

Chapter 6

The Desertification of the Egyptian Sahara during the Holocene (the Last 10,000 years) and Its Influence on the Rise of Egyptian Civilization

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6.1 Introduction

Egyptian civilization is the gift of the Nile. But it is also the result of climatic change since the last ice age (Fagan 2004). During the last 10,000 years or so, desertification, punctuated by temporary reversals, has driven people out of what was once a well-watered savannah covering vast areas of the present Sahara into smaller areas fed by rivers and near-surface groundwaters. In Egypt, the result was a relatively large population in a relatively small area, the Nile Valley (Barich 1998). This has led to ideas that this population required organization in order for it to survive and allow complex regimented societies to develop; exemplified by the early Pharaonic period with its huge public works projects—the pyramids and associated monuments (Wilkinson 2003). But did complex societies evolve during this organization or was the organization a pre-requisite for the complex societies; did it take place before the constriction of society into the Nile Valley; and did it begin in one area and then spread? A popular view is that increasing social complexity occurred during the development of agriculture, made possible by a benign climate while severe climatic change interrupted this development (Burroughs 2005). On the other hand, there is increasing evidence that social complexity developed during climatic deterioration (Brooks 2006). Such questions require objective analysis of the timing of development of different social systems

related to climatic change in different parts of Egypt and adjacent areas.

The area covered in this study is primarily encompassed by the present country of Egypt with some data from adjacent areas of Libya, Chad, Sudan, and even further away where necessary (Fig. 6.1). And because of the lack of evidence in the Nile delta and adjacent areas, most of this study deals with an area between Gilf Kebir and the Red Sea coast, south of Cairo (30°N). This band contains four rather separate areas: (a) the westernmost desert (around Gilf Kebir, Gebel Uweinat, and the Great Sand Sea), characterized by abundant cave engravings and paintings. There are few studies from this area and the few Bedouin inhabitants of the area left when the last wells dried out in the early twentieth Century; (b) the oases belt between the westernmost desert and the Nile, with few engravings or paintings but with many stratified sites; (c) the Nile Valley (including the Faiyum), with the best stratified sites and dates; and (d) the eastern desert between the Nile and the Red Sea, with mostly engravings and paintings.

This chapter attempts to: first, summarize the climatic changes from physical evidence; second to summarize the changes in human societies in different parts of Egypt as they moved from hunter-gathering in the Sahara savannah of the early Holocene, to the complex civilization of the early Pharaohs in the Nile Valley, and to relate these to climatic changes during this period. For the first we require fossils, sedimentary and landscape evidence that allows us to determine environment. For the second we require evidence of societal change that can be preserved: these are such structures as refuges and buildings, tools and other artefacts, pre-

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See Plate 5 in the Color Plate Section; also available at: extras.springer.com

Fig. 6.1 Location map of Egypt and Sudan with cited localities. Dashed line is current boundary between western desert and oases divisions. Nile river division separates oases and eastern desert division. Present oases are in bold italics

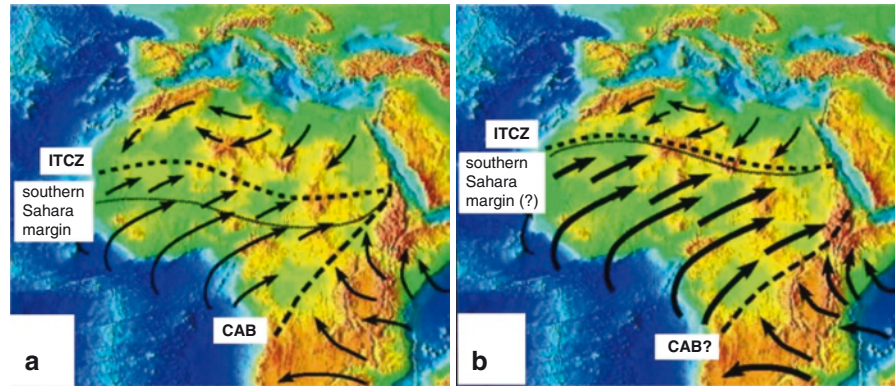


served art, sculpture and painting for example, and a stratigraphy or relative age which allows their placement in a historical context. For both we require good dating, not only of the societal changes but also the climatic changes, and this is difficult to get.

Relative dating comes from standard stratigraphic methods such as superposition and cross-cutting relationships. The main problems are: that time breaks of greater or lesser magnitude may separate the strata themselves and any incised pits; and the different artefacts used in different cultures at the same time obscure time equivalence.

Absolute dating (in years) comes from a variety of methods. Fortunately, artefacts from about 5000 BP (in Egypt) can sometimes be calibrated with written historical records. Prior to that, ^{14}C dates require calibration to calendar years with tree rings, but only up to about 7000 BP. Prior to this other methods are needed: this paper uses the Thorium/Uranium calibration with fossils corals back to 50,000 BP (Before Present, present being 1950) (Fairbanks et al. 2005); and all ^{14}C dates in this paper are calibrated and are given both in BP and BC: to convert add or subtract 1950 years respectively.

Fig. 6.2 **a** Present-day August positions of Intertropical Convergence Zone (ITCZ) and Congo Air Boundary (CAB) with southern Sahara margin and wind directions. **b** Inferred early Holocene position of ITCZ and winds. Note that more southern January ITCZ position would also imply penetration by northeasterly Mediterranean winds at that time



6.2 The Present Situation

The first necessity in interpreting climate and culture in the past is to determine existing relationships and interactions in comparable modern situations.

Tropical to subtropical climates are currently dominated by the two Hadley circulation cells. Hot air rises at the equator at the Intertropical Convergence Zone (ITCZ) and cooler air descends around 30°N & S and flows back towards the ITCZ. The ITCZ migrates north and south with the seasons, bringing summer rains to the Sahel and Sahara and winter rains to the Mediterranean coast. The northward movement of the (ITCZ) in the summer (Fig. 6.2a) determines the quantity of rainfall in a particular year: if its circulations penetrate far to the north there will be a long rainy season and good rains; if they do not penetrate sufficiently far north, then the rains may fail totally. During the winter, hot dry winds blow from the northeast. In spring, Mediterranean cyclones may rarely penetrate the eastern Sahara bringing rare downpours to hyperarid areas such as the Gilf Kebir. Rainfall decreases northwards from the tropical rainforests to the Sahara: and rainfall variability also decreases with increasing annual rainfall. A dry year with a 10% probability (9 out of 10 years will be wetter) has only half the rainfall of an average year at 200 mm, 65% at 400 mm and 80% at 1000 mm. During the early Holocene, the ITCZ penetrated much further north (Fig. 6.2b). Climate determines both the nature and location of the major ecotype belts and their land use (Fig. 6.3).

At present, there is a sharp division between the arid to hyperarid western and eastern deserts with their sparse nomadic Bedouin populations and the Nile

Valley and oases with their dense settled agricultural populations. This sharp division did not occur in pre-historic times when the climate was generally wetter and the more gradual changes now seen south of the Sahara were often prevalent. The desert to savannah habitats and societies of northern Africa are thus particularly relevant for interpreting the pre-historic Holocene societies of Egypt (Midant-Reynes 2000; Thurston et al. 1993).

