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Polish Archaeology in the Mediterranean 23/1, 462-470

2014

DESERT WELLS IN THE DUBAIJ. PRELIMINARY REPORT ON ARCHAEOLOGICAL INVESTIGATIONS. THE AL-SUBIYAH PROJECT, 2011

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Abstract: The archaeological fieldwork in 2011 at the site of Dubaij situated on the Al-Subiyah plateau focused on the exploration of two desert wells and their immediate surroundings. One was a large well-cistern, the other a small well; they appear to have been complementary to one another, but the question remains to be resolved. The two shafts were cleared of accumulated sand and modern rubbish, reaching the modern water-table. Both were found to be constructed skillfully of undressed sandstone blocks and slabs without the use of bonding mortar.

Keywords: As-Sabbiya, Dubaij, desert well, cistern, shaft, ground water

The Desert Wells Project was initiated by the Kuwaiti–Polish Archaeological Mission in 2008 with the excavation of an impressive desert well (SM 12) in the Muheita area, investigated over the course of three consecutive seasons (see Bieliński 2009: 55–65, Reiche 2010: 39–45). The next site that was explored was Dubaij.[1] The site was located in a flat and sandy area at the foot of the Jal al-Zor escarpment, some 3.5 km to the southeast of the Mugheira Well Field. It was first identified in the 1980s by Fahed al-Wohaibi, then director of the Kuwaiti National Museum, and registered as SB 23. In the late 1990s, the stone structures at Dubaij were surveyed and briefly described by a Kuwaiti–British team (Carter 2010: 218–219), but the site remained unexplored until 2010. [*Fig. 1*].

The search for water was naturally essential to societies living in arid environments and pressure on water supplies must have been especially high there. Indeed, the very name of this seemingly arid region, al-Subiyah (اَلصَّبِيَّة), bears connotations that suggest a relative abundance of water from the winter rains flushing down from the

[1] Investigations by the author (5 March–12 April 2011) within the frame of the Kuwaiti–Polish Archaeological Mission to Al-Subiyah; for the work in general, see Rutkowski 2013: 513–515.

hills towards the rocky plateau fringe. Two wide wadi beds can still be seen in the area despite extensive bulldozing for the construction of the Subiyah highway running to Bubiyan Island and the pipelines to the Subiyah power station.

The coastal-plain landscape of the site is dominated by two modern stone structures situated in the vicinity of a large well shaft. A few meters to the southwest of the well there is a rectangular building (3.25 m x 1.85 m; 2.35 m high), built of reddish sandstone blocks, buttressed with a pillar in the middle of its north wall, opposite the well shaft (SB23-1A in *Fig. 1*). To the northeast of the shaft stands an obelisk-shaped pillar of sandstone covered with cement plaster on all sides, approximately 3.80 m high (SB23-1B in *Fig. 1*). The pillar (square in section, 0.60 m to the side) was raised directly upon bedrock, some 0.40 m above the crown of the well shaft. The structures are thought to have been built in the mid-20th century, presumably by the Bechtel Oil Company. A notch on top of the building, situated above the buttress, and a U-shaped metal element on top of the pillar indicate that the structures were part of water-lifting devices. High masonry piers were necessary apparently to carry the pulley beam over the well and wheel above the mouth of the shaft. The same engineering project called for a partial rebuilding of the mouth of the well shaft, its raising and reinforcement with concrete.

The actual well complex comprises the said large well-cistern (SB 23-1) and a small

