wadi Tanezzuft with formalised burial sites and ceremonial centres (di Lernia & Manzi, 2002).

There existed in the Late Neolithic increasing ethnic fragmentation, pooling of economic wealth (in the form of ovicaprines or cattle depending on the region) in the hands of an emerging lineage elite and formalised through the acquisition and control of prestige trade items with regionalised mediums of exchange. *Contra* McIntosh and McIntosh (1988), the pastoral burials weree not consistent. They vary in time and space, and the material culture demonstrates socially transmitted patterns of culture through cumulative inheritance systems. The deposition of goods within the tumuli show that the descendants were wealthy and powerful enough to dispose of them.

Cultural structures, imbued with power symbolism, were visible symbols of social organisational principles with wealth accumulation partly substituting for abstract symbols. The rise of the political ideology of domination and enculturation, with its thoughts and rules, lie behind the regulation of behaviour and the instigation of principles of descent, selective material redistribution for prestige and labour divisions. These early manifestations of social complexity and hierarchy separated ritual and political influences and were the basis for the later early Sahara, West African and Nubian states (Bradley 1992; Holl 1993, 1998a; MacDonald 1998b; di Lernia and Manzi 2002; Magnavita 2004).

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# References

Abu-Lughod, L. 1991. Writing against culture. In: Fox, R. (ed.), *Recapturing anthropology: Working in the present*. School of American Research Press, Santa Fe, pp.137–162.

Adams, B. 2000. *Excavations in the Locality 6 cemetery at Hierakonpolis 1979-1985*. BAR International Series 903, Oxford.

Addison, F. 1949. *Wellcome excavations in the Sudan: I, Jebel Moya, 1910-1914*. Oxford University Press, Oxford.

Althusser, L., 1977. *For Marx*. New Left Books, London.

Amblard, S. 1983. *Tichitt-Walata (R.I. Mauritanie): Civilisation et industrie lithique*. Editions Recherches sur les Civilisations, Paris.

Applegate, A., Gautier, A. & Duncan, S. 2001. The north tumuli of the Nabta Late Neolithic ceremonial complex. In: Wendorf, F., Schild, R. and Associates (eds.), *Holocene settlement of the Egyptian Sahara (Volume 1): The archaeology of Nabta Playa*. Kluwer Academic/Plenum Publishers, London, pp. 468–488.

Applegate, A. & Zedeno, N., 2001. Site E-92-9: A possible Late Neolithic solar calendar. In: Wendorf, F., Schild, R. and Associates (eds.), *Holocene settlement of the Egyptian Sahara (Volume 1): The archaeology of Nabta Playa*. Kluwer Academic/Plenum Publishers, London, pp. 463–467.

Arrighetti, B., Reale, B., Ricci, F. & Bordgognimi Tarli, S. 2002. Skeletal markers of stress at Site 96/129. In: di Lernia, S. & Manzi, G. (eds.), *Sand, stones, and bones: The archaeology of death in the Wadi Tannezzuft Valley (5000-2000 BP)*. Arid Zone Archaeology Monographs 3. All-Insegna del Giglio, Florence, pp. 269–280.

Baistrocchi, M. 1987. Pre-Islamic megalithic monuments of the northern Tadrart Acacus. In: Barich, B. (ed.), *Archaeology and environment in the Libyan Sahara: The excavations in the Tadrart Acacus, 1978- 1983. Cambridge Monographs in African Archaeology 23*. British Archaeological Reports International Series 368, Oxford, pp. 87–96.

Bard, K. 2017. Political economies of Predynastic Egypt and the formation of the early State. *Journal of Archaeological Research* 25 (1), 1–36.

Barich, B., Lucarini, G., Hamdan, M. & Hassan, F. 2014. *From lake to sand. The archaeology of Farafra Oasis, Western Desert, Egypt*. Edizioni All-Insegna del Giglio, Florence.

Biagetti, S. & di Lernia, S. 2013. Holocene deposits of Saharan rock shelters: The case of Takarkori and other sites from the Tadrart Acacus mountains (southwest Libya). *African Archaeological Review* 30 (3), 305–338.

Biagetti, S. & di Lernia, S. 2003. Vers un modèle ethnographique ècologique d’une sociètè pastorale prèhistorique saharaienne. *Sahara* 14, 7–30.

Biagetti, S., Merighi, F. & di Lernia, S. 2004. Decoding an Early Holocene Saharan stratified site. Ceramic dispersion and site formation processes in the Takarkori Rock-Shelter, Acacus Mountains, Libya. *Journal of African Archaeology* 2 (1), 3–21.

