

The Harbor Facilities of King Khufu on the Red Sea Shore: The Wadi al-Jarf/Tell Ras Budran System

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Abstract

Since 2011, a joint team of the Paris-Sorbonne University and the French Institute in Cairo (IFAO) has been excavating an exceptionally well-preserved harbor complex from the Early Old Kingdom at Wadi al-Jarf along the Egyptian coast of the Red Sea. Considered now to be the oldest port site in Egypt and the first prototype of this kind, it was used for a short time as a departure point to the Sinai Peninsula for royal expeditions on the way to the regions of Serabit al-Khadim and Wadi Maghara, the principal mining areas for copper and turquoise. According to the finds and epigraphy, all these installations date back exclusively to the very beginning of Dynasty 4. In 2013 the site received much scientific attention after the discovery of hundreds of fragments of narrative and administrative papyri, some of them name King Khufu and report various operations linked to the construction site of the Great Pyramid at Giza.

Since 2013, the installations along the coastline have been under investigation and revealed all the constitutive elements of a harbor, such as an extensive mole underwater, numerous nautical elements, dwelling and storage buildings with evidence of administrative control and even a large workmen's barracks. The site at Wadi al-Jarf seems to naturally extend on the west coast of the Sinai Peninsula and a clear connection now has to be considered with the so-called late Old Kingdom fortress at Tell Ras Budran identified on the shore of the El-Markha plain. Based on the Wadi al-Jarf discoveries, its short-term occupation and the pottery evidence, which create a direct link between the sites, the function and chronology of the fortress needs to be completely reassessed and be regarded as a component and the bridgehead of the same ambitious system established at the very beginning of the Dynasty 4 along the two sides of the Gulf of Suez in order to reach the mining areas securely.

The Wadi al-Jarf site, under excavation since 2011,¹ is now best known for the exceptional discovery of a papyrus archive from the time of King Khufu—the oldest found in Egypt so far—and part of it has been linked to the building of the Great Pyramid at Giza.² It can also be considered to be one of the first large-scale attempts to establish a seaport on the Red Sea shore. As previously reported in several preliminary articles published about the progress of the work,³ it should be pointed out here that this

¹ The Wadi al-Jarf is a joint project of the Paris-Sorbonne University, the French Institute of Oriental Archaeology in Cairo (IFAO) and the Asyut University. Since 2011, it has been funded by the IFAO, the French Ministry of Foreign Affairs, the CNRS (UMR 8167), the Aall Foundation, the Honor Frost Foundation and French companies such as Vinci, Colas Rail and Total Egypt.

² The publication of the two most important documents from this archive—logs from a team of sailors shipping blocks of limestone from Tura to Giza Complex—is forthcoming: Pierre Tallet, *Les papyrus de la mer Rouge I. Le « Journal de Merer » (Papyrus Jarf A et B)*, IFAO, Cairo.

³ Pierre Tallet and Gregory Marouard, “An Early Pharaonic Harbour on the Red Sea Coast,” *EA* 40 (2012), 40–43; Pierre Tallet, “Ayn Soukhna and Wadi al-Jarf: Two Newly Discovered Pharaonic Harbours on the Suez Gulf,” *BMSAES* 18 (2012), 147–68; Pierre Tallet, Gregory Marouard, and Damien Laisney, “Un port de la IV^e dynastie identifié au ouadi al-Jarf (mer Rouge),” *BIFAO*

harbor site had a very short life and an occupation exclusively limited to the reign of Khufu at the end of which the site was apparently closed in an official manner. To date, no traces of the reign of Snefru, Khufu's predecessor, have been recovered and for the first time in 2016 a few traces corresponding to the reign of Khafra have appeared in a limited reoccupation phase, which occurred much later after the general abandonment and the sand encroachment of the port site and installations. In the stratigraphy, no evidence for any occupation appears above those levels, which are directly covered in Zone 1—the storage gallery area—by the traces of encampments left in 1823 during the short passage of the explorer and first British Egyptologist Sir John Gardner Wilkinson.⁴ In between those ca. 4400 years, nothing has been found from Dynasty 5 or the rest of the Old Kingdom or from any other of the major phases of Egyptian history. In addition to the major historical contributions by the different epigraphic material found at the site, the Wadi al-Jarf offers from an archaeological point of view a unique assemblage of artifacts and an exceptional snapshot of the material culture from the first half of Dynasty 4.