But some definitions of the type of societies present are needed. Foraging societies collect food available in nature by gathering wild plants, hunting wild animals and fishing. Pastoral societies raise livestock such as goats, cattle and sheep as food. Specialized pastoralists rely on such livestock, periodically moving the herds in search of fresh pasture and water. Multisource pastoralists mix herding with foraging and even farming. Farming is the growing of domesticated plants and raising of domesticated animals. None of these, of course are mutually exclusive which makes archaeological

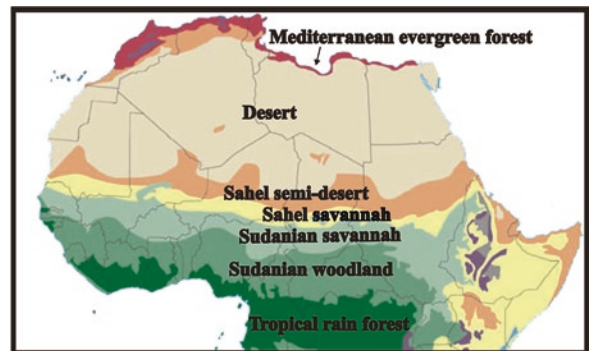


Fig. 6.3 Current biomes of northern Africa; the highest cattle concentrations are in the northern Sudanian savannah and southern Sahel biomes

interpretations very difficult. For example, among pastoralists, at one extreme the nomadic Fulani people herd cattle, goats and sheep across vast dry areas from west Africa to Sudan, keeping somewhat separate from the local agricultural populations, though they trade with them (Bonte 1999): at the other extreme the Raikas of Baluchistan often exchange milk, meat, wool, and manure, for grain, vegetables, and other goods produced by their settled neighbors. Also the cultivators compete and pay for having herds manure their fields and in exchange allow the herd to graze in their forests (Agrawal 1999). Foraging societies are now very limited, being mostly replaced by pastoralists and/or farmers.

The Sudanian savannah is divided into the East Sudanian savannah, east of the Cameroon highlands and the West Sudanian savannah to the west and these have slight differences (Fig. 6.4a). Rainfall (from April to October only), varies from 600 mm in the north to 1000 mm in the south. Typical species are trees and shrubs (*Combretum*, *Terminalia*, *Acacia*), and tall elephant grass (*P. purpureum*), with large mammals like the African elephant, giraffe, cheetah, leopard, lion, giant eland, black rhinoceros, and white rhinoceros, though many have been eliminated through over-hunting. During the dry season, most of the trees lose their leaves, and the grasses dry up and often burn. Human population density is high (50–100 people/km²) with land use varying from farming in settlements to multi-resource and specialized pastoralism (Fig. 6.4b, c). The Sudanian savannah is the main area of arable farming

because: the rainfall is high enough, yet leaching is still modest; the variability of rainfall is rather limited; and the availability of nutrients for growth of annuals is at maximum. The distribution of rainfall in a single season also promotes the growth of annual plant species and thus arable subsistence farming, where cereals are the obvious favored crops in view of the potential yield in both quantity and quality per unit area.

The Sahel is mostly covered in grassland with areas of savannah woodland and shrubland. At present, the Sahelian *Acacia* savannas form an unstable transition zone between the wooded Sudanian savannas on the south, composed mainly of shrub and tree species and tall elephant grass, and the true Sahara Desert on the north (Fig. 6.4d). Grass cover is fairly continuous and dominated by annual grass species with *Acacia* species as the dominant trees. The Sudanian and Sahelian savannas are the dominant areas of specialized pastoralism as shown by the density of cattle. In the northern Sahel, areas of desert shrub, alternate with areas of grassland and savannah. During the long dry season (November to May), many trees lose their leaves, and the predominantly annual grasses die. Before over-hunting, the Sahel had large populations of grazing mammals, including the scimitar-horned oryx, dama gazelle, dorcas gazelle, red-fronted gazelle, and bubal hartebeest, along with the African wild dog, cheetah, lion, and other large predators. Traditionally, most people in the Sahel are specialized pastoralists. Herds graze on high quality feed in the north during the wet season, and then trek several hundred kilometers to the south,

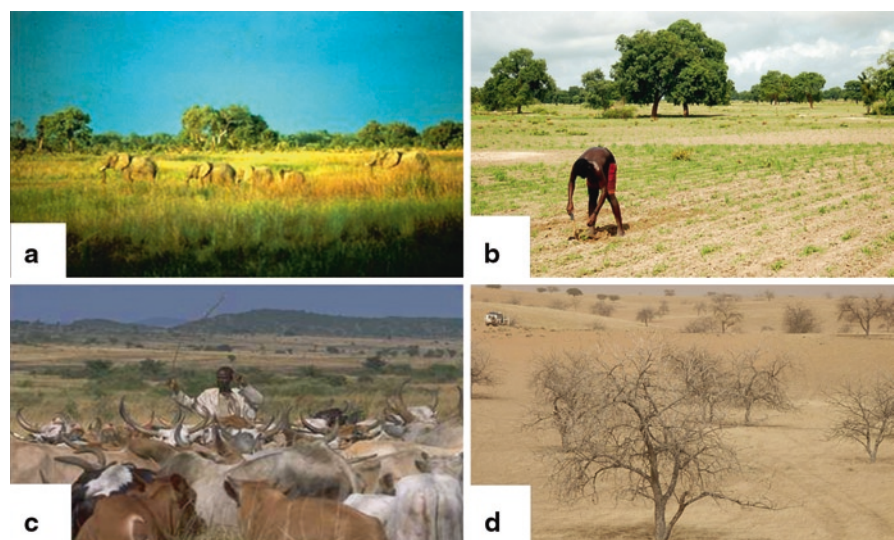


Fig. 6.4 Biomes and land use. **a** East Sudanian savannah. **b** Agriculture in Sudanian savannah. **c** Cattle herding in northern Sudanian savannah. **d** Sahelian *Acacia* grasslands in winter

to graze on more abundant, but less nutritious feed during the dry period. Before the domestication of animals, however, foraging would be the only viable strategy. In historic times, a series of decentralized empires (multiresource pastoralism) emerged after 750 AD, and supported several large independent trading cities in the Niger Bend region, including Timbuktu, Gao, and Djenné. Expansion south into the forest zone was prohibited as their horses and camels could not survive the heat and diseases of that region.

In the twentieth century, great variations in annual rainfall have caused relatively favorable times to alternate with killing droughts: and such alternations occurred in the past. The nature of these alternations requires investigation as they are critical to understanding Holocene changes. For example, perennial grasses, shrubs and trees extend their habitat to the north during long periods of higher rainfall and relative low exploitation of the vegetation. But a few years of drought are enough to push them back again, far to the south. This is a much faster process than the extension of habitats to the north, which is counteracted by the predominantly southward seed dispersion mechanisms by the Harmattan, the dry wind from the Sahara, and by migrating herds (Bremen 1992). We would expect that any northward migration of cultures would be slower than southward retreat. The biomes and their associated human cultures can be used to interpret the archaeological record in terms of climate change.