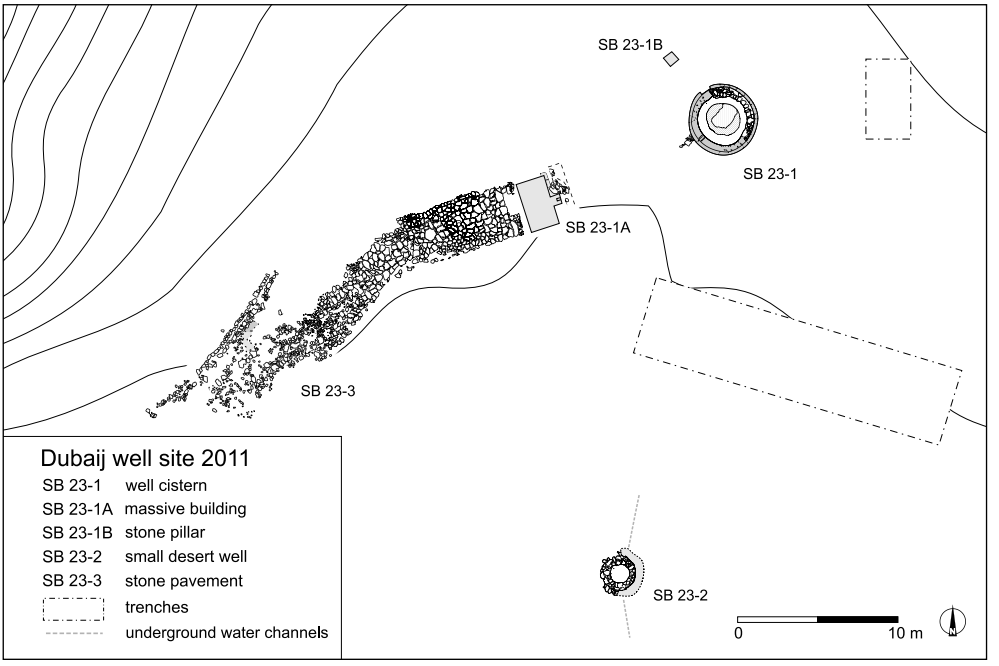

Fig. 1. Dubaij well site: general plan (Drawing P. Zakrzewski)

desert well (SB 23-2). In 2010, the shafts of both wells were cleared and examined (Rutkowski 2013: 513–515). In 2011, investigations focused on reconstructing the operating principles of the wells, working on the assumption that their proximity indicated joint operation within a single system [*Fig. 1*]. A search was put on for other desert wells, which were hinted at in local stories and which could be concealed under thickly accumulated sand (mostly at the mouth of the wadi where the coastal plain begins) and the numerous small oval dunes measuring 3–4 m across. Despite an intensive exploration of the region, nothing like the five shafts without stone steening discovered on the Mugheira site were found at Dubaij.

WELL-CISTERN SB 23-1 AND SURROUNDINGS

The large oval well, designated as SB 23-1, was fully excavated and documented this season [*Fig. 2*]. It is situated in the middle of the wadi bed. Its outer diameter, including the modern concrete collar, reaches 5.60 m, but the shaft itself is much narrower. As the wall flares from the bottom towards the mouth, the inner diameters are 2.63 m at the bottom, widening to 3.80 m at the top. The steening of the shaft was skillfully made of a single course of sandstone slabs in various sizes. It consists of 23 to 25 layers of undressed, cream and pinkish sandstone blocks laid without mortar. The lowest course is made of larger, irregular blocks of differentiated size, while the remaining layers, especially in the upper part of the shaft, are composed of long slabs just 5 cm to 8 cm high. The wall face is uneven with projecting stones forming irregular recesses and distorting the sequence of layers.

Stones in the nine lowermost layers bear traces of water erosion. This is a clear indication that water levels when the shaft was in use reached approximately 1.10–1.25 m above the bottom of the lowermost layer of stones. Observed differences in block size, color and porosity and in the quality of the masonry indicate at least two different phases of well construction and repair, this not including the modern reconstruction, which cemented the crown and added the concrete well collar.

Ground-water seepage terminated the exploration of the shaft in 2010, but a drop in subsurface water levels in 2011 permitted a full excavation, reaching almost half a meter beneath the bottommost layer of stones 2.90 m below ground surface. The stone masonry was found to have been built on a thick layer of gray, compact clay and wet sand, which is obviously an aquifer layer presumed to correspond to the level of the underground water table. The sand was permanently wet during exploration and within hours from excavation water appeared at the bottom of the well. In a couple of days water had risen to about 20 cm above the bottom. Daily observations and measurements taken over three weeks led to the conclusion that this was the maximum ground-water table nowadays and even with heavy winter rains, which would raise the water level significantly for a short period of time, it would not be enough to keep the well and its water-lifting devices in use. It should be assumed then that the insufficient water supply had been the main reason for the abandonment of the well.