The archaeological campaigns conducted between 2013 and 2016 have mainly focused on the study of the coastal parts of this site, revealing imposing remains and providing a confirmation with regard to the chronology and the official use of the area limited to the beginning of Dynasty 4.

There is an obvious complementarity of information between the latest developments in relation to the rediscovery of pharaonic settlements on the western coast of the Suez Gulf, such as the Wadi al-Jarf and Ayn Sukhna, and the most recently studied sites in the Sinai, in particular the Old Kingdom fortress at Tell Ras Budran identified on the west coast of the peninsula, on the shore of the El-Markha plain. The function of this latter site was recently the subject of several preliminary reports,⁵ which unfortunately distort the contribution of archaeological data, notably because of the lack of bibliographical references to the most recent fieldwork. The Tell Ras Budran fortress should in our opinion be reassessed, especially in light of the abundant publications not considered by the excavators.⁶

This article aims to take into account all the new information and to present a concise study of the coastal parts of the Wadi al-Jarf settlement including an overview of the pottery that was found on the site, and which is particularly significant in this case. Those results are then correlated with the published data from the fortified site at El-Markha and its chronological assessment, as presented by the excavators, will be reconsidered in light of the new evidence obtained from the Wadi al-Jarf. Both loca-

112 (2012), 399–446; Pierre Tallet, “The Wadi al-Jarf Site: A Harbor of Khufu on the Red Sea,” *JAEI* 5.1 (2013), 76–84; Pierre Tallet and Gregory Marouard, “The Harbor of Khufu on the Red Sea Coast at Wadi al-Jarf, Egypt,” *NEA* 77.1 (2014), 4–14; Pierre Tallet, “Les ‘ports intermittents’ de la mer Rouge à l’époque pharaonique: caractéristiques et chronologie,” *Nehet* 3 (2015), 31–72.

⁴ Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 400. A handwritten note from the hand of J. G. Wilkinson was discovered in those surface contexts, which are marked by several campfires, ceramics and pipes from the Ottoman era and fine English tableware.

⁵ Gregory Mumford, “Explorations in El-Markha Plain, South Sinai: Preliminary Findings at Tell Markha (Site 346) and Elsewhere,” *JAEI* 7.1 (2015), 91–115; Gregory Mumford and Rexine Hummel, “Preliminary Findings at a Late Old Kingdom Fort in South Sinai, including the Pottery, from the 2008 Season,” *JAEI* 7.1 (2015), 52–82; Gregory Mumford, “The Sinai Peninsula and Its Environs: Our Changing Perceptions of a Pivotal Land Bridge between Egypt, the Levant, and Arabia,” *JAEI* 7.1 (2015), 1–24. For previous preliminary reports about the Tell Ras Budran fortress, see idem, “Tell Ras Budran (site 345). Defining Egypt’s Eastern Frontier and Mining Operations in South Sinai during the Late Old Kingdom (Early EBIV/MB1),” *BASOR* 342 (2006), 13–67; idem, “Ras Budran and the Old Kingdom Trade in Red Sea Shells and Other Exotica,” *BMSAES* 18 (2012), 107–45; idem, “Ongoing Investigations at a Late Old Kingdom Coastal Fort at Ras Budran in South Sinai,” *JAEI* 4.4 (2012), 20–28.

