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Before Food Production in North Africa

*Questions and tools dealing with resource exploitation
and population dynamics at 12,000-7000 bp*

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The Use of Plants During the Early Holocene in the Egyptian Sahara: Early Neolithic Food-Economies

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Excavations at Early Neolithic (8100 - 7800 bp) harvesting site at the internally drained basin of Nabta Playa, located 100 km west of Abu Simbel, has yielded abundant evidence for the intensive use of plants during this period. Thousands of charred seeds, tubers and other plant remains have been recovered, representing over 40 varieties of plants, including sorghum, millets and legumes. These plant remains were associated with floors of temporary shelters and their associated storage pits. All of the plants appear to be morphologically wild; however, the taxonomic status of the sorghum is not clear. Infrared and MS Gas Chromatograph analyses of over 50 varieties of sorghum suggest that the archaeological sorghum has a closer genetic affinity to some varieties of domestic sorghum than to modern wild sorghums. This may indicate either that the sorghum was cultivated, or that intensive collecting of the sorghum had led to modifications in the gene pool of the sorghum towards the modern domestic varieties. Regardless of whether the sorghum was wild or domestic, it is clear that many different kinds of plants combined to form an important component in the diet of some early Holocene populations in the Eastern Sahara.



Early Neolithic groups in the Eastern Sahara were cattle-pastoralists, who appear to have followed the modern African mode of pastoralism in using their animals as living sources of protein (milk and blood), rather than slaughtering them for meat (Wendorf *et Al.* 1987; 1990; Wendorf and Schild 1994). Meat was obtained primarily from gazelles and hares, which were presumably hunted. Grinding stones occur frequently even in the earliest Neolithic sites (Close 1984; Connor 1984), suggesting the use of plant foods, but plant remains, except for wood-charcoal, are almost never recovered. However, reexcavation in 1990, 1991 and 1992 of an Early Neolithic site in Nabta Playa, Site E-75-6, revealed an astonishing assemblage of remains of plant-foods that is unparalleled in sites of this age in Africa and has few equals anywhere else in the world (Wendorf *et Al.* 1992; Wasylikowa *et Al.* 1993). These were found in several houses and numerous large storage pits of two major periods of occupation, dated 8100-7900. and 7600-7300 bp. Rare plant remains were also recovered from Site E-77-7 at el-Gebel el-Beid Playa, with two dates around 8900 and 8800 bp, and at Site E-91-1, with two occupations, one dating around 7600. and the other at 7400 bp. Sites of the early stages of the Early Neolithic in the Eastern Sahara seem to represent seasonal herding camps occupied by small groups who used the area after the summer rains. After 8100-8000 years ago (uncalibrated), there is evidence, primarily the presence of large walk-in wells, that the desert was occupied throughout the year.

Site E-75-6 is located on a low dune in the lowest part of the Nabta Basin, and during the early Holocene the site was seasonally inundated by the summer rains. It was presumably occupied in the fall and winter, after the playa had dried, and it may well have functioned as a harvesting locality. Most of the plant remains found in the site are grasses, and these most likely grew on the slopes of the basin and on the adjoining plateaus. The lower part of the basin, with its contracting soils, would not have been favorable for the growth of grasses, although tubers and marsh plants would have grown there.

Site E-75-6 was discovered in 1973 and was partially excavated in 1974, 1975 and 1977 (Banks 1984: 61-129). Almost 1000 m² were excavated, revealing cultural deposits of two different types of Early Neolithic but without reaching the southern and southeastern boundaries of the site. The lower horizon was assigned to Early Neolithic of el-Kortein type, but is now thought to be the el Adam type of Early Neolithic, and probably dates to around 8900-8700 bp. The overlying layer was assigned to the Early Neolithic of el-Nabta type, and had several radiocarbon dates between 8100 and 7900 bp. The el Nabta occupation was the best defined, and was represented by a patterned arrangement of two rows of huts with basin-floors, as well as storage pits and walk-in wells.

During field-work in the 1970's, the excavated deposit was passed through a 4-mm screen, which probably explains why no plant remains were recovered. A few identifiable remains, including a few grains of barley, were reportedly recovered from the profile of a pit (Hadidi 1980), but subsequent work in that pit in 1990 indicated that those materials were not in true association with the site (Wendorf *et Al.* 1991; Wasylikowa *et Al.* 1995).