Blench, R. & MacDonald, K. 2000. The origins and development of African livestock; Archaeology, genetics, linguistics and ethnography. *UCL Press*, London, pp. 355–367.

Bonnet, C. 1992. Excavations at the Nubian royal town of Kerma: 1975-91.  *Antiquity* 66 (252), 611–625.

Bonnet, C. & Valbelle, D. 2005. *Des Pharaons venus d’Afrique: la cachette de Kerma*. Citadelles & Mazenod, Paris.

Bonte, P., Friedman, J. & Rowlands, M. 1977. Non-stratified social formations among pastoral nomads. In: Friedman, J. & Rowlands, M. (eds.), *The evolution of social systems: Proceedings of a meeting of the Research Seminar in Archaeology and Related Subjects held at the Institute of Archaeology, London University*. Duckworth, London, pp. 173–200.

Bradley, R. 1992. *Nomads in the archaeological record: Case studies in the northern provinces of the Sudan*. Meroitica 13, Berlin.

Brass, M. 2003. Tracing the origins of the ancient Egyptian cattle cult. In: Eyma, A. & Bennett, C. (eds.), *A Delta-man in Yebu: Occasional volume of the Egyptologists’ Electronic Forum No. 1*. Universal Publishers, Parkland, pp. 101–110.

Brass, M. 2007. Reconsidering the emergence of social complexity in early Saharan pastoral societies, 5000 - 2500 BC. *Sahara* 18, 1–16.

Brass, M. 2015. Interactions and pastoralism along the southern and southeastern frontiers of the Meroitic State, Sudan. *Journal of World Prehistory* 28, 1-34.

Brass, M. 2016. *Reinterpreting chronology and society at the mortuary complex of Jebel Moya (Sudan)*. Cambridge Monographs in African Archaeology 92, Archaeopress, Oxford.

Brass, M. 2018. Early North African cattle domestication and its ecological setting: A reassessment. *Journal of World Prehistory* 31 (1), 81–115.

Brooks, N. 2006. Cultural responses to aridity in the Middle Holocene and increased social complexity. *Quaternary International* 151 (1), 29–49.

Brooks, N., di Lernia, S., Drake, N., Raffin, M. & Savage, T. 2003. The geoarchaeology of Western Sahara: Preliminary results of the First Anglo-Italian Expedition in the liberated zone. *Sahara* 14, 63–80.

Brumann, C. 1999. Writing for culture: Why a successful concept should not be discarded. *Current Anthropology* 40 (S1), S1–S27.

Camps, G. 1974. *Les civilisations préhistoriques de l’Afrique du Nord et du Sahara*. Doin. Paris.

Caneva, I. & Marks, A. 1990. More on the Shaqadud pottery: Evidence for Saharo-Nilotic connections during the 6th-4th millennium B.C. *Archéologie du Nil Moyen* 4, 11–35.

Carter, P. a& Clark, J.D. 1976. Adrar Bous and African Cattle. In: Berhanou, A., Chevaillon, J. & Sutton, J. (eds.), *Proceedings of the 7th PanAfrican congress of Prehistory, Addis Ababa 1971*. Provisional Military Government of Socialist Ethiopia, Ministry of Culture, Addis Ababa, pp. 487–493.

Castro, L. & Toro, M. 2004. The evolution of culture: From primate social learning to human culture. *PNAS* 101 (27), 10235–10240.

Chapman, R. 1995. Ten years after - Megaliths, mortuary practices, and the territorial model. In: Beck, L. (ed.), *Regional approaches to mortuary analysis*. Plenum Press, London, pp. 29–51.

Clark, J.D., Williams, M. & Smith, A. 1973. The geomorphology and archaeology of Adrar Bous, Central Sahara: A preliminary report. *Quaternaria* 27, 245–297.

Connor, D. 1984. The Kiseiba Plateau & Bir Murr Playa. In: Wendorf, F., Schild, R. & Close, A. (eds.), *Cattle-keepers of the Eastern Sahara: The Neolithic of Bir Kiseiba*. Department of Anthropology, Institute for the Study of Earth and Man, Southern Methodist University, Dallas, pp. 350–403.

Conrad, D. & Frank, B., 1995. *Status and Identity in West Africa*. Indiana University Press, Bloomington and Indianapolis.

Cremaschi, M. & di Lernia, S. 1999a. Holocene climatic changes and cultural dynamics in the Libyan Sahara. *African Archaeological Review* 16 (4), 211–238.

Cremaschi, M. & di Lernia, S. 1999b. *Wadi Teshuinat. Palaeoenvironment and prehistory in South-Western Fezzan (Libyan Sahara)*. All’insegna del giglio, Florence.