⁶ One should add to the bibliography about South Sinai—amongst others—the regular reports of the work of our team in this area between 2003 and 2012: Moustafa Resk Ibrahim and Pierre Tallet, “King Den in South-Sinai: The Earliest Monumental Rock Inscription of the Pharaonic Period,” *Archéo-Nil* 19 (2009), 179–84; Pierre Tallet and Damien Laisney, “Iry-Hor et Narmer au Sud-Sinai (Ouadi ‘Ameyra). Un complément à la chronologie des expéditions minières égyptiennes,” *BIFAO* 112 (2012), 381–98; Pierre Tallet, *La zone minière du Sud-Sinai I. Catalogue complémentaire des inscriptions du Sinai*, MIFAO 130 (Cairo, 2012); idem, *La zone minière pharaonique du Sud-Sinai II : Les inscriptions pré et proto-dynastiques du ouadi Ameyra*, MIFAO 132 (Cairo, 2015); idem, *La zone minière pharaonique du Sud-Sinai III. Les expéditions égyptiennes dans la zone minière du Sud-Sinai du prédynastique à la fin de la XX^e dynastie* (forthcoming). The proceedings of the international colloquium that we organized in 2009 about the latest results of the archaeological discoveries at the Red Sea is not quoted by G. Mumford, even if he indirectly participated in this event: Pierre Tallet and El-Sayed Mahfouz, eds., *The Red Sea in Pharaonic Times*, BdE 155 (Cairo, 2012). Similar remarks about an article on the Wadi al-Jarf were published a few years before in the same *JAEI* series (Tallet, “The Wadi el-Jarf Site,” 76–84).