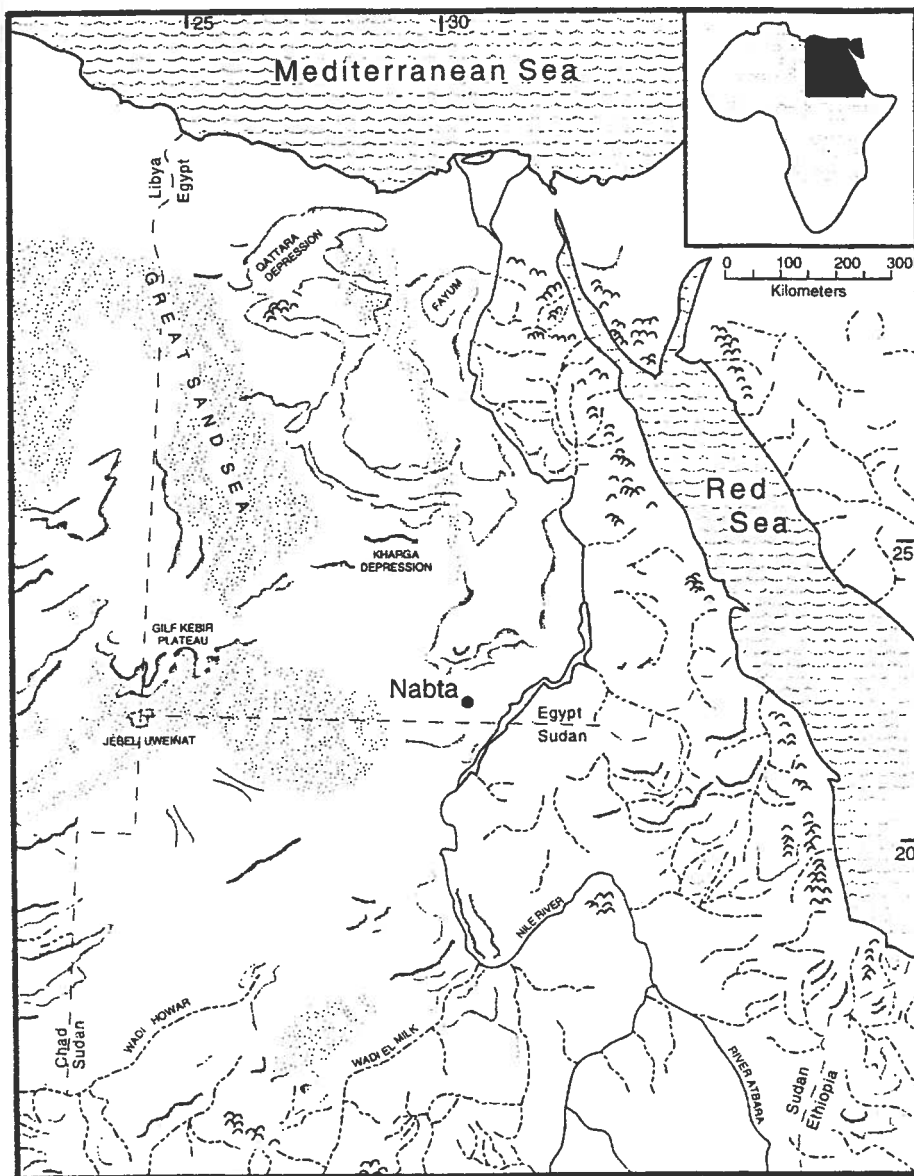


Fig. 1 – Location of the site E-75-6 at Nabta Playa.

When E-75-6 was reexcavated in 1990 one of the major goals was to try and confirm the presence there of barley. As part of this effort an area was opened southeast of the earlier excavations that was sealed beneath playa clays, as the 1970's areas had not been. Initially, the field-techniques used were those developed for the recovery of plant-remains in Wadi Kubbaniya (Wendorf *et Al.* 1989: 4), and included passing all excavated deposit through a 2.5-mm mesh, at the largest. The use of screens was abandoned in the 1991 and subsequent seasons, and instead bulk samples were taken and examined by the project botanists in the field laboratory where they were dry sieved through either a 1.0 or 0.5 mm mesh and the residue examined with the aid of a 4x magnifying lens. Excavation was slower but the result was a much larger sample of plant-remains, and in a few instances, plants were recovered from situations which otherwise seemed unsuitable for their preservation. These new excavations showed that there were three phases of occupation: at the base, the earlier el Adam phase; in the middle, the houses and features of el Nabta phase; and an upper, Middle Neolithic phase, the latter represented by several large storage pits which cut through the two earlier occupations.

