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Neolithic wells of the Western Desert of Egypt

The intensive study of the Neolithic of the Western Desert began in 1974 by scholars of the Combined Prehistoric Expedition. The area taken into account was initially in the vicinity of Gebel Nabta (seasons 1974,1975, 1977, 1990-2000) then the oasis of Kharga (1976) and Bir Kiseiba area (1979) (Fig. 1). A total of sixteen field seasons resulted in the discovery and detailed study of a number of Neolithic sites representing different types of settlements and dated to different phases of the Eastern Saharan Neolithic.

The area of the Western Desert is now one of the driest regions in the world, situated midway between the southernmost reach of the winter rainfall belt along the Mediterranean and the northernmost limit of the summer tropical rainfall belt of central Africa (Wendorf and Schild 1980). The average annual rainfall here is now less than 1 mm per year. During the Neolithic times, ca. 9500 bp –5000 bp, the rainfall was much more abundant and is estimated to have been between 100 mm - 200 mm per year or even slightly more. Rains resulting from the northward shift of the monsoon belt during several recognized humid phases in the Neolithic watered the Western Desert. The local environment could be compared to the semi-desert zone of modern Sudan (Wendorf and Schild 1980). According to the botanical investigations at least 10 species of trees and shrubs, and well over 100 different kinds of grass and other plants have been identified at sites of this period. It is thought that during humid phases there was a relatively dense plant cover over much of the area. The associated fauna was composed of only a few species and was dominated by small gazelles, hares and ostriches. The extensive deflation basins, probably hollowed during the preceding Late Pleistocene hyperarid phase were hydrologically active because of local rainfalls. Playa silts slowly filled these basins. But the climate was not steady. Periods of aridity were frequent, especially at the final phases of the Neolithic. The growing desiccation threatened the population and finally led to the abandonment of the area

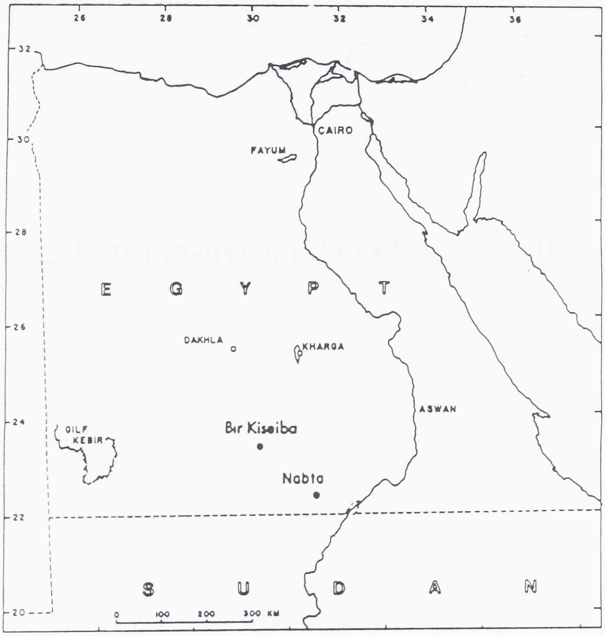

Fig.1. Location of Bir Kiseiba and Gebel Nabta on the Western Desert.

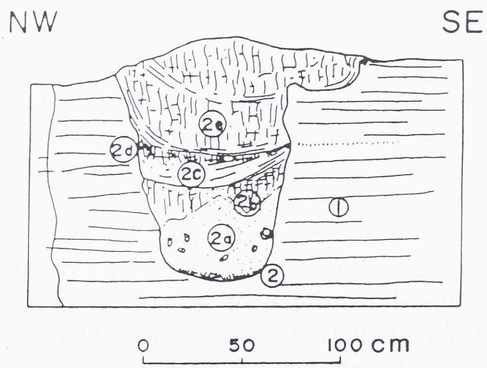

Fig. 2. Site E-79-8, Kiseiba Area. Cross-section of the well.

1 - laminated sands with silt streaks; 2 – thin layer of silt (first phase of use); 2a – cemented structurless sands with angular to slightly rounded, dispersed blocks and pieces of silt (first infilling dry season); 2b – structureless, sandy silts, more silty at top (second phase of use); 2c – loose to consolidated laminated sands, uncomfortably overlying 2b (second infilling – rainy (?) season); 2d – cemented, structureless sandy silt, grading into 2c (third phase of use); 2e – cemented silt with sand-streaks and pronounced, small, blocky structure (third infilling). Descriptions by R. Schild. (after Connor 1984).