The area around the shaft was cleared and tested archaeologically in a few places. Apparent stone tumble from the shaft wall, discovered in a test pit northeast of the shaft, just beside the concrete collar of the steening, may be associated with modern repairs or rebuilding of the shaft, possibly necessitated by damage to the northeastern side of the shaft exposed to gushing rainwater in winter. Testing to the southwest of the well uncovered a few sandstone blocks and flat slabs that formed part of a stone paving lying flush with the base of the shaft collar.

A well-preserved stone paving was discovered in a test trench situated to the southwest of the modern building [SB23-2 in *Fig. 1*]. The total length of the pavement exceeded 20 m, however its southwestern part, where the ground is elevated, was difficult to trace due to the poor condition of the stones, which ultimately disappeared under a desert track running by the site. In the northeastern part, the paving was

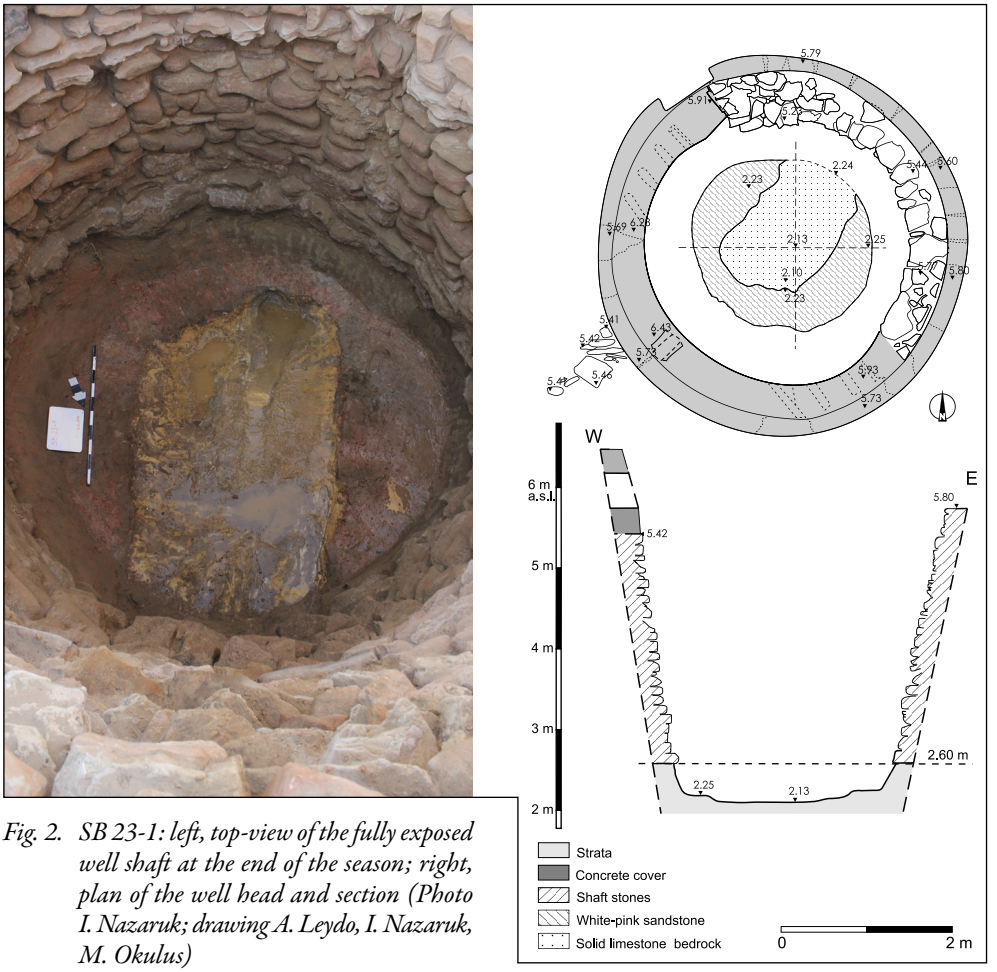

Fig. 2. SB 23-1: left, top-view of the fully exposed well shaft at the end of the season; right, plan of the well head and section (Photo I. Nazaruk; drawing A. Leydo, I. Nazaruk, M. Okulus)