There were two kinds of houses associated with the middle phase, those with elongated outlines, and round ones; both appear to be about the same age. Both kinds of houses have shallow basin floors on which there are from one to five hearths, as well as numerous shallow hemispherical pits, or pot-holes, scattered around the floors and in the hearths. These pot-holes may have held baskets or other containers (probably not pots; ceramics were present, but very rare). It was from the ashy deposits near the hearths and in the pot-holes that most of the plant remains were recovered, presumably spilled during their preparation as food. The houses and pits also yielded numerous animal bones, mostly gazelle and hare, but also an occasional *Bos*.

A series of 28 radiocarbon age determinations (on charcoal, seeds/fruits, and ostrich eggshells) come from the pits and features of the middle phase of occupation. They range from ca. 8600 (Gd-4587) to 7600 (Gd-6507) years bp. The most consistent, however, are eight accelerator dates measured on seeds and tubers recovered from pits and huts. These range from ca. 8025 (OXA-32320) to 7900 (OXA-3221) years bp. All are within one standard deviation of 8000 bp (Wendorf *et Al.* 1992). These dates on seeds and tubers probably frame the period of occupation for the middle layer, because the older dates on charcoal samples may have been measured on reused or fossil wood, while the dates younger than 7800 bp may have been from the upper horizon. Pits associated with the upper horizon yielded five dates between 7600 (Gd-6503) and 7330 (Gd-6510) years bp, contemporary with the early Middle Neolithic at several sites in the basin.

To recover the plant remains, separate bulk samples were taken from each pot-hole and hearth (and for the larger hearths, different sections of the hearth were sampled separately). Several tens of thousands of seeds, tubers and fruits were found, and they represent some 40 different morphological types, about half of which have been identified as to taxo-

onomic units of various ranks. The various kinds of plants were not evenly distributed across the site, or even within the same hut, and some of these differences are statistically significant, but the implications of these analyses are still under study. Even without these data these plant remains have completely altered our concepts of the food-economy among these early Holocene pastoralists of the Eastern Sahara.

Among the more frequent types found were sorghum, several wild grasses of the millet group, particularly *Panicum* cf. *turgidum* and *Echinochloa* cf. *colona*, as well as *Digitaria* t., *Setaria* t., *Brachiaria* t. and *Urochloa* (Wasylikowa *et Al.* 1995: 143-147). Other common plant remains in the assemblage include seeds from the annual herb *Schouwia*, seeds of the shrub *Capparis*, and fruit stones of *Ziziphus*. Other seeds and fruits not identified to species have been classified as *Cyperaceae*, *Luguminosae* and *Cucurbitaceae*. There are also numerous seeds of an unidentified sedge, and another sedge assigned to *Schoenoplectus*. Finally, there were several kinds of edible tubers in the collection. All of these plants today occur in the Eastern Sahara, some of them in the better-watered oases farther north or south, while others are found in the Nile valley. Given a small increase in rainfall, most of them would grow today in the Nabta Basin.

The sorghum seems to have been handled differently from the other grasses. Sorghum sometimes occurred in abundance and with few or no other kinds of seeds. On the other hand, other seeds were always found in groups from several different kinds of plants. Also, sorghum sometimes dominated all of the samples from a house, but in other huts sorghum was present but relatively less frequent. These differences in the way sorghum and the other grasses were utilized suggest that sorghum at Nabta was viewed differently by the Nabta people; it may have been cultivated, but if so, it was sowed and harvested by techniques that did not produce the genetic changes indicative of domestication (Stemler 1984).