(Wendorf and Schild 1980). For almost all the settlement systems of the Early Holocene in the Eastern Sahara, one of the critical variable was water, especially needed for watering cattle - the basis of subsistence for the Saharan pastoralists at that time. On facing drought the Neolithic inhabitants of the semi-desert tried to obtain the necessary water by all possible means. One of these, probably the most efficient, was to dig the wells.

Archaeological investigations of several sites dated from Early to Final Neolithic prove that the pastoralists living in the Eastern Sahara tried to sustain their existence, especially during the arid periods, by digging wells. The idea was to reach and extract drinking water available in the deep sandy substratum adjacent to the impermeable layers of Nubian Sandstone or shale-like layers known as the Qusseir Clastics. The moisture accumulated in the natural subterranean aquifers. When the ground water level dropped down during the arid phase, the water could have been obtained only by reaching the moisture-carrying horizon.

Generally two types of wells were used. The first one was the regular pit excavated into the consolidated dune sands. The water was probably drawn by a container hanging on a rope. A good example could be a well localized at the northern edge of site E-79-8 in the Kiseiba area (Fig. 2-3). Today it is 135 cm deep (from the modern surface) but it must have been deeper when in use. We do not know how much of the backfilled well was cut by the deflation. The well was slightly oval in its horizontal section and only ca 70 cm in diameter. At least three episodes of use are verified by alternating layers of silts and sands which can be seen on the vertical profile. According to Connor (1984), the silts were deposited at the bottom of the well as they settled out of standing water during the period of use. The sands were probably washed in during the rainy season when standing water in the playa itself made the well unnecessary. It seems that this well was used only during the dry season of the year. The small step visible on the upper right part of the profile may indicate where the person was standing when drawing water.

The occupation of the site E-79-8 is dated by several radiocarbon samples. It was occupied regularly or periodically between 9500-9000 years B.P., i.e. in the Early Neolithic. Such is also the age of the well described above, at this site.

Wells also occur in the Late Neolithic, for example, in the locality E-75-7 by Gebel Nabta. Some of them reached a depth of 2.3 m (Fig. 4).

The second type of well is the so-called walk-in wells. They are much larger and deeper than the simple wells. The best example is the large object lately excavated at Gebel Nabta at site E-00-1, the largest so far discovered in the southern part of the Western Desert (Fig. 5-7). It was dug in the Early Neolithic into the consolidated phytogenic dune covering the natural subterranean aquifer

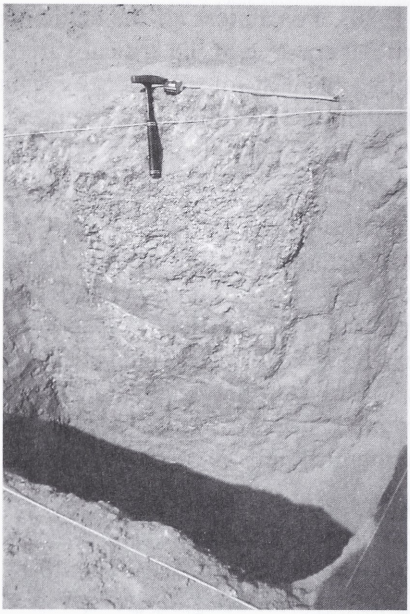

Fig. 3. Site E-75-7. Nabta Area. The well.