3.25 m to 3.55 m wide [*Fig. 3*]. In the southwest, where it curved southwards, it may have been even twice as wide, but the current state makes it difficult to ascertain the exact dimensions. The sandstone blocks of the construction were of varying size and shape, apparently originating from the neighboring cliff; they were dressed and fitted together in a single course that was bedded on a thin layer of pink-brownish sand. In the northeastern part, the surface of the pavement was almost perfectly flat. On the northwest, it was bordered by a low curb keeping the pavement in place, the stones preserved for at least 3 m. There is no evidence of mortar between the stones. The overall orientation of the pavement is SW–NE and it appears to run as a kind of pathway from the desert track towards the well. A low roofed building that was located directly in its way turned out to be raised later than the pavement. Clearing of the pavement revealed no archaeological finds whatsoever.

The described pavement should be interpreted as part of a larger water-lifting

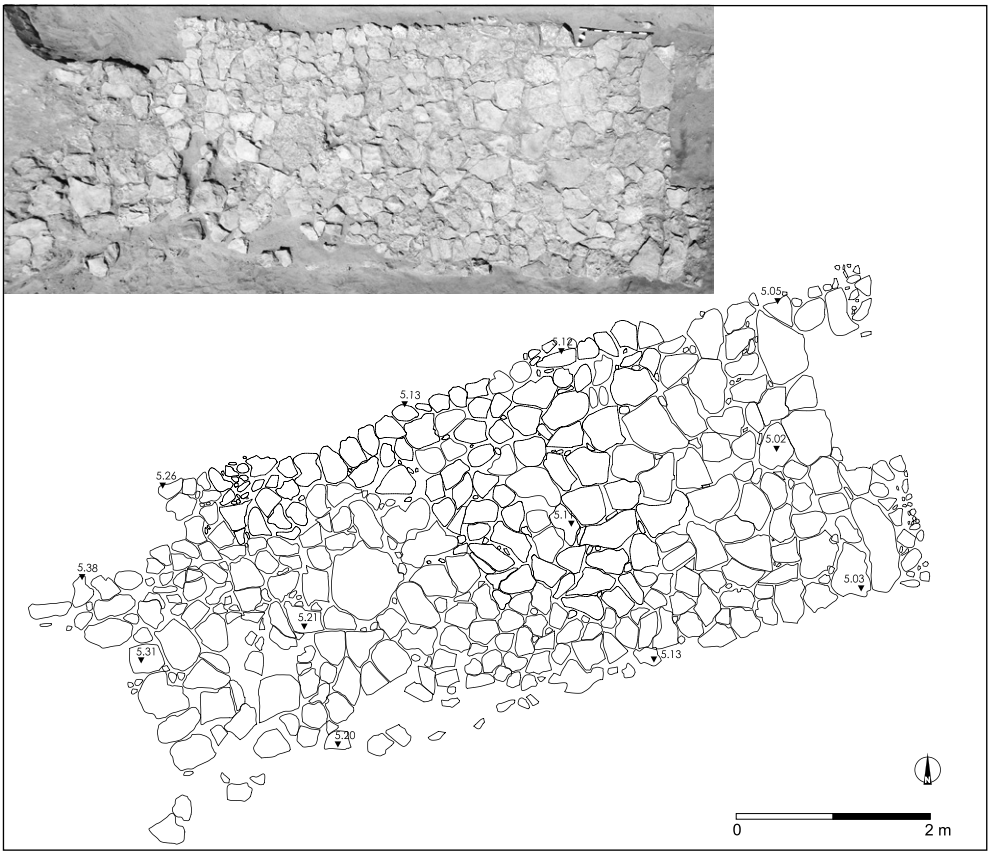

Fig. 3. Northeastern part of a pavement unearthed in the neighborhood of SB 23-1; top view in close-up at top right (Photo I. Nazaruk; drawing A. Niemirka, I. Nazaruk)