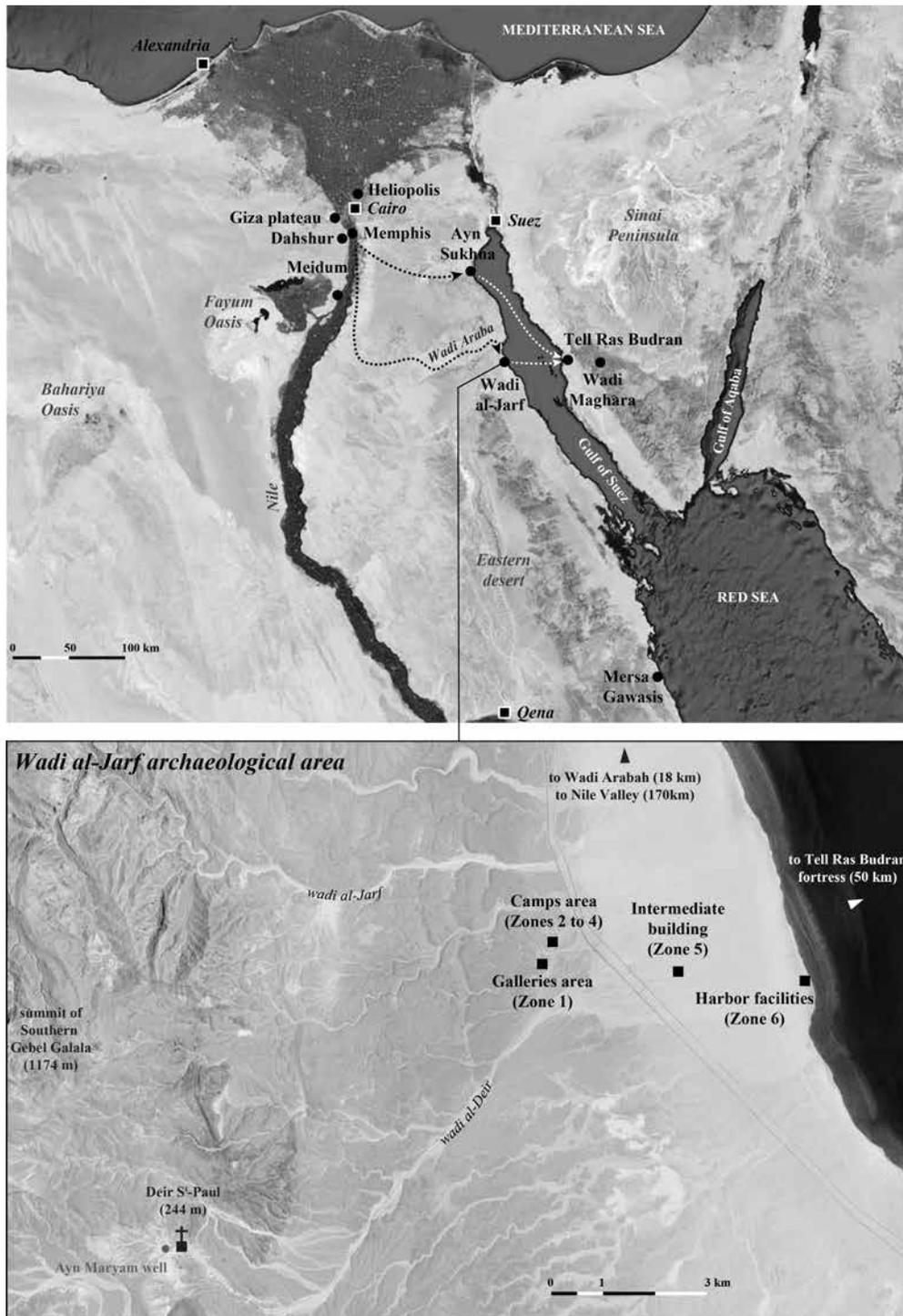


Fig. 1. Location of the port site installations at Wadi al-Jarf (map: G. Marouard, satellite photographs courtesy of Google Earth©).

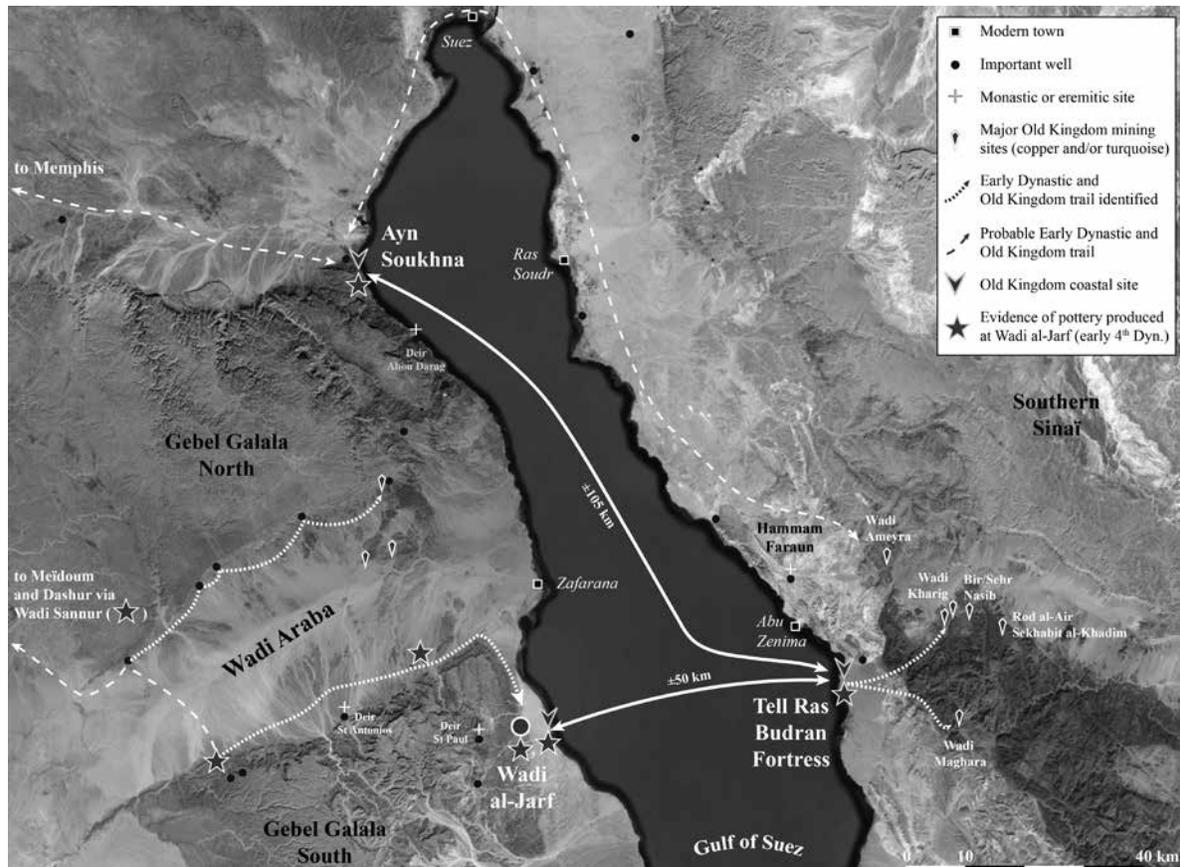


Fig. 2. Comprehensive map of royal expeditions and possible trails leading to the southern Sinai copper and turquoise mining sites during the Old Kingdom (map: G. Marouard, satellite photographs courtesy of Google Earth®).

tions are without any doubt strictly contemporary, they show the same chronological sequence, and can both be regarded as parts of the same ambitious, but ephemeral, system introduced at the beginning of Dynasty 4 along the two sides of the Gulf of Suez in order to ease the exploitation of copper and turquoise in the Sinai mining area.