6.3 Climatic Change

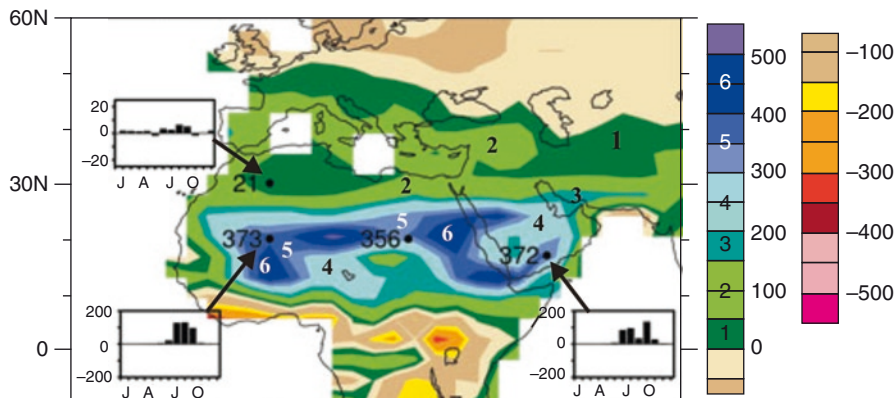
Evidence of climatic changes comes from: (a) sedimentary evidence of sand dune movement and accumulation (dry) and active fluvial channeling and sediment accumulation in both fluvial channels and lakes (wet), though care has to be taken to try and separate arid and hyperarid stream deposits from semi-arid stream deposition (a very difficult thing to do), many wetter phase deposits, such as lake deposits have been, and are being, removed by aeolian deflation during dry phases (Kröpelein et al. 2008), and there can be significant lags between climatic change and sedimentary response (Kocurek 1999); (b) fossil evidence of the presence or absence of a biota indicating grassland, savannah, lake and desert environments; (c) artefacts indicating human activities in drier, savannah climates

(such as hunting tools without other artefacts and without permanent settlements) and wetter climates where crops can be grown (such as carbonized cereal grains and grinding querns); (d) sculptures, engravings and paintings indicating the animals living in the area, such as giraffes (drier savannah) and hippopotamus (at least locally wetter periods) (Muzzolini 1992).

Contrary to earlier concepts of climatic stability during the Holocene, studies during the last decade indicate marked climatic changes in the Sahara which do not correlate with higher latitude climatic changes (Kuper and Kröpelein 2006). Astronomical forcing is one of the causes of these changes (Crucifix et al. 2002): for example, the maximum Earth obliquity was reached at 10,000 BP and has declined by about 1° of latitude since then: this affects the insolation of both hemispheres as well as the latitudinal migration of the Intertropical Convergence Zone (ITCZ), which would reach one degree further both north and south in the earliest Holocene. The present biotope distribution is related to the annual rainfall partly controlled by the summer position of the ITCZ (Fig. 6.2a). During the early Holocene maximum ITCZ displacement, the biotope distributions show increased summer-early autumn rainfall in the Sahara centered on about 20°N, extending southwards to the Sudanian woodland as well as northwards to the Mediterranean and southern Europe (Fig. 6.5), and with slightly cooler tropical and subtropical temperatures which would reduce evaporation (Salzmann et al. 2006).

Current ideas on climatic change in the Sahara have been summarized by Brooks (2006). After a long late glacial hyperarid period, including the Younger Dryas (from 12,900 to 11,500 BP), when the Nile underwent enormous fluctuations in discharge (Said 1993) and the huge sand dunes of the Great Sand Sea developed (Bessler 2002), the entire Sahara became wetter as tropical rainfall belts shifted northwards by as much as 800 km (Nicholson and Flohn 1980). From around 10,500–6000 BP, the Sahara had many lakes with an abundant Sudanian- and Sahelian-type savannah climate flora and fauna (Damnati 2000). This period was interrupted by colder episodes of increased aridity, as shown by Nile discharges: the most severe was around 8000 BP which is inferred from a widespread cooling in the oxygen isotope signal between 8400 and 8000 BP and evidence of an abrupt climatic reorganization between 8200 and 7800 BP as circulations changed to full postglacial conditions (Brooks 2006).

Fig. 6.5 Annual rainfall in northern Africa: early Holocene deviations from current annual rainfall; note max positive changes are in Sudanian, Sahelian and Desert areas



Though wetter conditions recurred after 8000 BP, the northern playas began to dry as early as 7700 BP (see oases belt below): most rainwater-fed playas began to wane around 7000 BP and became desiccated by 5500 BP. About 6200 BP the modern phase of hyperaridity had begun in southern Egypt (Wendorf and Schild 1998).

The Sahelian vegetation zones were 500–600 km north of their present range around 8000 BP, and 300–400 km north around 6400 BP. With increasing desiccation from 6000 BP onwards, the savannah formations retreated to the south until their present position was reached by 3800 BP (Neumann 1989). Some climate modelling results and paleoclimate data have indicated that the change from a semi-arid climate with about 250 mm of rainfall to a hyperarid climate with less than 50 mm/year of rainfall occurred over a relatively short period of time, on the order of hundreds of years (deMenocal et al. 2000). But recent evidence from sediment cores from Lake Yoa in the east-central Sahara (Fig. 6.1) indicates that a slower transition over several thousand years may have taken place, at least in that location (Kröpelein et al. 2008), while evidence from a number of localities suggest that transition times may have varied from place to place by as much as 2000 years (Salzmann et al. 2006). The rate of climatic change is important in understanding the feedback mechanisms involved, but the evidence is still inconclusive, especially as feedback and lag effects have to be considered (Kocurek 1999). For example, a change from desert to grassland in the southern Sahara would increase rainfall by 12% (Kutzbach et al. 1996). Abrupt climate changes over a few hundred years have a greater impact on human societies than changes over thousands of years.

6.4 Societal Changes

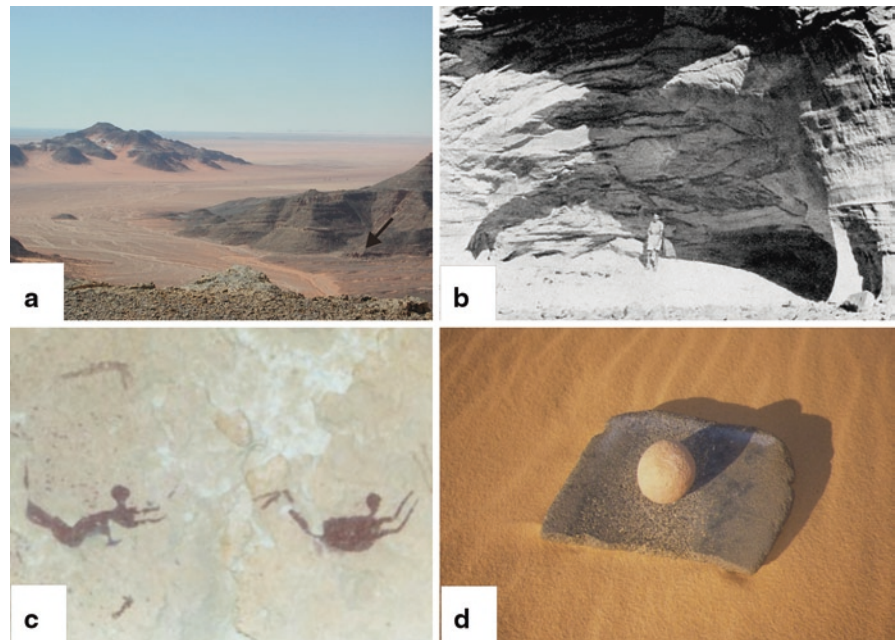
The best evidence of societal change comes from habitation structures with associated artefacts arranged in a stratigraphic order of change. These are very rare and mostly limited to the later stages of societal development which, being relatively young, have a better chance of preservation. Sculpture and paintings can also help determine such changes. The type of artefacts can also help in determining the activities of the contemporary population and, by comparison with existing societies help in determining the structure and complexity of those ancient societies (Diamond 1997). For example, religious structures suggest a priesthood specialization, while variations in contemporary grave goods suggest social stratification.