Cremaschi, M. & di Lernia, S. 2001. Environment and settlements in the mid-Holocene palaeo-oasis of Wadi Tanezzuft (Libyan Sahara). *Antiquity* 75, 815–825.

Crossland, Z. 2014. *Ancestral encounters in highland Madagascar: Material signs and traces of the dead*. Cambridge University Press, Cambridge.

Dachy, T., Briois, F., Marchand, S., Minotti, M., Lesur, J. & Wuttmann, M. 2018. Living in an Egyptian oasis: Reconstruction of the Holocene archaeological sequence in Kharga. *African Archaeological Review* 35 (4), 531–66.

di Lernia, S. 1999a. Discussing pastoralism. The case of the Acacus and surroundings (Libyan Sahara). *Sahara* 11, 7–20.

di Lernia, S., 1999b. *The Uan Afuda cave: Hunter-gatherer societies of Central Sahara*. Arid Zone Archaeology Monographs 1. All’Insegna del Giglio, Florence

di Lernia, S. 2002. Dry climatic events and cultural trajectories: Adjusting Middle Holocene pastoral economy of the Libyan Sahara. In: Hassan, F. (ed.), *Droughts, food and culture: Ecological change and food security in Africa’s later prehistory*. Kluwer Academic/Plenum Publisher, London, pp. 225–250.

di Lernia, S. 2004. *Aridity, cattle, and rites. Social responses to rapid environmental changes in the Saharan pastoral societies, 6500-5000 yr BP.* Paper prepared for the Rapid and catastrophic environmental changes in the Holocene and human response. First joint meeting of IGCP 490 and ICSU Environmental catastrophes in Mauritania, the desert and the coast. Retrieved 18 July 2004 from World Wide Web:<http://atlas-conferences.com/cgi-bin/abstract/camu-24>

di Lernia, S. 2006. Building monuments, creating identity: Cattle cult as a social response to rapid environmental changes in the Holocene Sahara. *Quaternary International* 151 (1), 50–62.

di Lernia, S. 2013. Places, monuments, and landscape: Evidence from the Holocene central Sahara. *Azania: Archaeological Research in Africa* 48 (2), 173–192.

di Lernia, S., Bertolani, G., Merighi, F., Ricci, F., Manzi, G. & Cremaschi, M. 2001. Megalithic architecture and funerary practices in the late prehistory of Wadi Tanezzuft (Libyan Sahara). *Libyan Studies* 32, 29–48.

di Lernia, S. & Manzi, G. 1992. La sepoltura preistorica presso Uan Muhuggiag (H2) e le nuove ricerche nel Tadrart Acacus (Sahara Libico). *Origini* 16, 161–80.

di Lernia, S. & Manzi, G. 1998. Funerary practices and anthropological features at 8000-5000 BP. Some evidence from central-southern Acacus (Libyan Sahara). In: Cremaschi, M. & di Lernia, S. (eds.), *Wadi Teshuinat. Palaeoenvironment and prehistory in south-western Fezzan (Libyan Sahara)*. CNR, Milano, pp. 217–41.

di Lernia, S. & Manzi, G. 2002. *Sand, Stones, and Bones: The Archaeology of Death in the Wadi Tanezzuft Valley (5000-2000 BP)*. Arid Zone Archaeology Monographs 3. All’insegna del giglio, Florence.

di Lernia, S., Manzi, G. & Merighi, F. 2002. Cultural variability and human trajectories in the Wadi Tanezzuft later prehistory. In: di Lernia, S. & Manzi, G. (eds.), *Sand, stones, and bones: The archaeology of death in the Wadi Tanezzuft valley (5000-2000 BP). Arid Zone Archaeology Monographs 3*. All’insegna del giglio, Florence, pp. 281–302.

di Lernia, S., Tafuri, M.-A., Gallinaro, M., Alhaique, F., Balasse, M., Cavorsi, L., Fullagar, P., Mercuri, A.-M., Monaco, A., Perego, A. & Zerboni, A. 2013. Inside the ‘“African Cattle Complex”’: Animal burials in the Holocene Central Sahara. *PLoS ONE* 8 (2), p.e56879.

di Lernia, S. & Tafuri, M.-A. 2013. Persistent death places and mobile landmarks: The Holocene mortuary and isotopic record from Wadi Takarkori (SW Libya). *Journal of Anthropological Archaeology* 32 (1), 1–15.

Digard, J.-P., 1981. *Techniques des nomades Baxtyari d’Iran*. Cambridge University Press, Cambridge.