The harbor site at Wadi al-Jarf was chosen primarily for reasons of accessibility, its position is indeed the best equation of various factors such as a rapid connection from the Nile Valley (through the Wadi Araba), the proximity of a sufficient water supply (the major active source near St Paul monastery), and the quick access to the coast of the southern Sinai Peninsula (fig. 1). In this latter case, Zone 6 is located in an area where the width of the Red Sea is limited to a maximum of 50 km and exactly opposite to the sandy beaches that mark the large plain of el-Markha (fig. 2). The navigation eastward was also facilitated by the steep cliffs of the Hammam Fara'un mountain and the Abu Zenima bay situated on the opposite bank, which constituted exceptional visual markers in order to navigate straight ahead and reach quickly the Tell Ras Budran site and the entry of the mining areas (through the Wadi Baba and the Wadi Maghara). The port installations at Zone 6 were also installed in one of the few places in this portion of the coastline south of Zafarana where the coral reef presents a large opening, more than 300 m in width, which certainly allowed a safer crossing for the boats. The harbor (Zone 6) is separated from the storage facilities (Zone 1) and the main camps (Zone 2-4) by at least 5 km (fig. 1), a distance that is mainly explained by the obligation to find within the foothills of the southern Gallala mountains



Fig. 3. View of the submerged pier at low tide in June 2011, from the east (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

a suitable area in order to cut the necessary storage galleries into the natural rock formation. These galleries are an essential component common to all the Egyptian ports known to date at Wadi al-Jarf,⁷ Ayn Soukhna,⁸ and Mersa Gawasis:⁹ they corroborate the intermittent use of those harbors, that make it necessary to dig storage spaces in order to keep, amongst other items, the dismantled boat parts between two expeditions to the Sinai. After three seasons conducted between 2013 and 2015, the extensive excavations of Zone 6 are now completed and they have clearly confirmed the presence here of major installations from the early Old Kingdom, exclusively dated to the beginning of Dynasty 4, and which designates from a structural point of view the Wadi al-Jarf as the oldest harbor ever discovered in the world.

1. The Pier at Zone 6

Already well explored since 2011 thanks to a phase of exceptionally low tide (fig. 3), the submerged parts of the port at Wadi al-Jarf were mapped by using specific methods combining the topographic

⁷ Tallet, Marouard, and Laisney, "Un port de la IV^e dynastie," 403–7, figs. 3, 10; Tallet, "The Wadi al-Jarf Site," 77–78, fig. 3; Tallet and Marouard, "The Harbor of Khufu," 4–5, fig. 2, Tallet, "Les 'ports intermittents' de la Mer Rouge," 55.

⁸ Mahmoud Abd el-Raziq, et al., "The Pharaonic Site of Ayn Soukhna in the Gulf of Suez: 2001–2009 Progress Report," in Tallet and Mahfouz, *The Red Sea in Pharaonic Times*, 3–20 (5–6); Tallet, "Les 'ports intermittents' de la Mer Rouge," 39–46, fig. 13; Mahmoud Abd el-Raziq, Georges Castel, and Pierre Tallet, *Ayn Soukhna III : le complexe de galeries-magasins* (MIFAO, forthcoming).

⁹ Kathryn Bard and Rodolfo Fattovich, "Spatial Use of the Twelfth Dynasty Harbor at Mersa/Wadi Gawasis for the Seafaring Expeditions to Punt," *JAEI* 2.3 (2010), 1–13; idem, "The Middle Kingdom Red Sea Harbor at Mersa/Wadi Gawasis," *JARCE* 47 (2011), 105–29.