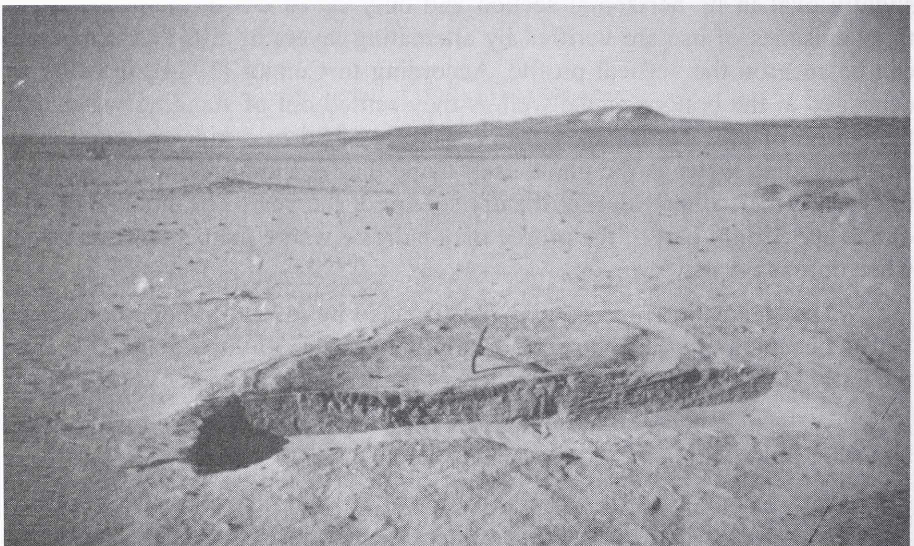

Fig. 5. Site E-00-1, Nabta Area. Walk-in well. Beginning of excavation

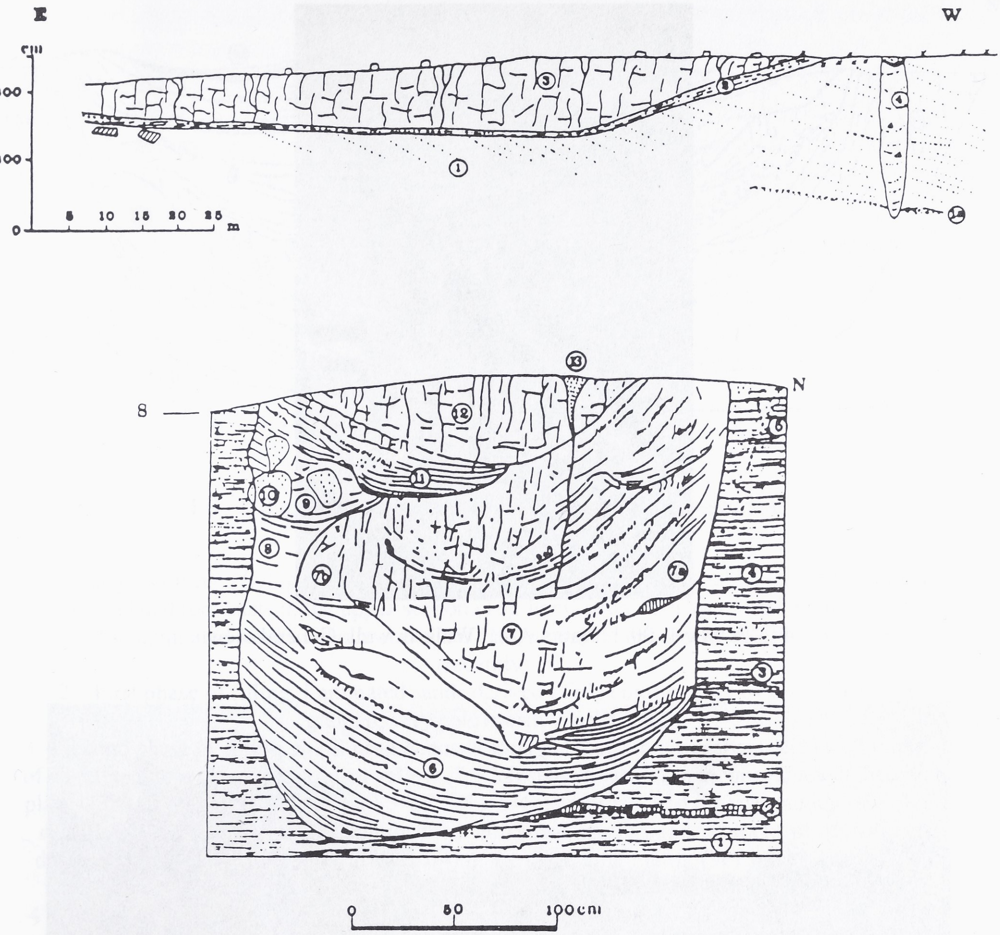

Fig. 4. Site E-75-7, Nabta Area. General cross-section of the site with well visible on the western edge. Below the cross-section of the well.