Flores, D. 1999. *The funerary sacrifice of animals during the Predynastic period*. Unpublished Ph.Dthesis, University of Toronto, Toronto

Fried, M. 1967. *The evolution of political society: An essay in political anthropology*. Random House, New York.

Friedman, R. 1996. The ceremonial centre at Heirakonpolis Locality HK29A. In: J. Spencer, (ed.), *Aspects of early Egypt*. British Museum Press, London, pp. 16–35.

Garcea, E. 2001. *Uan Tabu in the settlement history of the Libyan Sahara*. Arid Zone Archaeology Monographs 2. All’insegna del giglio, Florence.

Garcea, E. 2013. *Gobero: The no-return frontier. Archaeology and landscape at the Saharo-Sahelian borderland*. Journal of African Archaeology Monograph Series 9. Africa Magna Verlag, Frankfurt.

Garfinkel, Y. & Miller, M. 2002. *Sha’ar Hagolan 1: Neolithic art in context*. Oxbow Books, Oxford.

Gautier, A. 1987. Prehistoric men and cattle in North Africa: A dearth of data and a surfeit of models. In: Close, A. (ed.), *Prehistory of arid North Africa: Essays in honor of Fred Wendorf*. Southern Methodist University Press, Dallas, pp. 163–187.

Gautier, A.2001. The Early to Late Neolithic archeofaunas from Nabta Playa and Bir Kiseiba. In: Wendorf, F., Schild, R. and Associates (eds.), *Holocene settlement of the Egyptian Sahara (Volume 1): The archaeology of Nabta Playa*. Kluwer Academic, London, pp. 609–635.

Gerharz, R. 1994. *Jebel Moya*. Meroitica 14. Akademie Verlag, Berlin.

Goody, J. 1971. *Technology, tradition and the state in Africa*. Cambridge University Press, Cambridge.

Gramly, R. 1975. Meat-feasting sites and cattle brands: Patterns of rock-shelter utilization in East Africa. *Azania* 10 (1), 107–121.

Hall, M. 1993. The archaeology of colonial settlement in southern Africa. *Annual Review of Anthropology* 22, 177–200.

Haour, A. 2003. One Hundred Years of Archaeology in Niger. *Journal of World Prehistory* 17 (2), 181–234.

Haour, A., Manning, K., Arazi, N., Gosselain, O., Guèye, N., Keita, D., Livingstone Smith, A., MacDonald, K., Mayor, A., McIntosh, S. & Vernet, R. 2010. *African pottery roulettes past and present: Techniques, identification and distribution*. Oxbow Books, Oxford.

Hassan, F., 2000. Climate and cattle in North Africa. In: Blench, R. & MacDonald, K. (eds.), *The origins and development of African livestock: Archaeology, genetics, linguistics, and ethnography*. University College Press, London, pp. 61–86.

Hodder, I., 1992. *Theory and Practice in Archaeology*. Routledge, London.

Hoffman, M. 1993. *Egypt before the pharaohs: The prehistoric foundations of Egyptian civilization*. Barnes & Noble Books, New York.

Holl, A., 1993. Late Neolithic cultural landscape in south-eastern Mauritania: An essay in spatiometrics. In: Holl, A. &Levy, T. (eds). *Spatial boundaries and social dynamics*. International Monographs in Prehistory, Ann Arbor, pp. 95–133.

Holl, A. 1998a. Livestock husbandry, pastoralisms, and territoriality: The West African record. *Journal of Anthropological Archaeology* 17 (2), 143–165.

Holl, A. 1998b. The dawn of African pastoralisms: An introductory note. *Journal of Anthropological Archaeology* 17 (2), 81–96.

Holl, A. 2004. *Saharan rock art: Archaeology of Tassilian pastoralist iconography*. AltaMira Press, Walnut Creek.

Honeggar, M., Gatto, M., Fallet, C. & Bundi, M. 2013. *Kerma 2012-13*. Documents de la mission archéologique suisse au Soudan. Université de Neuchâte, Hauterive.

Hutchinson, S. 1996. *Nuer dilemmas: Coping with money, war and the state*. University of California Press, Berkeley.

Ingold, T. & Thomas, J. 2000. The temporality of the landscape. In: Thomas, J. (ed.), *Interpretive archaeology: A reader*. Leicester University Press, London, pp. 510–530.

Irish, J. 2001. Human skeletal remains from three Nabta Playa sites. In: Wendorf, F., Schild, R. and Associates (eds.), *Holocene settlement of the Egyptian Sahara (Volume 1): The archaeology of Nabta Playa*. Kluwer Academic/Plenum Publishers, London, pp. 521–528.