Our present knowledge of societal changes are summarized in numerous books and articles (Grimal 1992; Phillipson 2005; Midant-Reynes 2000; Wendorf and Schild 2001; Edwards 2004; Burroughs 2005) and four successive cultural phases have been recognized (Kuper and Kröpelein 2006). Although these phases will be followed in the summary, they need to be backed up by evidence from individual sites discussed below (all locations are on Fig. 6.1).

6.4.1 Westernmost Desert

In the westernmost desert, information is mostly limited to surface finds and the abundant paintings in caves, alcoves and rock outcrops at Uweinat, Arkenau and Gilf Kebir (Fig. 6.1), where numerous engravings and

Fig. 6.6 Gilf Kebir. **a** Gilf Kebir looking west to Libya, arrow shows typical location of groundwater sapping that forms ‘caves’. **b** Cave of swimmers alcove, with Count Almasy around 1933. **c** Swimmers. **d** Grinding quern and stone grinder



paintings, together with stone tools, show the activities of the inhabitants and their animals (Fig. 6.6).

The best stratified site is Wadi Bakht on the south-eastern side of the Gilf Kebir (Fig. 6.1). Here, an early Holocene dune at the end of the terminal Pleistocene hyperarid phase (around 10,000 BP) blocked a wadi, ponding back an ephemeral lake which was occupied until 5250 BP (Fig. 6.7a,b; Linstadter and Kröpelein 2004). Four cultural phases were distinguished in this and adjacent areas (Fig. 6.7c; Gehlen et al. 2002). Gilf A (10,000–8500 BP) has only limited small lithic tools and simple pottery. Gilf B (8500–6500 BP) associated with stone circles (probably dwelling sites) has a more extensive tool kit with evidence of wild cereal gathering (grinding stones) and hunting (foraging). Gilf C (6500–5500 BP) has evidence not only of foraging, but also of goat and possibly cattle husbandry (foraging- specialized pastoralism), whereas Gilf D (5500–5000 BP) is limited and represents a decline in populations, but seems to be cattle based (specialized pastoralism).

In the Great Sand Sea of alternating dunes and dune corridors, Neolithic stone tool sites are abundant on the stone pavements of the corridors (Fig. 6.8a, b) and hut circles and tools, marginal to eroding silts marking temporary playas or lakes indicate foraging before 5500 BP (Fig. 6.8c, d). But only a few ^{14}C dates have come from scattered playas; tools and pottery are dated

only by cultural comparison and very little is known of the history of this vast area (Haynes 1985).

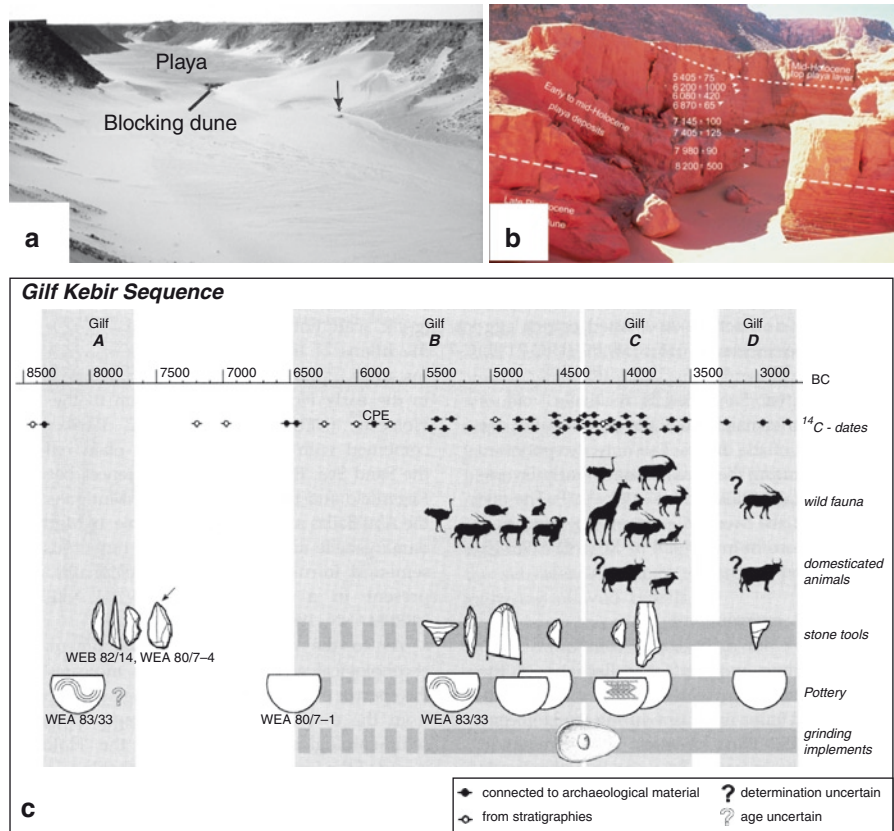
In the Abu Ballas area (Fig. 6.9a), stone circles with fire hearths (Pachur and Braun 1980; Kuper 1993) range from 9000 to 3500 BP, but with a concentration around 5800–5000 BP (Gabriel 1987). Storage jars of the New Kingdom (3500 BP) (Fig. 6.9b) record a trade route still used in Pharaonic times while the red-painted figure of a pharaoh (none other than Khufu, the builder of the great pyramid at Giza, reigned 4539–4516 BP) smiting his enemies was recently discovered on this route (Fig. 6.9c; Bergmann et al. 2001).

6.4.2 Oases Belt

Most data comes from the existing oases and playas, Siwa, Bahariya, Farafra, Dakhleh, Kharga, Nabta Playa, Selima, Wadi Howar and Laqiya (Fig. 6.1). Most are deflation basins that were periodically inundated throughout the Holocene (Brookes 1993).

Dakhleh Oasis (70 × 20km) was fairly humid through the early Holocene, drying through the mid-Holocene, though short-lived arid episodes occurred even during the wetter phases (McDonald 2002, 2003). The mid-Holocene sequence in Dakhleh (Fig. 6.10)

Fig. 6.7 Wadi Bakht. **a** General view with blocking dune and truck for scale arrowed. **b** Detail of blocking dune, playa sediments and ¹⁴C dates (both from Linstadter and Kröpelein 2004). **c** Gilf Kebir sequence (from Gehlen et al. 2002)



begins with the Masara culture of foragers around 8800 BP. The Bashendi A culture (about 6400–5500 BP) has slab enclosure structures which seem large enough for cattle corrals (Fig. 6.11b), both plain and impressed

pottery, and evidence of the use of wild cereals, sorghum and millets (multiresource pastoralism). In Bashendi B, from about 5500–4000 BP, correlated with increasing aridity, there are no slab structures but quite

