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The earliest, Holocene production of cereals in the Egyptian Sahara

In 1972 the Combined Prehistoric Expedition began a longterm project concen trated on prehistory and the reconstruction of paleoenvironments of the Western Desert of Egypt. Quaternary climatic fluctuations in this part of the world, today one of the driest areas of the Sahara, had deep repercussions in the floral, animal and human history of the area. A record of past climates and environments is preserved in the sediments which usually tend to be removed or severely damaged during arid episodes. Hence, the latest wet periods are often better represented and seem to be more complex than the older or dryer ones. In spite of the fact that the researches of CPE unearthed the evidence of at least four major wetter periods, the last one, occurring during Final Pleistocene and Early Holocene, is obviously better studied and understood. It also coincides with the main subject of our conference.

Recent researches of the CPE in the Western Desert of Egypt included both stationary work, in selected areas, as well as intensive surveys of the desert in the vicinity and beyond the worked areas (Wendorf and Schild, 1980). Most of the work concentrated in the central and southern part of the Western Desert, generally south of the Eocene Plateau, at Dakhla (1972 season), Kharga (1976 season), vicinity of Gebel Nabta (1974, 1975 and 1977 seasons), Bir Sahara (1973 and 1974 seasons), Bir Tarfawi (1974 season), and vicinity of Bir Kiseiba (1979 and 1980 seasons). Some additional work was also done in the Dyke Area (1972 season), south of Dakhla, and in the Gilf el Kebir (1975 season). Although almost every area yielded some information on the last wet episode of the Western Desert and associated archaeology, two areas (vicinity of Gebel Nabta and Bir Kiseiba) provided the main bulk of data serving as a base for this presentation of the results obtained.

About 100 km west and slightly north of Abu Simbel, and 60 km north of the border of Sudan, a high Nubian Sandstone gebel with Kurkur Limestone cap – Gebel Nabta – provides a prominent landmark. Extensive flat areas, remnants of former internally drained enclosed basins filled with clays, silts or fine sands, form a huge lacustrine system composed of several adjoining and isolated playas. The

sediments are highly deflated, and usually preserved only in deeper sections of these former lakes. Numerous prehistoric sites, of various ages, occur on the surface, in most cases in a typical lag position, while some are still embedded in the original sediments.

Three separate basins were worked in the vicinity of Gebel Nabta during the 1974, 1975 and 1976 field seasons. Most of the research was done at Nabta Playa where five sites were excavated, all during the three seasons mentioned. Two remaining, smaller basins, (El Kortein Playa, some 20 km to the north of Gebel Nabta, and El Gebel El Beid Playa, 10 km north of El Kortein) were examined during the 1977 season. Three sites were excavated and collected at the El Kortein and one at the El Gebal El Beid Playa.

Another large area, investigated during the 1979 and 1980 seasons, extends along the Kiseiba Scarp where several fossil lakes developed during the Early and Middle Holocene. The lakes occupy the lowest and northernmost end of the huge Nakhlai--Sheb pediplain bordered on the north by the Kiseiba Scarp, standing some 90 m high. Here too, the basins form a system of interconnected or separated waterbodies, today highly deflated and destroyed. Sands, clays and silts fill the deepest part of the lakes while many prehistoric sites occur on their shores or within the basins. Thirteen prehistoric sites located within the Kiseiba, El Ghorab, El Gebel El Fil and El Adam Playas were extensively worked throughout these two seasons. Additionally, a detailed survey of the plateau beyond the scarp was undertaken in the 1980 season, as well as a brief visit to and sampling of two sites in the Bir Mur area.

Three other areas, Kharga Oasis (1976), the Dyke Area (1972) and Wadi Bakht (1975) yielded additional sites associated with the Holocene wet periods. At Kharga four sites were most extensively studied (E-76-2, E-76-6, E-76-7a and E-76-7). Three of them are associated with small spring-fed basins, while one occurs in a large playa, near the village of Ezbet Mokhamed Khalil (E-76-2). At the Dyke Area, some 195 km south of the village of Balat in Dakhla Oasis, a single, rich concentration associated with a small enclosed, sandy basin was investigated during the 1972 season (E-72-5). In the Gilf El Kabir, the known site of Mayers in Wadi Bakht was briefly visited. A small collection of artifacts and some materials for radiocarbon dating were taken in the 1975 season.