Johnson, A. & Earle, T. 2000. *The evolution of human societies: From foraging group to agrarian state*. Stanford University Press, Stanford.

Joyce, R. 2005. Archaeology of the body. *Annual Review of Anthropology* 34, 139–158.

Keesing, R. 1981. *Cultural anthropology: A contemporary perspective. 2nd ed*. Holt Rinehart and Winston, New York.

Keesing, R. 1994. Theories of culture revisited. In: Borofsky, R. (ed.), *Assessing Cultural Anthropology*. McGraw-Hill, New York, pp. 301–310.

Kemp, B., 1989. *Ancient Egypt: Anatomy of a civilization*. London: Routledge.

Kobusiewicz, M., Kabacinski, J., Schild, R., Irish, J., Gatto, M. & Wendorf, F. 2010. *Gebel Ramlah: Final Neolithic cemeteries from the western desert of Egypt*. Institute of Archaeology and Ethnology, Polish Academy of Sciences, Poznan.

Kuper, R. 1978. *Sahara: 10,000 Jahre zweischen Weide und Wuste*. Museum der Stadt, Koln.

Kuper, R. & Kröpelin, S. 2006. Climate-controlled Holocene occupation of the Sahara: Motor of Africa’s evolution. *Science* 313 (5788), 803–807.

Lenssen-Erz, T., Tegtmeier, U. & Kröpelin, S. 2002. *Tides of the desert: Contributions to the archaeology and environmental history of Africa in honour of Rudolph Kuper. 14 Africa Praehistorica, Monographs on African Archaeology and Environment*. Heinrich-Barth Institut, University of Cologne, Cologne.

Linseele, V. 2010. Did specialized pastoralism develop differently in Africa than in the Near East? An example from the West African Sahel. *Journal of World Prehistory* 23 (2), 43–77.

Linseele, V. 2013. Early stock keeping in northeastern Africa: Near Eastern influences and local developments. In: Shirai, N. (ed.), *Neolithisation of Northeastern Africa*. Ex Oriente, Berlin, pp. 97–108.

Lull, V. 2000. Death and society: A Marxist approach. *Antiquity* 74 (285), 576–580.

MacDonald, K. 1998a. Archaeology, language and the peopling of West Africa: A consideration of the evidence. In: Blench, R. & Spriggs, M. (eds.), *Archaeology and language II: Correlating archaeological and linguistic hypotheses*. Routledge, London, pp. 33–66.

MacDonald, K. 1998b. Before the Empire of Ghana: Pastoralism and the origins of cultural complexity in the Sahel. In: Connah, G. (ed.), *Transformations in Africa: Essays on Africa’s later past*. Leicester University Press, London, pp. 71–103.

MacDonald, K., 2011a. A view from the south: Sub-Saharan evidence for contacts between North-Africa, Mauritania and the Niger, 1000 BC - AD 700. In: Dowler, A. and Galvin, E. (eds.), *Money, trade and trade routes in Pre-Islamic North Africa*. British Museum Press, London.

MacDonald, K. 2011b. Betwixt Tichitt and the IND: The pottery of the Faïta Facies, Tichitt Tradition. *Azania* 46 (1), 49–69.

Magnavita, C. 2004. Zilum - Towards the emergence of socio-political complexity in the Lake Chad region (1800 BC - 1600 AD). In: Krings, M. & Platte, E. (eds)., *Living with the lake. Perspectives on history, culture and economy of Lake Chad*. Studien zur Kulturkunde, 121. Köppe, Köln, 73–100.

Manning, K. & Timpson, A. 2014. The demographic response to Holocene climate change in the Sahara. *Quaternary Science Reviews* 101, 28–35.

McDonald, M. 2016. The pattern of neolithization in Dakhleh Oasis in the Eastern Sahara. *Quaternary International* 410, 181–197.

McHugh, F. 1999. *Theoretical and quantitative approaches to the study of mortuary practice*. BAR International Series 785, Oxford.

McIntosh, R. 1993. The Pulse Model: Genesis and accommodation of specialization in the Middle Niger. *Journal of African History* 34 (2), 181–220.

McIntosh, R. 1998. *The peoples of the Middle Niger: The island of gold*. Blackwell Publishers, Oxford.

McIntosh, S.K. & McIntosh, R. 1988. From stone to metal: New perspectives on the later prehistory of West Africa. *Journal of World Prehistory* 2 (1), 89–133.