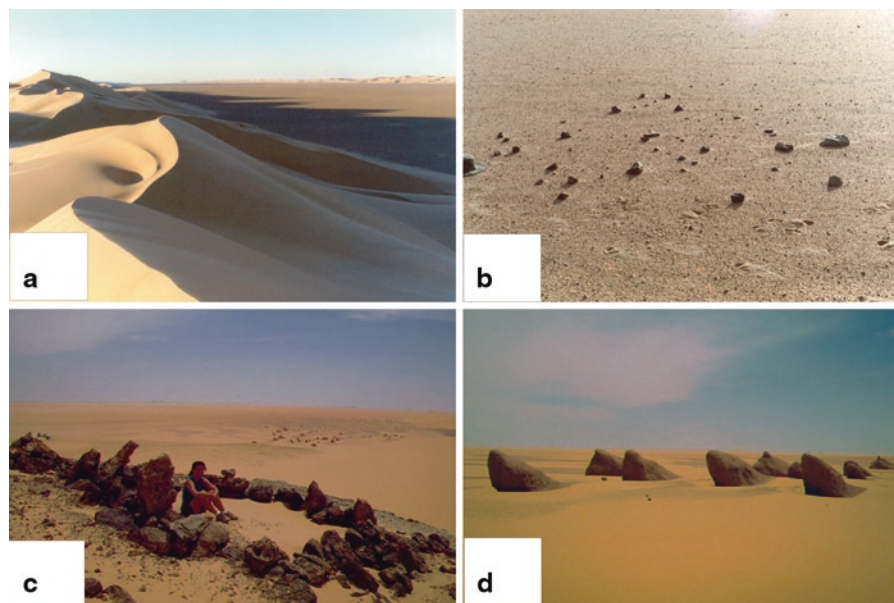
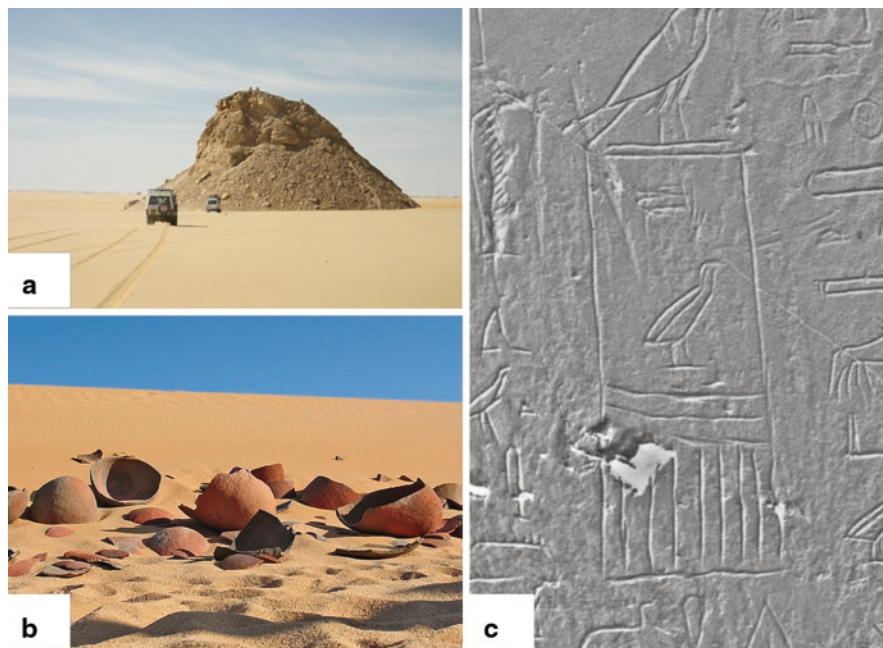


Fig. 6.8 Great Sand Sea. **a** Dunes and dune corridors just north of Gilf Kebir. **b** Neolithic tool-making site in dune corridor (Plate 5b). **c** Camp sites around lake (yardangs in background). **d** Lake silts now eroded into yardangs with scattered flake tools at margins—detail of background to c

Fig. 6.9 Abu Ballas. **a** Abu Ballas monadnock. **b** Storage jars. **c** Cartouche of Khufu incised on rock



extensive scatters of hearth mounds with common grinding equipment (Fig. 6.11c). Prestige items such as bracelets, toggles, stone beads and small polished stone axes may indicate the mobile elites of pastoral groups (McDonald 2002, 2003). The impoverished Sheikh Muftah culture (about 4000–2800 BP) is confined to the central lowlands of the oasis where they are often associated with marshy areas: there is no sign of structures or permanent settlement and no evidence

of cultivation. The same cultural units also occur in Kharga Oasis just to the east (Mandel and Simmons 2001; Warfe 2003).

Nabta Playa forms a natural depression of about 5000km² (Fig. 6.1). Around 11,000 BP, temporary lakes or playas formed. Early cattle pastoralism, as well as the elaboration of religious beliefs and cultural practices was followed, beginning about 9000 BP, by larger permanent settlements which relied on wells and had sheep, cattle, and goat herding. After a period of intense drought between 8000 and 7000 BP, renewed permanent settlement recommenced, and by about 6500 BP, the inhabitants had developed a sophisticated, accurate way of marking time and seasons with a stone henge, using the stars as their guides (Fig. 6.12).

At Selima Oasis (Sudan), an extensive deep stratified lake formed around 9700 BP and lasted until about 6500 BP (Haynes et al. 1989). Its fossil plant and animal remains indicate a savannah climate, and many lake level and climatic fluctuations with a high lake level around 8000 BP (Haynes et al. 1989; Pachur and Holzmann 1991).

Wadi Howar (Sudan), the largest dry river system in the presently hyperarid Eastern Sahara, stretches over 1100 km from eastern Chad to the Nile (Figs. 6.1, 6.13a). But between 9500 to 4500 BP, lower Wadi Howar flowed through an environment with

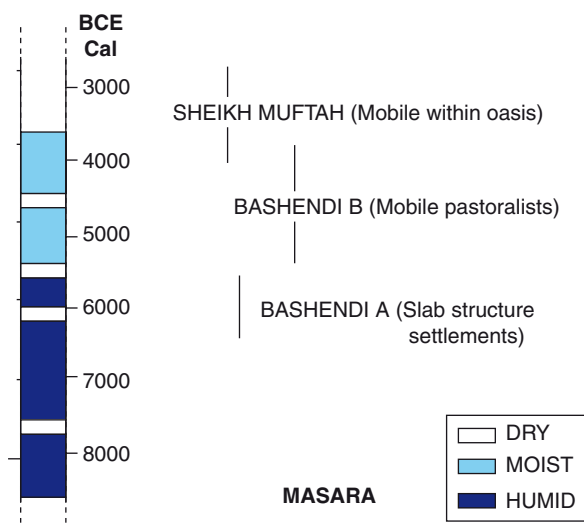


Fig. 6.10 Dakhleh Oasis: climate and cultural succession. (Courtesy of McDonald, modified)

Fig. 6.11 Dakhleh Oasis.
a Present oasis. **b** Bashendi A dwelling area. **c** Bashendi B grinding querns. (**b, c** Courtesy of MMA McDonald)



numerous ground water outlets and freshwater lakes (Pachur and Kröpelein 1987). From 8000 to 7000 BP, the first inhabitants practiced fishing, hunting and gathering and produced ceramics decorated with Dotted Wavy Line and Laqiya-type patterns. From 6000 BP, intensive cattle herding began, and around 4200 BP, in response to increasing aridity, small livestock, sheep and goat, were added to the herds (Fig. 6.13b).