The Nabta sorghum is the earliest known thus far, and while it is morphologically wild, it is not yet determined whether it was cultivated or not. In attempting to answer this question, the approach thus far has been through chemical analysis. Infrared spectroscopy of the lipid fraction of the grains have indicated a resemblance to some domestic sorghums (Wasylikowa *et Al.* 1993). Recent analyses have used gas chromatography-mass spectrometry techniques, but as yet this method has not resolved the question of the status of the sorghum (see paper by Biehl and Wendorf, elsewhere in the reports of this Congress). They have, however, indicated that of the more than 100 varieties analyzed, including most of the wild and domestic sorghums found in Africa, the carbon compounds in the Nabta sorghum have by far the closest similarity with those of *S. sudanese*, a variety of sorghum which today is cultivated in the United States, but grows as a wild, weedy plant in the Sahelian zone of central Sudan. Unfortunately, no modern samples of wild *S. sudanese* could be found in the United States for comparison with the Nabta sorghum. While promising, it is not yet established whether these chemical analyses can distinguish wild and domestic sorghums. However, ef-

forts are now underway to extract DNA from the archaeological seeds, and if this is successful, questions of the status of the sorghum and its identity may be resolved.

In terms of human behavior the botanical status of the sorghum is only marginally important. In this context it much more important that these Early Neolithic groups were not just pastoralists and hunters, but were also intensively utilizing locally available grasses, that they may have been cultivating sorghum, or at least regarded it as different from the other grasses they harvested, and that these edible plant remains, mostly seeds, formed an important component of the food-economies. This pastoralist, hunting and gathering economy may well have been not very different from that of many modern Sahelian cattle pastoralists who also harvest the seeds from the extensive stands of wild grasses that grow in the Sahel and the southern margin of the Sahara (Harlan 1989: 83-85). These wild seeds provide a very important source of food among Sahelian pastoralists.

Although the plant remains thus far have received most of the attention, the numerous large, deep, bell-shaped storage pits may ultimately be of greater importance, because they probably mark a profound change in the food economy among these Saharan pastoralists. Adjacent to every house at Site E-75-6 (and at every other site of this period we have excavated in this region) was at least one of these large storage features, and some houses had two or more nearby storage pits, not all necessarily contemporary. These pits were filled with cultural debris that had been washed in when the site was flooded; and a few contained grinding stones, apparently placed there in anticipation of the next season. The pits that were excavated in 1990-92 contained a few plant remains (those excavated previously probably did as well), but there was no way to determine if these seeds were remnants of those stored in the pits, or if they were washed in with the other cultural debris. It is unlikely, however, that very much would have been left in the pits when the site was abandoned since they undoubtedly knew it would soon be submerged under water. Nevertheless, because of the quantities of plant remains found at the site, it is reasonable to suggest that these large pits were used to store the seeds and other edible plant remains when they were harvested.

The size of these pits, from 1.0 to 1.75 m in diameter, and all about a meter deep, is a good indication of the quantity of plant foods collected by each family, and available as a surplus for future use. At no previous time in the Eastern Sahara do we find this kind of emphasis on storage of foods for later consumption. While there is good evidence that plant foods were consumed by earlier Holocene groups in this area, none of these sites have storage facilities. A major transformation seems to have occurred with this new emphasis on stored foods at Nabta. This transformation most probably was the intensification in the use of grass seeds for food.

The cause or causes of this transformation are not clear. It may be related to the increase in rainfall that may have occurred at the onset of the el Nabta phase of the Early Neolithic; it may have been a pattern that developed elsewhere and was introduced to the

Eastern Sahara (but if so there is no evidence of such an economy elsewhere at this time); or it may have been the response to the decision to live in the desert year-round. Regardless of the cause or source for this change in the food economy, it may well have been accompanied by a shift in the settlement system that tied the communities seasonally to a few localities where these resources were most abundant, and led them repeatedly to return to those localities each year. It did not, however, result in true sedentism, because of the need to move their cattle for new pastures.

The food-economy of modern cattle-pastoralists in desert North Africa probably had its origin at this point. Since that time, some of the wild plants previously gathered were domesticated, small livestock were introduced, and in a few favorable areas, some groups adopted a mixed pastoralist and farming economy. For most pastoralists, however, wild grass seeds are still an important food resource. In this setting, the early Holocene food economies seem to have survived with very little change, and today Saharan pastoralists have food economies that are closely similar to that indicated for Site E-75-6.

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