McIntosh, S.K. 1994. *Excavations at Jenne-Jeno, Hambarketolo, and Kaniana (Inland Niger Delta, Mali), the 1981 season*. University of California Press, Berkeley.

McIntosh, S.K., 1999. Pathways to complexity: An African perspective. In: McIntosh, S.K. (ed.), *Beyond chiefdoms: Pathways to complexity in Africa*. Cambridge University Press, Cambridge, pp. 1–30.

Meeker, M. 1989. *The pastoral Son and the spirit of patriachy: Religion, society, and person among East African stock-keepers*. University of Wisconsin Press, Madison.

Meskell, L. 2001. Archaeologies of identity. In: Hodder, I. (ed.), *Archaeological theory today*. Polity Press, Cambridge, pp. 187–213.

Midant-Reynes, B. 2000. *The prehistory of Egypt: From the first Egyptians to the first pharaohs*. Blackwell Publishers, Oxford.

Milburn, M. 1996. Some recent burial dates for central and southern Sahara, including monuments. *Sahara* 8, 99–103.

Minozzi, S., Manzi, M., Ricci, F., di Lernia, S. & Borgognini Tarli, S, 2003. Nonalimentary tooth use in prehistory: An example from Early Holocene in Central Sahara (Uan Muhuggiag, Tadrart Acacus, Libya). *American Journal of Physical Anthropology* 120 (3), 225–232.

Mohammed-Ali, A. & Khabir, A. 2003. The Wavy Line and the Dotted Wavy Line pottery in the prehistory of the Central Nile and the Sahara-Sahel Belt. *African Archaeological Review* 20 (1), 25–58.

Mori, F. 1965. *Tadrart Acacus: Arte rupestre e culture del Sahara preistorico*. Einaudi, Torino.

Mori, F. & Ascenzi, A. 1959. La mummia infantile di Uan Muhuggiag. Osservazioni antropologiche. *Riv Antropol* 46, 125–48.

Muller, J.-D., 1996. Ideology and dynamics in Dii Chiefdoms. A study of territorial movement and population fluctuation (Adamawa Province, Cameroon). In: Claessen, H. (ed.), *Ideology and the formation of early states*. E.J. Brill, New York, pp. 99–115.

Munson, P. 1971. *The Tichitt tradition: A late prehistoric occupation of the Southwestern Sahara*. University of Illinois, Urbana

Nelson, K. and Associates. 2002. *Holocene settlement of the Egyptian Sahara (Volume 2): The pottery of Nabta Playa*. Kluwer Academic/Plenum Publishers, New York.

Paris, F. 1984. *La région d’In Gall-Teggida N Tesemt (Niger): Programme archéologique d’urgence 1977-1981. Les sépultures du Néolithique Final a l’Islam*. Etudes Nigériennes 50, Niamey.

Paris, F. 1995. Essai de classification des monuments funéraires sahariens. *Bulletin de la Société Préhistorique Francaise* 92, 533–549.

Paris, F. 1996. *Les sépultures du Sahara nigérien du Néolithique à l’islamisation*. Orstom, Paris.

Paris, F. 1997. Burials and the peopling of the Adrar Bous region. In: Barich, B. & Gatto, M. (eds.), *Dynamics of populations, movements and responses to climatic change in Africa*. Bonsignori, Rome, pp. 49–61.

Paris, F. 2000. African livestock remains from Saharan mortuary contexts. In: Blench, R. & MacDonald, K. (eds.), *The origins and development of African livestock: Archaeology, genetics, linguistics and ethnography*. UCL Press, London, pp. 111–126.

Pauketat, T. 2007. *Chiefdoms and other archaeological delusions*. Altamira Press, Plymouth.

Petit-Maire, N. & Dutour, O. 1987. Holocene populations of the western and southern Sahara: Mechtoids and paleoclimates. In: Close, A. (ed.), *Prehistory of arid North Africa*. Southern Methodist University Press, Dallas, pp. 259–285.

Petit-Maire, N. and Riser, J. 1983. *Sahara ou Sahel? Quaternaire récent du bassin de Taoudenni (Mali)*. Editions du CNRS, Marseille.

Quéchon, G., 1986. Groupements de lames néolithiques dans la region de Termit (Niger). Analyse d-un remontage et de ses implications. *Cahiers des Sciences Humaines* 22, 2–15.

Reid, A. & Lane, P. 2004. *African historical archaeologies*. Kluwer Academic/Plenum Publishers, New York.

Renfrew, C. 1976. Megaliths, territories and populations. In: S. De Laet, (ed.), *Acculturation and continuity in Atlantic Europe*. De Tempel, Dissertationes Archaeologicae Gandenses, Brugge, pp. 198–220.