6.4.3 Nile Valley and Adjacent Areas

The Faiyum Depression is encircled by a northern escarpment and for much of its past it contained a lake (Lake Moeris) fed by a Nile run-off (Bar Yusef) which in prehistoric times seasonally flooded the depression, laying down fertile silts (Fig. 6.14a). The fluctuations in Nile flooding directly controlled the

Fig. 6.12 Nabta playa.
a Stone circle. **b** Standing stone

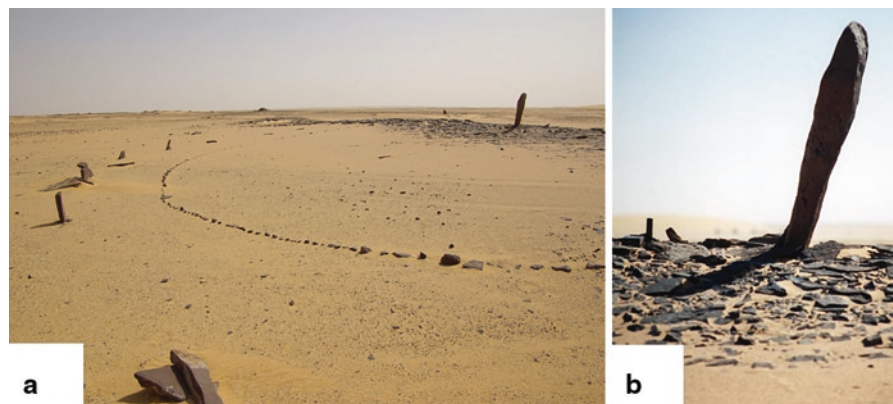
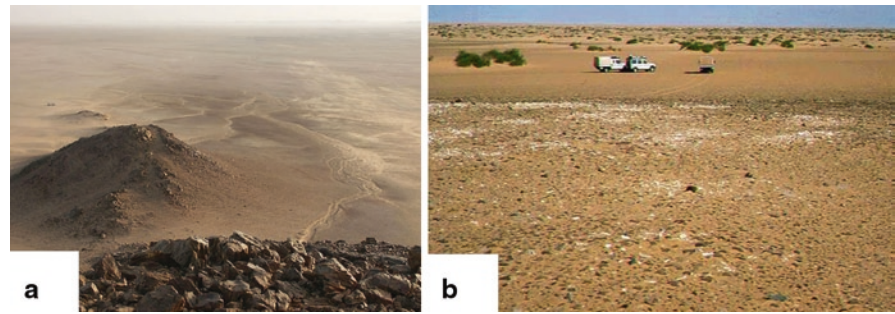


Fig. 6.13 Wadi Howar.
a View across dry plain.
b Cultural site with artefacts



levels of the lake which, in turn affected the settlements of the Faiyum (Fig. 6.14b) (Byrnes 2008). Although settlement of Faiyum began in Paleolithic times, only the latest Neolithic Qarunian is well represented (Wenke et al. 1988).

Qarunian settlements (ca. 9600–8200 BP) were generally on high-ground overlooking Lake Moeris (Wendorf and Schild 1976) and had a lithic industry, associated with a diet heavily based on fishing and hunting and an increasing reliance on wild grain: there is no sign of domestication. Though similar to contemporary Nabta Playa, there are major differences between the lithic tool kits which suggest little contact (Wenke and Brewer 1992). The Qarunian and the succeeding Faiyumian are separated by a long time gap of up to 1000 years, suggesting the Faiyum was abandoned for at least several centuries (Wenke 1999).

The Faiyumian (7200–6200 BP) represents the earliest known fully agricultural economy in Egypt, with hearths, lithic tools, pottery shards and some grinding stones (Fig. 6.14c). The economic basis for settlement was cereals (barley, emmer-wheat and flax) and domesticated animals (cattle, sheep, goats and pigs) derived from the Fertile Crescent of Arabia to the northeast (Zohary and Hopf 1993), though hunting and fishing continued to be practiced (Phillipson 2005). There may be a time gap between the Fayumian and the succeeding Moerian when Lake Qarun may have come close to drying up (Hassan 1986).

The Moerian (6200–5050 BP) has: more complex settlements with several hearths and light shelters; different ceramic styles and methods of producing and modifying stone tools. Faunal assemblages indicate a heavy reliance on fish, with only a few sheep and goat



Fig. 6.14 Faiyum. **a** Satellite view showing connection to Nile. **b** Present-day Lake Faiyum. **c** Faiyum A pot

remains, together with infrequent gazelle and waterfowl remains

In Lower Egypt (basically the delta), much has been buried by ongoing sedimentation (Fig. 6.1). The earliest known settlement is at Merimde 50 km northwest of Cairo on a mound above Nile flood levels, and gives calibrated ¹⁴C dates of 6830–6200 BP. The house styles and street patterns reflects a growing level of urban organization. Like the Faiyumians, the Merimidian agriculturalists cultivated cereals, reared cattle, goats, and pigs, and hunted animals such as antelope, but their pottery is plain and simple. The dead were buried inside the unoccupied sections of the settlement, with few grave offerings, apart from the occasional beads, amulets or reed mats, suggesting little social stratification. El-Omari (around 5500 BP) is transitional to the Maadi culture (Mortensen 1999).

The Maadian (about 5800–5100 BP) is based on a center about 10 km south of Cairo, and is the most important of the local delta predynastic cultures. There are few grave goods and tombs in general, and the Maadi culture retained strong Neolithic characteristics, but with disk-shaped mace-heads, cosmetic palettes, stone vessels, and abundant copper (the first introduction of metal in this area). Significant trade is shown by imported Sinai copper, flint tools and lance blades (Midant-Reynes 2000). There is, however, no sign of anything more than basic social differentiation, certainly no sign of hierarchies, nor craft specialization based on function. And yet, contrast the rapid changes during this time at Naqada in Upper Egypt (Bard 1994).

In Upper Egypt (the upper Nile River valley south of Cairo), the Elkabian (around 9000 BP) is known from only one site where it is characterized by small lithic tools of a hunting/fishing culture. After a long gap of about 2000 years, the Tarifian (around 7000 BP) has hearth sites with lithic tools, no signs of agriculture, and only a few scattered pot fragments: it is little advanced from the Elkabian (Wetterstrom 1995). After a 500-year-old gap, the Badarian (about 6400–6000 BP) is the first farming culture in Upper Egypt. Small village settlements were occupied for only a short time and their huts seem to be built from very lightweight material (Hendrickx and Vermeersch 2000). They did, however, use metal and produced the first glazed pottery. Occasional characteristic Badarian finds further south and in

the Wadi Hammamat show that the culture was established also in other parts of Upper Egypt.

The succeeding Naqada culture (6400–5000 BP), defined at Naqada about 25 km north of Luxor, shows more rapid change, especially during Naqada 3 (Phillipson 2005).

Naqada 1 (Amratian) (6400–5500 BP) is noted for its black-topped and painted pottery, with war and hunting represented as a dual theme. There are only few and very poor remains of dwellings and these were built from a mixture of mud, wood and reed.

Naqada 2 (Gerzean) (5500–5200 BP) is noted for the first marl pottery, usually with ochre-brown paintings on beige background. Graves become better equipped: often multiple burials sheltered up to 5 individuals. Through Naqada 2, copper tools replaced stone tools, silver and gold use increased, and the macehead changed from disc-shaped to pear-shaped and developed into a symbol of kingly power. Also, soft and hard stone-working techniques developed, which would be of central importance during younger Egyptian civilizations. This culture advanced both south and north from the area of Naqada 1, reaching the eastern edge of the Nile Delta and Nubia (where it is referred to as the Nubian A Group). The South Town of Naqada became the most advanced of Egypt's towns, fortified by walls, and a large mud-brick structure (30 × 50 m), possibly a royal palace, was built.