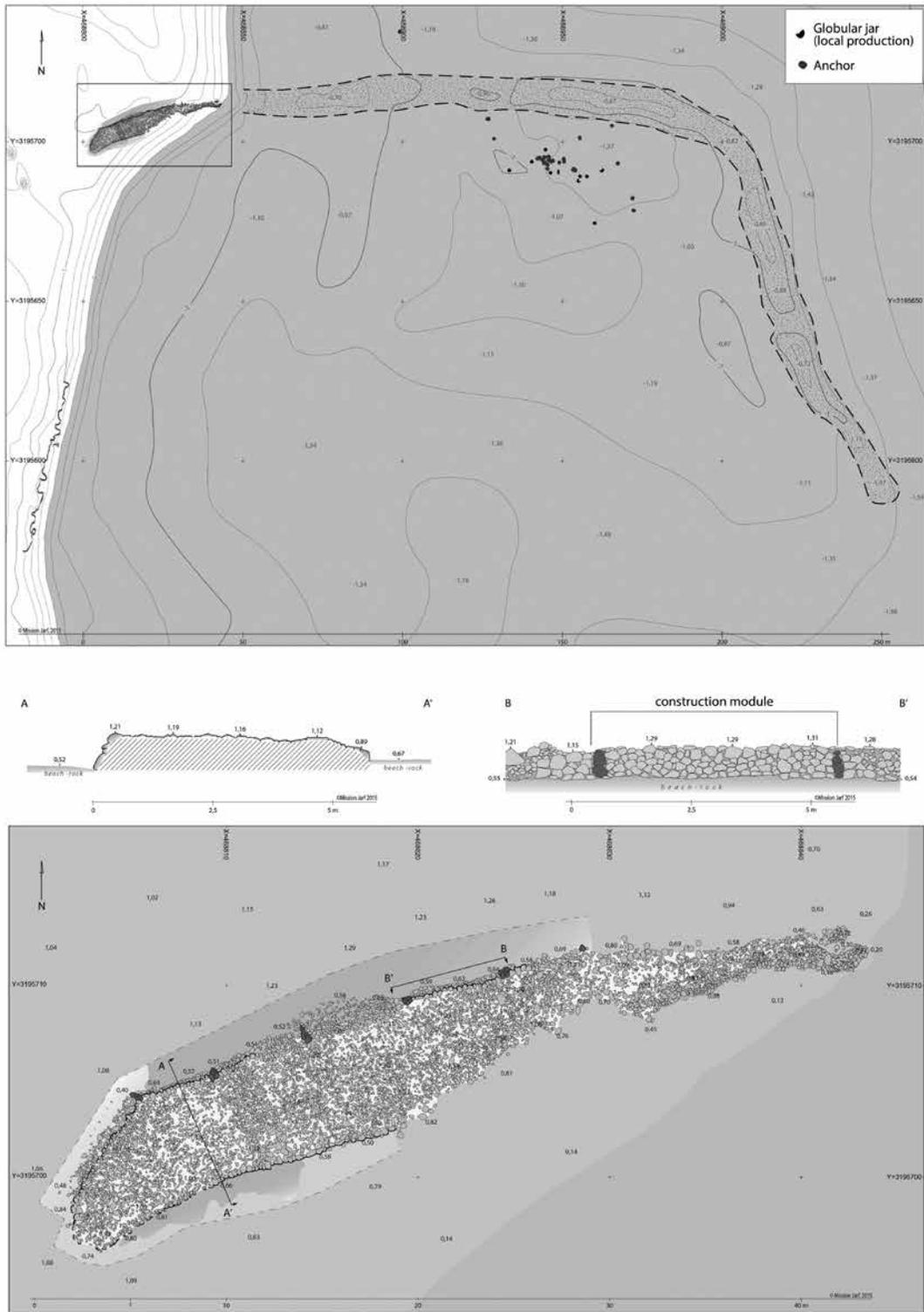


Fig. 4. Map of the submerged section of the breakwater (above) and detailed plan of the emerged part of the pier (below) (plan: D. Laisney, G. Marouard, and P. Tallet/Wadi al-Jarf archaeological mission).