Richerson, P. & Boyd, R. 2005. *Not by genes alone: How culture transformed human Evolution*. University of Chicago Press, Chicago.

Riemer, H. 2007. When hunters started herding: Pastro-foragers and the complexity of Holocene economic change in the Western Desert of Egypt. In: Bollig, M., Bubenzer, O., Vogelsang, R. & Wotzka, H.-P. (eds.), *Aridity, change and conflict in Africa*. Proceedings of an International ACACIA Conference held at Königswinter, Germany October 1–3, 2003. Heinrich-Barth-Institut, Köln, pp. 105–144.

Rigby, P. 1977. Opul and entoroj: The economy of sharing among the Pastoral Baraguyu of Tanzania. In *Pastoral Production and Society Production: Proceedings of the International Meeting on Nomadic Pastoralism*. Cambridge University Press, Cambridge, pp. 329–347.

Robb, J. 2007. Burial treatment as transformations of bodily ideology. In: Laneri, N. (ed.), *Performing burial*. University of Chicago Press, Chicago, pp. 287–298.

Roset, J.-P. 1987. Néolithisation, Néeolithique et post-Néolithique au Niger nord-oriental. *Bulletin de l’ Association Francaise pour l’Étude du Quaternaire* 24 (4), 203–214.

Sadr, K. 1991. *The development of nomadism in ancient northeast Africa*. University of Philadelphia Press, Philadelphia.

Saenz, C. 1991. Lords of the waste: Predation, pastoral production, and the process of stratification among the Eastern Twaregs. In: Earle, T. (ed.), *Chiefdoms: Power, economy, and ideology*. Cambridge University Press, Cambridge, pp. 100–118.

Salvatori, S. 2012. Disclosing archaeological complexity of the Khartoum Mesolithic: New data at the site and regional level. *African Archaeological Review* 29 (4), 399–472.

Saxe, A. 1971. Social dimensions of mortuary practices in a Mesolithic population from Wadi Halfa, Sudan. In: Brown, J. (ed.), *Approaches to the social dimensions of mortuary practices*. Memoir 25 of the Society for American Archaeology, Washington,pp. 39–57.

Seligman, C.& and Seligman, B. 1932. *Pagan tribes of the Nilotic Sudan*. Routledge and Sons, London.

Sereno, P.C., Garcea, E.A.A., Jousse, H., Stojanowski, C.M., Saliège, J.-F., Maga, A., Ide, O.A., Knudson, K.J., Mercuri, A.M., Stafford Jr., T.W., Kaye, T.G., Giraudi, C., N’Siala, I.M., Cocca, E., Moots, H.M., Dutheil, D.B. & Stivers, J.P. 2008. Lakeside cemeteries in the Sahara: 5000 years of Holocene population and environmental change. *PLoS ONE* 3 (8), p.e2995.

Service, E. 1958. *A profile of primitive culture*. Harper, New York.

Service, E. 1962. *Primitive social organization: An evolutionary perspective*. Random House, New York.

Service, E. 1971. *Cultural evolutionism*. Rinehart & Winston, New York.

Service, E. 1975. *Origins of the state and civilization*. Norton, New York.

Sivilli, S. 2002. A historical background: Mortuary archaeology in the Sahara between colonialism and modern research. In: di Lernia, S. & Manzi, G. (eds.), *Sand, stones, and bones: The archaeology of death in the Wadi Tanezzuft Valley (5000-2000 BP)*. All’insegna del giglio, Florence, pp. 17–24.

Skalnik, P. 1996. Ideological and symbolic authority: Political culture in Nanun, Northern Ghana. In: Claessen, H. & Oosten, J. (eds.), *Ideology and the formation of early states*. E.J. Brill, New York, 84–98.

Smith, A. 1974. Preliminary report of excavations at Karkarichinkat Nord and Sud, Tilemsi Valley, Mali, Spring 1972. *West African Journal of Archaeology* 4, 33–55.

Smith, A. 1986. Cattle domestication in North Africa. *African Archaeological Review* 4 (1), 197–203.

Smith, A. 1992. *Pastoralism in Africa: Origins and development ecology*. Hurst & Company, London.

Smith, A. 1993. *New approaches to Saharan rock art*. Memorie della Societa Italiana delle Scienze Naturali e del Museo Civico di Storia Naturale di Milano XXXVI, Milano.

Smith, A. 2000. Ideas on the later cultural history of the Central Sahara. *Sahara* 12, 101–106.