The playas occurring south of the Kiseiba scarp are characterized by smooth and hard surfaces, lack of salt crusts, in most cases, and apparent impermeability due to fine-grained elastic sediments within the group of clay, silt and fine sands. The formation of these playas in today's rainless desert was caused by surface floods and resulting redeposition of surrounding sediments which were gravitationaly sorted. This type of playas, according to the classification of Motts (1965), is called a "total surface-water discharge playa". They are usually characterized by the distribution of the vegetation in the form of a ring around the periphery of the basin with the central area barren, as the result of contraction of the clays in the central portion caused by alternating wet and dry seasons. Similar playas are seen today in the northwestern

desert of Egypt, south of the littoral belt and in northern Sudan (Northern Darfur Province), south of the high desert and on its fringe, all in an area with weak – 50 to 200 mm – rainfall *per annum*.

The lithostratigraphy of the excavated playas reflect pronounced environmental fluctuations recorded in the periods of lacustrine accumulation, deflation, down-cutting or dune formation. There are at least three wet pulsations recorded, all separated by arid intervals. The chronology of these is the following:

Playa I	ca. 10–11,000 –	8,200 B.P. (this one contains at least three pulsations)
First Arid Interval	around	8,200 B.P.
Playa II	8,200 –	7,700 B.P.
Second Arid Interval	around	7,700 B.P.
Playa III	7,700 –	5,500 B.P.

The sediments associated with the first humid pulsation are usually sandy or silty with lenses of silts and clays, clearly suggesting larger capacity and velocity of the surface runoff, resulting quite possible from scarcer vegetation and more torrential rains. On the other hand, disregarding facial variability of the deposits, the later playas are more often composed of silts and clays.

Rich faunal samples assembled at most of the sites (Gautier, 1980), clearly indicate an overwhelming predominance of small gazelles (*Gazella dorcas*) and hare (*Lepus capensis*). There are occasional large gazelles (*Gazella dama*?), rare large bovids (domestic cattle), wild cat, striped hyenas, a single warthog, porcupine, hedgehog, canids and rodents. Except for the *Bos*, to be discussed later, there is a total lack of megafauna and the predominance of *Gazella dorcas* and hare indicate a generally dry environment – that of the desert or semidesert. Today, the southern limit of the *Gazella dorcas* lies in the central western Sudan. The rainfall in the area where *Gazella dorcas* occure is between 0 mm and 300-400 mm in the south.

Limited floral evidence (macro-remains) gathered mostly at two sites of Nabta (E-75-6 and E-75-8), indicate the presence of acacia, salsola, tamarisks, dom palm and a date palme as well as several varieties of grases and weeds, all fitting very well in the presented evinronmental reconstruction (analysis by M. Nabil El Hadidi).

In short, all of the available data suggest that the area south of the Kiseiba Scarp should be classified as "semi-desert of Sudan" whose northern limit coincides with the 80 to 90 mm isohyet, while its southern limit lies between 300 and 400 mm of rainfall *per annum*. The vegetation in this zone is mainly composed of acacias (mostly shrubs), herbs and rare larger trees usually occurring along the water courses and playas.

It is highly conceivable that during most of the humid pulsations of the Holocene, the southern Western Desert of Egypt was dotted with rather numerous playas surrounded by semi-woodland vegetation, shrubs and grasses with rare permanent pools, as indicated by occasional presence of catfish bones(?). Extensive grasslands

extended on the sandy plains beyond the playas. Barren, exposed surfaces of Nubian Sandstone and Eocene Limestone occurred here and there on the gebels.

Although it is most likely that the magnitude of each wet pulastion was different, it seems that all of them were generally similar. Farther north, beyond the Kiseiba Scarp, in the Oasis of Kharga, they seem to coincide with the increased discharge of natural, artesian springs. Similarly, the date from the Gilf El Kebir show increasing precipitation following an arid phase which can be compared with Playa III of the south Western Desert.

Recently gathered data from the northern Western Desert (Hassan, 1976; 1978) at Siwa and Gara Oases, seem to indicate that the northern portion of the Western Desert was much more arid than the southern one during the early Holocene. Furthermore, the available dating permits the assertion that the onset of rainfall in the south Western Desert preceeds that of the northern portion by at least 1,000 years. Although the data at hand are not entirely conclusive, it is quite possible that the wet pulsation recorded at Gara and Siwa are off phase with those in the south. Obviously, all these data suggest primary association of the rainfall in the south Western Desert with summer and the monsoonal belt.