Fig. 5. Globular storage jars discovered underwater in the inner harbor area in Zone 6 (photographs: G. Pollin and G. Marouard/Wadi al-Jarf archaeological mission).

and GPS survey with a photogrammetric and ortho-photographic coverage using a kite. The submerged section of the breakwater pier expands from the current level of the beach over 160 m eastward, then it forms a bend south-southeast where the pier expands rather irregularly on more than 120 m (fig. 4). In these underwater sections, the pier seems to have been made without any structuring efforts, the stone blocks are simply stacked and probably, because of the depth, they had been discarded from the deck of a boat. The interior of the space which is delimited by the jetty covers an area of at least 2.5 hectares.¹⁰ Against the southern face of the northern section, and about 120 m from the coastal strip, a concentration of 24 boat anchors and several complete large storage jars have been found about 1.00 m to 1.30 m under the water surface (fig. 4). At least four of these globular jars were brought up in order to be cleaned and restored and it has been possible to confirm that they indeed belong to the very characteristic local pottery production (fig. 5).

In 2015 an extensive cleaning of all the emerged part of the pier were completed. It has been possible to trace the structure for about 40 m in length, bringing the total extension of the east-west section to 200 m (ca. 380 cubits). On the beach, the preserved width varies greatly, from 1.70 m—for the part that is most exposed to the tide—to 6.70 m. Throughout the western half, protected by the accumulation of sand and silt, the two outer—north—and internal sides—south—have been well preserved, and the jetty here has a uniform width of 5.75 m to 6.25 m (about 11 or 12 cubits). The northern outer face was found in an exceptional state of preservation (fig. 6) revealing that special care had been employed for the construction and it also shows an unexpected original layout. One can observe a well-ordered assemblage of large limestone boulders and a pronounced and very regular sloping face. In contrast the interior of the pier is made of an extremely solid fill of small stone blocks that were compacted and finished with a yellowish clay mortar. The assembling of the blocks also revealed a very technical construction with contiguous moles measuring approximately 5.50 m to 6.00 m in length (again about 11 or 12 cubits) whose angles are well assembled using bigger blocks (fig. 4). Each one of those sections—at least five have been recognized—did not present a straight but a sharply concave northern outer face (fig. 7), which had been produced voluntarily by the constructors, presumably to accentuate the strength of this part of the pier being more exposed to strong coastline currents from the north and the repeated attacks of the swell and tide. This cleaning operation—complemented by several geo-

¹⁰ The possible existence of a second pier, which could have closed the southern part of the port, is still being discussed and will be investigated further during another campaign. Excavations in the inner harbor area and further offshore exploration are underway by an Egyptian team of divers from the MoA Department of Underwater Antiquities headed by Dr. Mohamed Abdel-Maguid.

Fig. 6. The emerged part of the pier excavated in 2015, from the east (photograph: G. Marouard/Wadi al-Jarf archaeological mission).



morphological trenches farther back from the shore—also confirmed a former coast line that once was significantly higher than today.¹¹ At the base of the northern outer face, two to three layers of blocks were found included in a sandy beachrock deposit in the process of cementation, which indicates that this area was formerly exposed to the tidal regime. Furthermore, this freshly formed beachrock has covered a thick level of fine yellowish clay that keeps again small charcoal inclusions, indicating a level of human occupation and activities that are without doubt contemporary to the functioning or at least to the construction of the pier. Finally, the fact that the northern face of two sections of the mole further east and slightly lower have been destroyed, clearly emphasizes repeated exposure to this part of the pier to the swell, to coastal currents and strong winter storms (fig. 7). All these factors tend to indicate that the coastline has experienced a fairly continuous phenomenon of regression occurring well-before the first human occupation, and at this stage of the study, it can be estimated that during the ancient historic times the Red Sea level in this specific part of the shore was about 30 to 50 cm higher than the actual modern level.

2. Storage Building and Living Quarters at Zone 6

About 150 m from the shoreline, the 2013 and 2014 campaigns have uncovered a vast complex built in stone, that measures 40 m long by 26 m wide, with two associated buildings showing a so-called “toothcomb” plan (fig. 8). The first one on the southern side, Building 2, is characterized by a long and narrow shape, the other one on the north side, Building 1, is much shorter but wider and whose functions can be clearly distinguished by the archaeological data. Building 2 is oriented east to west, it measures 40 m by 7.00–7.50 m and it includes 9 rooms with a north-south alignment and 2 cells at both extremities (fig. 9). Each room measures internally about 6.50–7.00 m by 3.10–3.25 m, a width that implies the former presence of a roof with intermediate supports. At least two successive phases of floors have been discovered inside, the oldest phase is characterized by quite clean yellowish clay floors including a central line of 3 to 4 postholes which were used to support a light roof. In a second phase, the clay floors have been rebuilt directly on top of the previous ones, but not all rooms seem to have been roofed at that time. These areas show intensive food preparation activities, as evi-

¹¹ A full geomorphological report is currently being prepared by J.-P. Peulvast, geomorphologist, Paris-Sorbonne University.