device that included a set of pulleys to hoist water up from the bottom of the well. There are numerous examples from the Arabian Peninsula of extensive hydraulic facilities (waterwheels) and animal tethering lines for lifting water (Jaussen, Savignac 1914: 41–42, Atlas Pl. XIV). Photos from the early 1920s, taken in Kuwait, show similar arrangements. Usually, the animals (oxen, donkeys or camels) powering the device pulled one or more wheels, on which the rope was pulled to lift water to higher ground. The other end of the main rope was attached to the animals that walked up and down a ramp, or walkway (Costa, Wilkinson 1987: 39) [*Fig. 4*]. The slope of the walkway compensated for the extra weight of the buckets or sacks filled with water. The lower the water table, the longer the walkway. The stone paving at Dubaij may be presumed to be a walkway or ramp of this kind. It seems to be older than the stone building and its construction should be related to the first stage of well usage. However, considering that the surface of the paving stones is neither polished nor evidently worn, the pathway could not have been in use over a long period of time. The lack of archaeological material has precluded a more precise dating. Modern methods of water acquisition, storage and distribution were undoubtedly similar to those used in earlier periods in the region. It was only recently (second half of the 20th century) that traditional animal-powered wells were replaced by a range of pump wells.

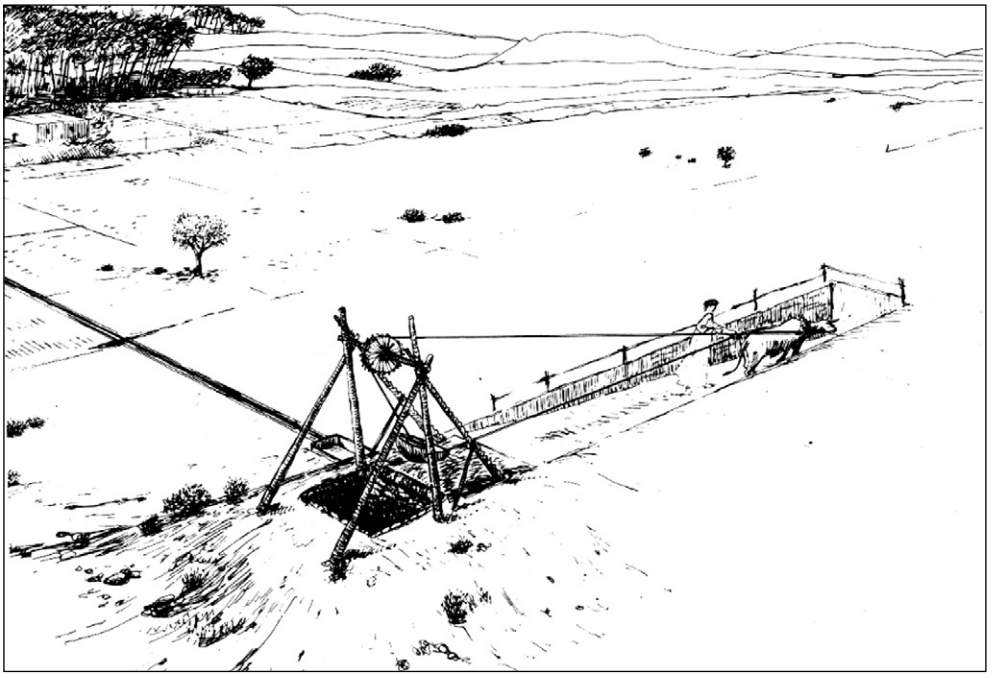

Fig. 4. Reconstruction of a desert water-lifting device (after Costa, Wilkinson 1987: 40, Fig. 6)

WELL SB 23-2

Limited investigations were conducted also in a small well SB 23-2, which was found some 25 m south of well SB 23-1 [see ***Fig. 1***]. The narrow stone-lined shaft of the well (approximately 1.25 m in diameter as measured at the mouth and about 1.55 m deep [***Fig. 5***]) was cleaned of accumulated sand. As already established in the previous season, the deepest part of the shaft appeared as an oval hole, up to 0.70 m in diameter, hollowed out in the sandstone bed. The total depth of the well, including the built and rock-hewn parts, was 2.75 m (the well at Mudaira is of similar shape and size). The facing of the shaft was made with care, one stone deep, using blocks of local sandstone laid out in 12 regular, horizontal courses. No mortar was used. Two horizontal cavities (or channels) were discovered in the lowest, rock-hewn part of the shaft. Similar channels (*qanawat*) are well-known from Iran, the Arabian Peninsula and North Africa. At Dubaij, it is reasonable to suppose that these underground watercourses, which are estimated to run no less than 4–5 m, led to lenses of fresh groundwater, by now dried up. One of the channels leads south, towards the coastal plain, while the other runs north in the general direction of the well-cistern SB 23-1. Should the two structures, SB 23-1 and SB 23-2, be connected by this channel, they may have somehow