Naqada 3 (around 5200–5000 BP) marks the emergence of the early dynastic civilization, state building, and the development of a complex culture. In this period, graves become richer and contain more elaborate grave goods. Hierakonpolis, the main city, lies about 100 km below Naqada, on the west bank of the Nile. Naqada 3 extends all over Egypt and is characterized by some sensational firsts: the first hieroglyphs, the first graphical narratives on palettes, the first regular use of serekhs, the first truly royal cemeteries, and possibly, the first irrigation.

In the Sudan, around Wadi El-Khowi, societies may have been more stratified earlier, where settlements and cemetery sites, range from about 7000–5500 BP. In the cemeteries, the most important individuals were men buried at the highest point of each cemetery mound, whose graves contained the most important objects, such as elaborately decorated pottery, fine tools and weapons, and strange stone female figurines.

Around 5000 BP, a larger settlement had an advanced level of planning and an elaborate defense system, with centers of administration, private residences, storage huts, workshops, and cattle enclosures (Bonnet and Valabelle 2006).

From about 4500 BP, Egyptian written records supplement the archaeology. About 4500 BP the Egyptian pharaoh Snofru invaded and captured Lower Nubia and built forts and towns there. About 4250 BP, groups of cattle herders moved into Lower Nubia and the Egyptians withdrew. These people were experts in the use of the bow and arrow and formed three small chiefdoms or kingdoms. Their rulers were shown in rock drawings just like kings of Egypt, but with names in hieroglyphics unlike the names of any known Egyptian kings. Their most interesting remains are their cemeteries of round graves, their beautiful red or black pottery covered with white designs, the tiny cattle and animal figures buried in their tombs, and the plump, tattooed women drawn on pottery or made into figurines. About 4150 BP Egypt lost power and civil wars started, but by 4040 BP the pharaohs of the Middle Kingdom had reunited all of Egypt and by 3950 BP they had retaken Lower Nubia, built a series of forts, and began to attack Upper Nubia.

6.4.4 Eastern Desert

The prehistory of the Eastern desert is poorly known. The Tree Shelter site near Quseir, Egypt, is one of the rare stratified sites (Marinova et al. 2008) which starts around 8000 BP and continues until about 5000 BP. The archaeological finds show clear connections with the Nile Valley and the Western Desert during the wet Holocene period. The lowest level (about 8100–7800 BP) contained hunting and hide working lithic tools of nomadic hunters, similar to the Elkabian. The higher level has numerous hearths (about 6600–5000 BP) with animal and fish bones, Red Sea molluscs, and lithic tools similar to the Tarifian. Many of the abundant engravings (petroglyphs) on the wadi walls in the Eastern desert, can be matched with paintings on grave goods from the Naqada I (6400–5500 BP) cemeteries in the Nile Valley (Wilkinson 2003).

6.4.5 Cultural Summary

The time relationships of the oases and Nile cultures are shown in Fig. 6.15. The early cultures like the Qarunian (9600–8200 BP), Elkabian (ca. 9000 BP) and Masarian (ca. 8800 BP) were hunter-gatherers and fishers (foragers), exploiting savannah, lake and wetland environments, and living a existence governed by the cycle of the seasons. Their origins are unknown. The slightly younger Bashendi A culture (8000–7500 BP) of Dakhleh was a cattle-based culture (multiresource pastoralists) developed during increasing aridity.

The succeeding Faiyumian (7600–6200 BP) marks the first agricultural society in Egypt with a fully evolved, albeit simple, cultural and economic identity. Though their origins are disputed, they may have brought their agriculture with them from the Near East, as the contemporary Nile and Oases cattle-herding based cultures, like the Merimide and Bashendi B (specialized pastoralists), show a decline from Bashendi A. That societal differentiation and social systems began to develop is shown by the differentiation of burials, with grave goods found in some (presumably higher status) graves but not others (Byrnes 2008). This indicates the development of a hierarchy, the existence

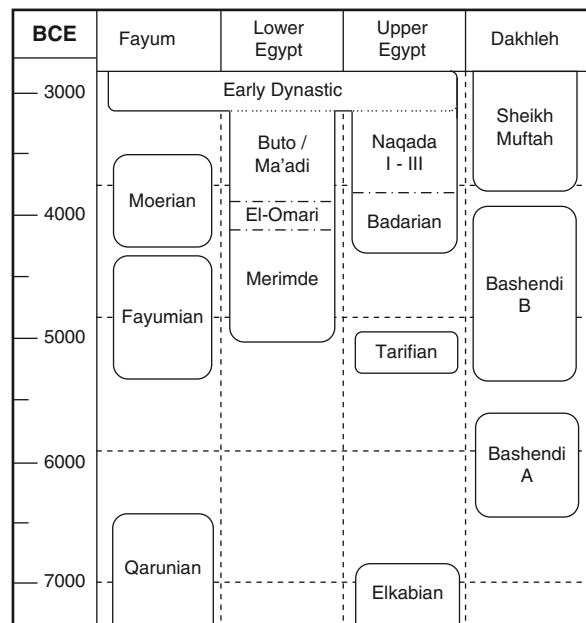


Fig. 6.15 Comparative chart of cultures from Dakhleh, Faiyum, and Lower and Upper Egypt

of skilled workers and an affiliation to a single given area. Thus, by about 7000 BP, social structures had advanced far enough to provide a springboard for their further elaboration in the Upper Egyptian Badarian and especially the Naquada cultures whose rapid evolution is continuous into the first dynastic societies.

6.5 Integration of Climatic and Societal Changes

During the end Pleistocene hyperarid phase, the Sahara extended about 400 km further south than it now does (Nichol 2004). Following this, after 11,000 BP, there are four distinct phases of human occupation of the Eastern Sahara (Kuper and Kröpelein 2006; Bubenizer and Riemer 2007): the Reoccupation phase (10,500–9000 BP); the Formation phase (9000–7300 BP) ending abruptly in areas without permanent water;

the Regionalization phase (7300–5500 BP) featuring retreat to highland and Nile refuges; and the Marginalization phase (5500–3500 BP) (Fig. 6.16).

During the Reoccupation phase (10,500–9000 BP), the northward advance of monsoon rains at 10,500 BP transformed the Sahara into a savannah, allowed hunter gatherers from the south (defined by their tool kit and animal bones and already adapted to a savannah life-style) to migrate northwards into the present desert. Camp sites (10,000–9000 BP) around former lakes show migrations of over several hundred kilometers into the Great Sand Sea, now the most inhospitable area of the entire desert (Fig. 6.8). The dunes and interdunes must then have provided enough wild grains and other plants to feed the hunter gatherers and their game. At this time, there are few archaeological sites either along the Nile or in the Wadi Howar region. Their absence has been attributed to marshy, unhealthy conditions, though this is disputable.