Until recently (1979), it was believed that the earliest Holocene occupation of the south Western Desert was that of Terminal Palaeolithic which began almost immediately after the onset of more humid environmental conditions. The sites of this period seemed to extend chronologically from around 9,000 B.P. (E-77-7, El Gebel El Beid) and lasted, according to the radiocarbon dating, until ca. 7,900 B.P. (E-76-6 at Kharga). These numerous Terminal Palaeolithic sites apparently did not contain any pottery and only occasionally showed the presence of more permanent structures, as well as grain processing equipment (E-72-5, Dyke Area). Some sites contained bones of a Bovid which, because of the poor environmental conditions, could have been domesticated. The sites were usually much smaller and thinner than the Neolithic ones and in most cases consisted of one to a few relatively thin concentrations of lithic artifacts. There were at least four clear taxonomic entities defined on the basis of technology and/or of co-occurrence of various tool classes.

These Terminal Palaeolithic sites seemed to be followed by the Neolithic whose earliest occurrences were contemporaneous with some of the late Terminal Palaeolithic ones. The oldest site (E-75-6, Upper Layer), dated to around 8,100 B.P. (by ten radiocarbon dates) contained pottery of the Early Khartoum general type, naked and hulled barley (Stemler and Falk, 1980) and consisted of at least two rows of circular huts with adjacent bell-shaped storage pits, post holes and a deep well. The latest sites at Nabta (E-75-8, Upper Layers) and Kharga (E-76-7), date ca. 5,800 B.P. and 5,500 B.P. respectively, and are associated with pottery di fferent from that of the Early Khartoum, general type. The presence of goat or sheep is noted for the first time in a later Neolithic horizon – although still with an Early Khartoum style pottery – at Site E-75-8, Lower Cultural Horizon, dated between 7,100 and 6,600

B.P. It also contained hulled barley as well as a grain of wheat, similar to emmer (Stemler and Falk, 1980).

There are several Neolithic taxonomic entities differentiated both by individual styles of pottery as well as by the character of their tool kits. The earliest group of units, although internally highly differentiated, is within the so-called Early Khartoum or Saharo-Sudanese tradition. The pottery from the Upper Cultural Complex of Site E-75-8, at Nabta, seems to be within the variability range of the Abkan Neolithic in the Nubian Nile Valley. The relatively late Neolithic from Kharga (E-76-7) is within the so called "Peasant Neolithic" of Caton-Thompson and contains pottery which do not seems to have analogies either in the Nile Valley or the Western Desert (for pottery styles see K. Banks, this volume).

The Neolithic sites associated with playas occur usually in two different geomorphic settings: the first are the seettlements located at the playa edge, usually large and often presenting organized, planned spacing of structures and/or the presence of various pits (*e.g.*, E-75-6 and E-75-8 at Nabta, or E-79-4 and E-79-6 at Bir Kiseiba); the second are within the playas, often near the center and consist of isolated structures with rare artifacts (E-77-5A) or isolated, richer concentrations with house or tent-like structures (E-77-5).

The latest results of the excavations of the sites occurring in the playas, just south of the Kiseiba Scarp, make the clustering of the Holocene archaeological materials from the Western Desert into two basic, chrono-economic units dubious. At Sites E-79-8 and E-80-4, El Adam Playa, a series of cultural lenses (Fig. 1) with seemingly Terminal Palaeolithic stone assemblages contained also a technologically well advanced pottery with a Saharo-Sudanese design (compare K. Banks, this volume). A series of eight radiocarbon dates place the occupations between 9,840±380 years B.P. (SMU-858) and 8,920±130 years B.P. (SMU-757). The dates near and within the level containing pottery are around 9,400-9,200 years B.P. Numerous bones found at this site contained also some which are certainly those of Bovid, most probably domesticated (see Gautier, this volume).

At another site in this area (El Ghorab Playa, Site E-79-4) an apparently Terminal Palaeolithic layer (Lower Layer), with a chipped tool assemblage similar or identical to one of the previously recognized entities, also yielded two potsherds. A radiocarbon date from this horizon is of 8,250±140 years B.P. (SMU-750).