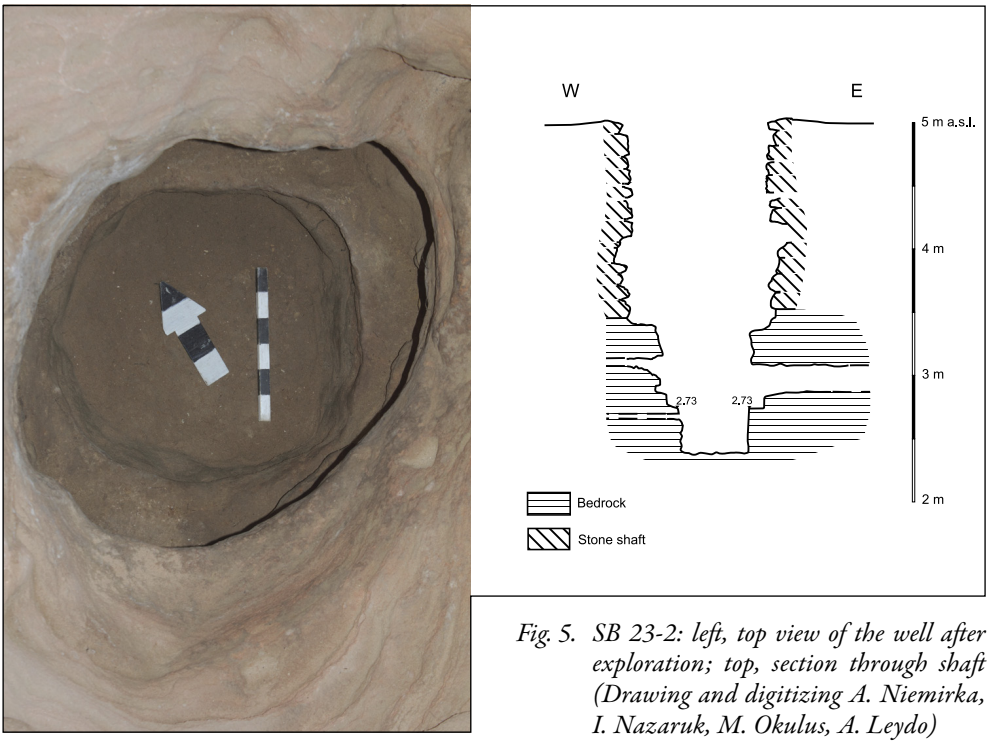

Fig. 5. SB 23-2: left, top view of the well after exploration; top, section through shaft (Drawing and digitizing A. Niemirka, I. Nazaruk, M. Okulus, A. Leydo)

functioned together as part of one unit. There is no way, however, to confirm this suggestion.

Three modern tin bowls found in the shaft below bedrock level suggest fairly recent use of the well, very likely in the last century. Unfortunately, the inverted bottle-shaped shaft is typical of both ancient and modern wells.

The Dubaij wells obviously did not function in isolation. Their construction may be related to overland trade during the Middle Ages, or to some other aspect of the economy of local communities.[2] Further archaeological investigations should be undertaken to establish the water supply networks of communities or semi-permanent settlements dispersed along the coastal plain of Northern Kuwait. Wells in Muheita, Mughaira, Mudaira and Dubaij seem to confirm the existence of such networks. It is all the more worthwhile to verify all the recorded instances of such devices that were collected by J.G. Lorimer during his travels (1908).

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[2] There must have been a trans-desert route between southern Iraq and Arabia that passed nearby; however, as far as we can tell, pilgrims traveling to Mecca avoided northern Kuwait, see Porter (ed.) 2012: 92ff., Fig. 57; Philby 1922: 120.

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