Fig. 6. Site E-00-1, Nabta Area. Walk-in well. General view.

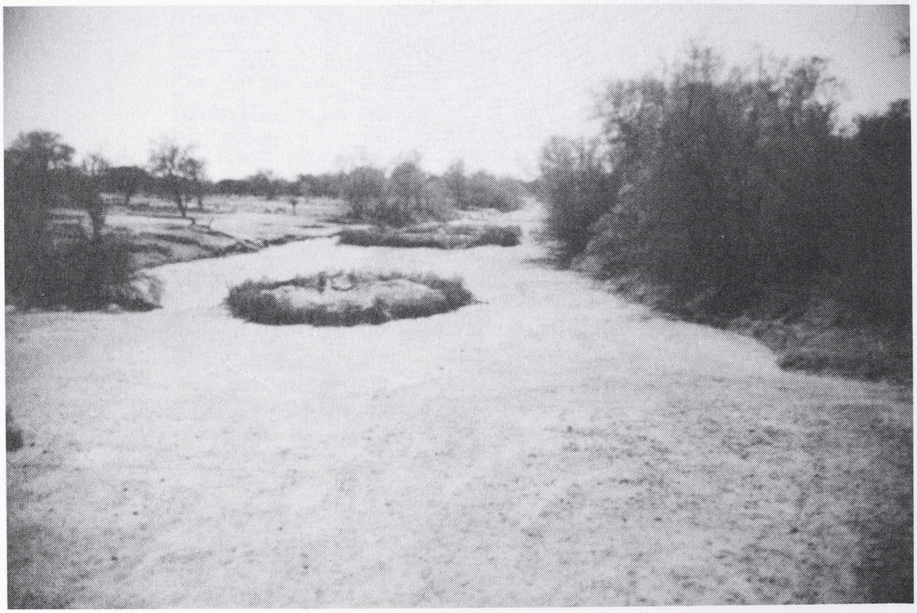

Fig 10. Seasonal river Shashe, Eastern Botswana. Present-day walk-in wells

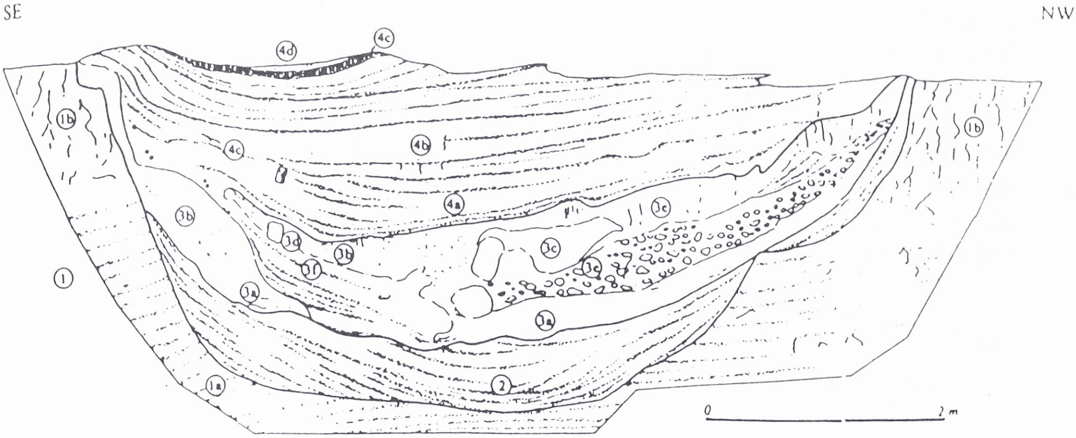

Fig. 7. Site E-00-1, Nabta Area. Walk-in well. Cross-section.