Some major points of the recent research conducted by the Combined Prehistoric Expedition in the Western Desert of Egypt could be summarized as follows:

1. Latest results suggest that all TP entities knew pottery.
2. It is most probable that they also had domesticated animals (cattle) and cereals, as suggested by faunal remains and the presence of grinding equipment (E-72-5). The latter is additionally supported by early dates for the already domesticated cereals at Site E-75-6, near Gebel Nabta.
3. It is suggested that the so-called TP assemblages, in fact, represent early colonization of the Desert which began already during a dryer, early phase of the Holo-

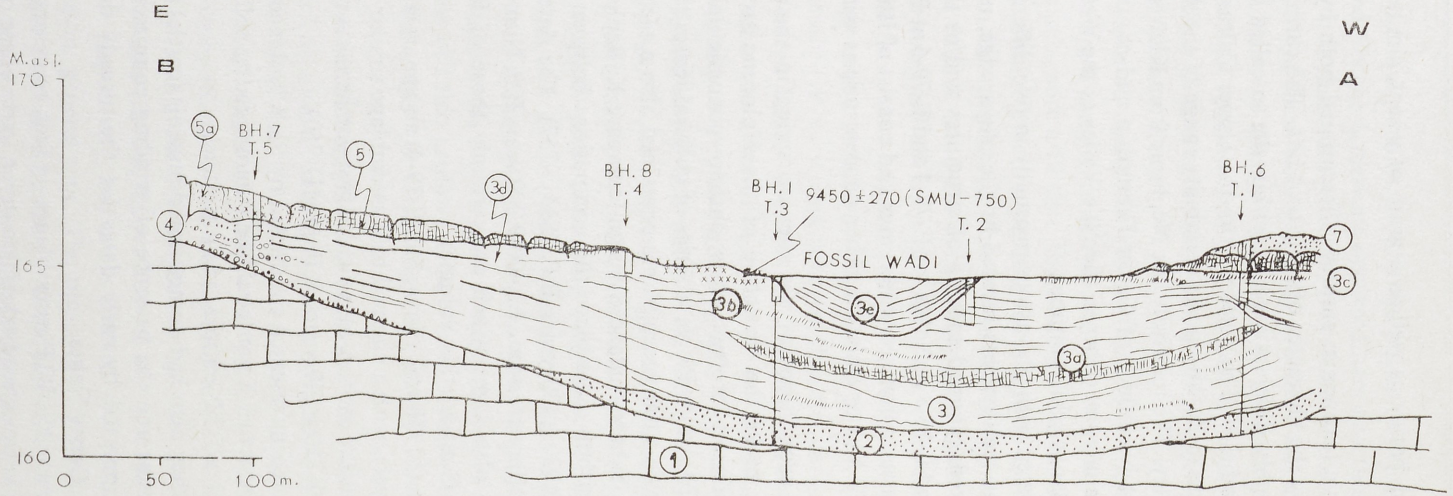

FIG. 1. General cross-section through El Adam Playa in the East-West direction

1: Nubia sandstone; *2*: Yellow, friable sand with occasional gravel; *3*: Silty sands and sandy silts with occasional lenses of finer material; *3a*: Clay; *3b*: Sandy silts with silt laminae and cultural layers of Site E - 78 - 8 at topmost 80 cm; *3c*: Sandy clay horizons; *3d*: Yellow, laminated sand grading laterally into "*4*"; *3e*: Fossil wadi, cut into "*3*"; *4*: Coarse-grained sand with gravel and pebble beds, fraible, grading upslope into slope wash; *5*: Brown, cemented clay with poligonal desiccation cracks, grading upslope into "*5*"; *5a*: Silty sand with Neolithic cultural layer at base, same as at Site E - 80 - 3; at Site E - 80 - 1 the cultural layer at the base of brown clay is radiocarbon dated between 8,122 ± 78 (SMU - 915) and 7,884 ± 212 (hummate fraction — SMU — 926) years B.P.; *7*: Recent, eolian sand sheet

cene wet pulsation. It is quite likely that these early occupations are only associated with seasonal grazing and hunting limited to the post-rain season, as it is today in the Maydub area of the Northern Darfur. The youngest T.P. sites, certainly contemporaneous with the earliest so-called Neolithic, most possibly represent differential use of the area. The sites belonging to the same taxonomic unit may contain dense, rich artifact concentrations, structures and apparently agriculture-related equipment (*e.g.* E-72-5, in the Dyke Area), on one hand, or appear as small short-lived concentrations without any traces of grinding pieces (E-76-6 in Kharga), on the other.

4. The agricultural use of playas was probably generally similar to that of modern playa agriculture of Northern Darfur.

5. The colonization of the south Western Desert is most certainly associated with the movement of the monsoonal belt toward the north and colonization of the new areas by populations moving with the rain belt. The new available land was first seasonally penetrated by hunting and grazing communities. Later, after further amelioration of the climate, the playas would be used for agriculture and villages would appear near the edge of certain playas.

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