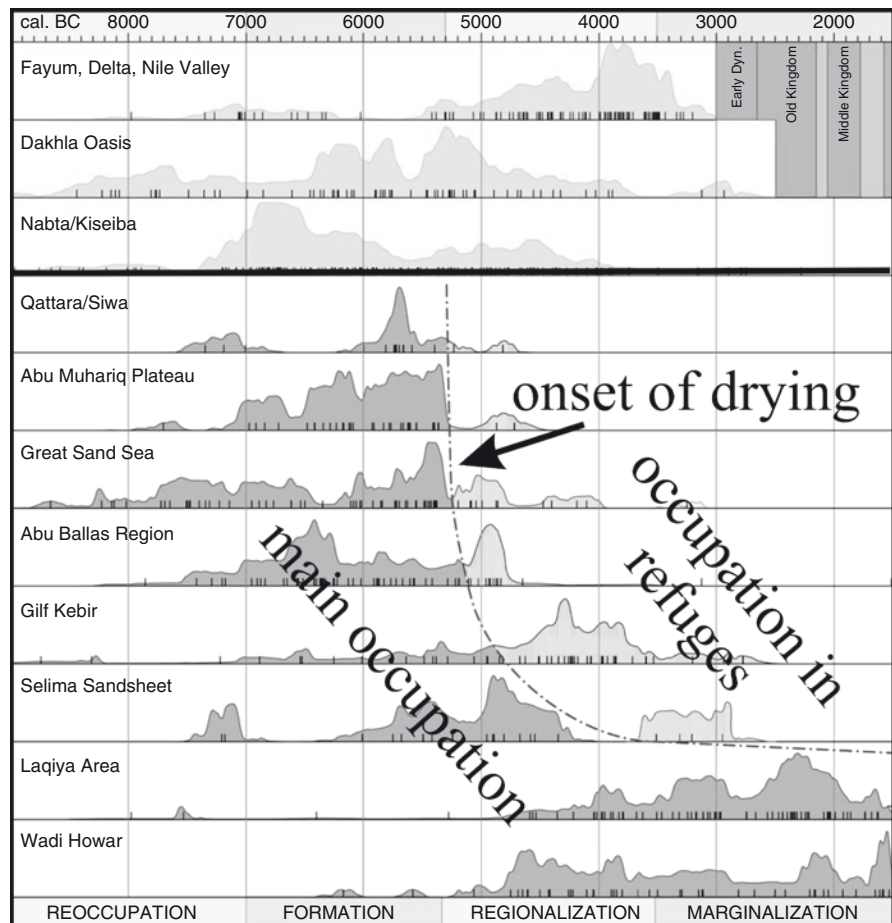


Fig. 6.16 Cultural sequence chart of calibrated ¹⁴C dates for representative areas of western desert showing southward migration of drying up. At top are dates from Faiyum + Delta + Nile Valley, Dakhla, and Nabta Playa/Kiseiba. (After Kuper 2006)

During the Formation phase (9000–7300 BP) human populations adapted to regionally different ecological bases with multi-resource pastoralism analogous to those that persist in some existing African cultures. On the Abu Muhariq plateau, bifacial tool technology derived from the Levant completely changed the tool kit which was then transmitted to the younger cultures of the Nile Valley. By contrast, Sudan-type pottery is found as far north as the Great Sand Sea and central Oases belt. Domestic livestock was introduced, sheep and goats from the Middle East, cattle probably from local domestication. Nabta Playa has the earliest documented domestic cattle (Hassan 2002), and these, together with goats, dominate the paintings in the westernmost desert, though the eastern desert has rather different and less detailed art. By the end of the formation phase, multi-resource pastoralism may have been the basis of human subsistence in all areas. Between 8000 BP and 7000 BP, the merging of the existing inhabitants and new arrivals is evident in the archaeological record by evidence of the fusion of the Saharan Neolithic herding and cultivation and Nilotic fishing with the first proto-agriculture from Near Eastern communities. The annual natural inundation and draining of the Nile floodplain, promoted a single crop of wild annual grasses.

During the Regionalization phase (7300–5500 BP), populations retreated from increasing desertification into refuges like the Gilf Kebir and plains further south, where rainfall was still sufficient. And this isolation may have fostered an even more regionalized cultural development. The old widespread wavy pottery was replaced by regional varieties. Only sporadic occupation occurred in the westernmost desert outside of the mountain refuges: for example, Abu Ballas was only sporadically occupied (or visited) by people from the oases to the east (McDonald 1998). The rise of specialized cattle pastoralism is reflected in the rock art of Uweinat and Gilf Kebir (if these paintings truly belong to this phase). Unlike the Near East, farming played no part in these developments. In Egypt, instead of the transition from nomadic hunter/gatherers to sedentary pottery producing farmers and stock keepers, we see pottery producing hunter/fisher groups replaced by nomadic cattle herders (Kuper 2006). In the Faiyum, Badarian occupation sites of ash layers, cultural debris and animal droppings resembling current African stock pens rather than any permanent dwellings.

During the marginalization phase (5500–3500 BP) permanent occupation of the desert was restricted to the northern Sudan (Kuper 2006). Even in ecological refuges, like the Gilf Kebir, permanent occupation ceased. By the beginning of the Early Predynastic Period, around 5000 BP, the inhabitants of Upper Egypt (upper Nile Valley) depended little on hunting for survival, having adopted an agricultural way of life, though field work has revealed no evidence of artificial irrigation dating to this period. The earliest currently available evidence for artificial irrigation is the macehead of the predynastic ruler King Scorpion (ruled around 5100 BP) (Fig. 6.17), which may not be the physical excavation of an irrigation canal but rather the symbolic cutting of a levee. Either way, a form of water control is evident, proving that the transition from a natural to an artificial irrigation system that was regulated (by the locals) had already been accomplished before Dynasty 1. The level of the Nile floods declined in the late predynastic (Said 1993), yet the response of the Ancient Egyptians was to cultivate new fields and construct new dwellings close to the new floodplain, instead of irrigating the existing fields by means of extended canals.

For the Pharaonic empire, well-established along the Nile after 5000 BP, the westernmost desert and oases, such as Abu Ballas in the western desert and Laqiya and Wadi Howar in the Sudan, played only a marginal role except as mineral exploration and sporadic trade routes to more fertile areas to the west, south and east (Fig. 6.1). Thus, at the beginning of the First Dynasty of Egypt (5050 BP) a united state had formed, with



Fig. 6.17 Scorpion King macehead, with king supervising agricultural digging activities

Memphis as probably the largest urban center, judging from the extent of the nearby cemetery fields on both sides of the Nile, at Saqqara (West Bank) and Helwan (East Bank). The development, however, of the requisite social specialization and hierarchies had begun much earlier, during the increasing aridity, in predynastic Naqada times at the latest.

6.6 Conclusions

The rise of Egyptian civilization followed the development (or immigration) of agricultural societies in the Faiyum (Faiyumian) at the end of the optimum formation phase and the start of increasing aridity of the regionalization phase around 7000 BP. During the next thousand years, these societies became increasingly fragmented as conditions worsened, with groups retreating to refuges like the Gilf Kebir and Nile Valley, returning to specialized pastoralism or migrating southward back to the Sudan. In Egypt, the onset of hyperaridity around 5500 BP, forced migration of already structured agricultural societies into the Nile Valley refuge where they developed greater innovation and organization rapidly over the next 500 years so that, by 5000 BP a complex Pharaonic society dominated the entire Egyptian Nile Valley. Though a broad oversimplified outline of the interaction of climate and the development of Egyptian societies is now possible (though liable to be modified by new findings in Sudan), accurate dating of the various phases in local areas is still inadequate and too inaccurate to separate specifically local from broader climatic and cultural changes (Vernet 2002). Such accurate dating to within one hundred years, or better one human generation (about 20 years), is one of the most important objectives of future research, together with scientific study of field areas, now rapidly disappearing both with the growth of existing human settlements (in the Nile areas) and by the thoughtless unrecorded removal of artefacts' everywhere (especially in the now accessible desert areas).

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