Smith, A. 2002. The pastoral landscape in Saharan prehistory. In: Lenssen-Erz, T., Tegtmeier, U. & Kröpelin, S. (eds.), *Tides of the desert: Contributions to the archaeology and environmental history of Africa in honour of Rudolph Kuper. 14 Africa Praehistorica, Monographs on African Archaeology and Environment*. Heinrich-Barth Institut, University of Cologne, Cologne, pp. 447–457.

Smith, A. 2004. A prehistory of modern Saharan pastoralists. *Sahara* 15, 43–58.

Southall, A. 1988a. On mode of production theory: The foraging mode of production and the kinship mode of production. *Dialectical Anthropology* 12 (2), 165–192.

Southall, A. 1988b. The segmentary state in Africa and Asia. *Comparative Studies in Society and History: An International Quarterly* 30 (1), 52–82.

Stevenson, A. 2009. *The predynastic Egyptian cemetery of El-Gerzeh: Social identities and mortuary practices*. Peeters, Leuven.

Stevenson, A. 2016. The Egyptian predynastic and state formation. *Journal of Archaeological Research* 24 (4), 421–468.

Stock, F. & Gifford-Gonzalez, D. 2013. Genetics and African cattle domestication. *African Archaeological Review* 30 (1), 51–72.

Stojanowski, C. & Knudson, K. 2014. Changing patterns of mobility as a response to climatic deterioration and aridification in the Middle Holocene Southern Sahara. *American Journal of Physical Anthropology*, 154, 79–93.

Sutton, J. 1974. The aquatic civilization of middle Africa. *Journal of African History* 15 (4), 527–546.

Sutton, J. 1977. The African Aqualithic. *Antiquity* 51 (201), 25–34.

Tafuri, M.A., Bentley, R., Manzi, G. & di Lernia, S., 2006. Mobility and kinship in the prehistoric Sahara: Strontium isotope analysis of Holocene human skeletons from the Acacus Mts. (Southwestern Libya). *Journal of Anthropological Archaeology* 25 (3), 390–402.

Vernet, R. 1993. *Prehistoire de la Mauritanie*. Centre Culturel Francais A. de Saint Exupery-Sepia, Nouakchott.

Warfe, A. 2003. Cultural origins of the Egyptian Neolithic and predynastic: An evaluation of the evidence from the Dakhleh Oasis (south central Egypt). *African Archaeological Review* 20 (4), 175–202.

Wendorf, F. & Krolik, H. 2001. Site E-96-1: The complex structures or shrines. In: Wendorf, F., Schild, R. and Associates (eds.), *Holocene settlement of the Egyptian Sahara (Volume 1): The archaeology of Nabta Playa*. Kluwer Academic/Plenum Publishers, London, pp. 503–520.

Wendorf, F., Malville, J., Wendorf, F., Schild, R. and Associates 2001. The megalithic alignments. In: Wendorf, F. Schild, R. and Associates (eds.), *Holocene Settlement of the Egyptian Sahara (Volume 1): The archaeology of Nabta Playa*. Kluwer Academic/Plenum Publishers, London, pp. 489–502.

Wendorf, F. & Schild, R. 1994. Are the early Holocene cattle in the Eastern Sahara domestic or wild ? *Evolutionary Anthropology* 3 (4), 118–128.

Wendorf, F. & Schild, R. 1998. Nabta Playa and its role in northeastern African Prehistory. *Journal of Anthropological Archaeology* 17 (2), 97–123.

Wendorf, F., Schild, R. and Associates. 2001. *Holocene settlement of the Egyptian Sahara (Volume 1): The archaeology of Nabta Playa*. Volume 1. Kluwer Academic/Plenum Publishers, London.

Wenke, R. 1989. Egypt: Origins of complex societies. *Annual Review of Anthropology* 18 (1), 129–155.

Wenke, R. 1991. The evolution of early Egyptian civilization: Issues and evidence. *Journal of World Prehistory* 5 (3), 279–329.

Wiessner, P. 1983. Style and social information in Kalahari San projectile points. *American Antiquity* 48 (2), 253–276.

Wynne-Jones, S. & Fleisher, J. 2015. *Theory in Africa, Africa in theory: Locating meaning in archaeology*. Routledge, Abingdon.

Wynne-Jones, S. & Kohring, S. 2007. Socialising complexity. In: Kohring, S. and

Wynne-Jones, S. (eds.), *Socialising complexity*. Oxbow Books, Oxford, pp. 2–12.

Yoffee, N. 2005. *Myths of the archaic state. Evolution of the earliest cities, states, and civilizations*. Cambridge University Press, Cambridge.