1 - Early Neolithic phytogenic dune. Fine grained, consolidated to friable, numerous poorly consolidated root casts in the upper section (1b), lamination destroyed, grading down into coarse laminated sand with rare root casts (1a), very pale brown (10YR 7/4), truncated (recently);

2 – First phase of filling. Laminated sands derived of (1) conformably over the base, fine grained, very pale brown (10YR 7/4);

3 – Second phase of filling. Spoil heap deposits slid (slumped) into the abandoned well made up of slightly silty basin sands, reddish yellow (7,5 YR 6/6) at base (3a), inconspicuously bedded at places (3b), to pink or light brown (7,5 YR 7/4 – 6/4) in topmost bed (3c) containing rare blocks of consolidated dune sand (3d), interbedded with a bed of subrounded blocks of consolidated dune, very pale brown in colour (10YR 7/4) in the same sand matrix (3c) and inconspicuously laminated with rare consolidated blocks of dune sand, also 10YR 7/4;

4 – Third phase of filling. Inconspicuously to conspicuously laminated fine, friable eolian sand, yellow (10 YR 7/6) (4a) interbedded with consolidated silt laminae in mid and upper sections (4b) topped by a thin silt bed with small blocky structure, light reddish brown (5YR 6/3) in colour, cemented (4c) and a thin remnant of eolian sand on top (4d). Drawing and description by R. Schild.

situated in a cavity on the surface of underlying Qusseir Clastic shale member. The prehistoric diggers must have reached the shale itself, because small lumps are still visible on the top of the waste heaps left at the edge of the well. The well is slightly oval in shape. It extends ca 8 meters from North to South with an entrance from the North. Today its depth is a bit over 3 meters and it was probably one meter deeper in the past. A stepped entrance led to the water covering the almost flat bottom. Probably three persons were involved in the process of obtaining water (Fig. 8):

Fig. 8. Walk-in well from site E-00-1 in operation – reconstruction

one standing at the edge of the water below was scooping water with a container which was handed higher up to the second person standing on a pronounced step visible in the cross-section. The water was then passed up to a third person standing at the edge of the well. Because of the increasing aridity in the Final Neolithic, the supply of water became too scarce and people were forced to leave the site. The abandoned well was quickly filled by different sediments. The phases of the well's history can be reconstructed as follows:

Phase I. Excavation of the well. Piles of excavated soil, dune sand and shale accumulate at the edge of the well.

Phase II. Use of the well. Horizontal layers of blown in sand mixed with compacted sand accumulated at the bottom. The bottom is almost flat, slightly sloping toward the entrance due to trampling by persons scooping water (layer 2).

Phase III. Abandonment of the well. The well begins to fill. The piles accumulated on its edge together with chunks of consolidated dune sand slide down. This probably occurred in the short time while the walls of the well were steep enough to enable materials to slide down (layer 3).

Phase IV. The piles stop sliding and the funnel-shaped upper part of the well is filled by blown in dune sands. This process was sometimes interrupted by seasonal rains washing in darker particles of playa silts. Today the top of the well's fill is sealed by a harder silty layer ca 8 cm thick. This layer came into being probably after a wetter period with enough moisture to create a deeper standing water from which the thicker layer of silt could have accumulated (layer 4).

Phase V. Wind causes deflation of the whole surface of the site including the upper filling of the well.

Pieces of Final Neolithic pottery found in the fill date the well to this period. The date is also confirmed by a radiocarbon date of 5170±80 yr. BP (A-11082).

Fig. 9. Site E-75-6, Nabta Area. Cross-section of a walk-in well. 1 – yellow dune sand; 3 – sand mixed with cultural debris, reworked backfill; 4 – sand with abundant charcoal; 5 – laminated lacustrine laid sand; 6 – playa clay (after Wendorf, Schild 1980).

Another walk-in well in the Nabta area is known from site E-75-6, representing a complex village type settlement (Fig. 9). It is slightly less than 2 m in diameter, cylindrical in cross-section and 2 meter deep. It also must have been deeper when in use. The bottom fill is composed of reworked sands with cultural debris and playa clays which filled the abandoned well. This object is well dated by radiocarbon dates to ca. 8100 years B.P. and is one of the earliest Neolithic wells known from the Nabta Playa. Other Late Neolithic large walk-in wells are recorded from the same area at the site E-75-8.

The walk-in wells are still in used in the arid regions of Africa. The author has seen them in Botswana dug into the dry bottoms of seasonal rivers (Fig. 10, see page 100). The deep water holes in the semi-desert of modern Sudan are still important factors of the nomadic adaptation (Fig. 11).

Digging wells certainly prolonged the existence of Neolithic pastoralists of the southern part of the Eastern Sahara. But finally the increasing aridity reached the point when the amount of obtained water was not enough to support life. People were forced to leave and the wind driven sands covered the abandoned wells preserving them for archaeologists.

References

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