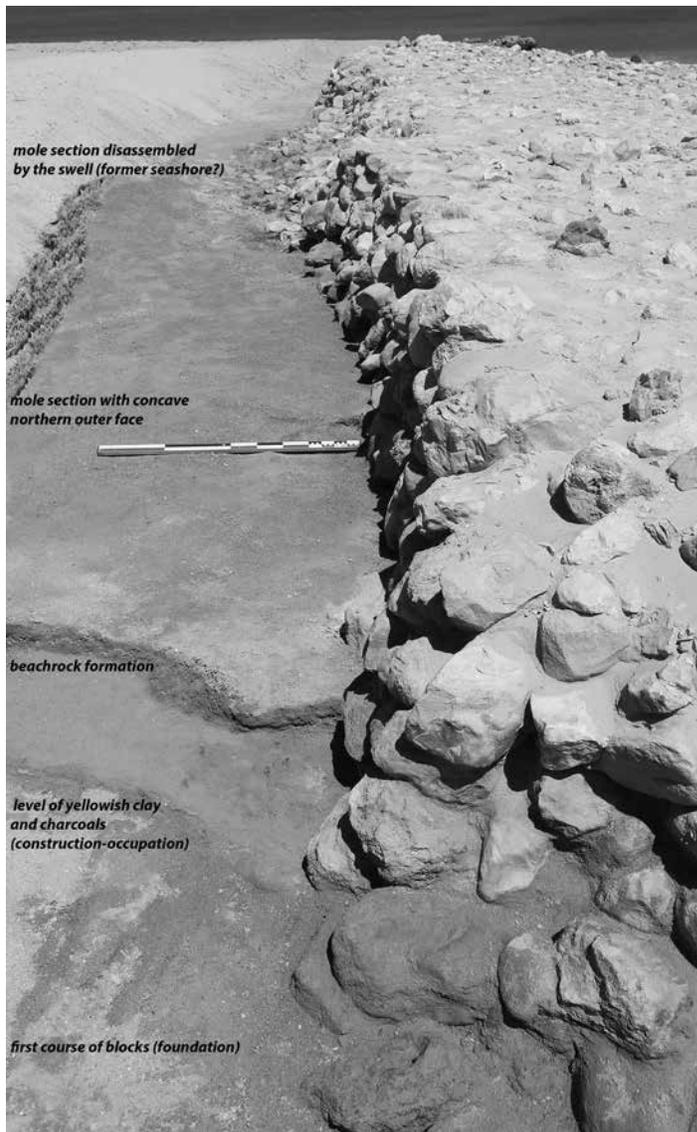


Fig. 7. Detailed view of a mole section of the emerged pier with concave northern outer face, from the east (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

denced by numerous fireplaces often containing traces of twigs and rope fragments. Large quantities of *bedja* bread molds have been found as well, and in Room 8 a rare example of a large ashy fireplace where several negative imprints of bread mold bulbs have been discovered (fig. 10), which is identical to some examples found several times at Heit el-Ghorab at Giza.¹² The function of this part of the complex seems to have been more distinctly devoted to housing and daily activities.

¹² Mark Lehner, "Excavations at Giza 1988–1991: The Location and Importance of the Pyramid Settlement," *The Oriental Institute News and Notes* 135 (1992), 1–9 (see 5–7, fig. 8); idem, "Pyramid Age Bakery Reconstructed: Experimental Archaeology Offers Clues to Ancient Baking Technology," *Aerogram: Ancient Egypt Research Associates: Groundbreaking Archaeology* 1–1 (1996), 6–7; Hanan Mahmoud and Rabee Eissa, "Bread and Bakeries at the Heit el-Ghorab Site: An Introduction," in Freya Sadarangani and Alexandra Witsell, eds., *Settlement and Cemetery at Giza: Papers from the 2010 AERA-ARCE Field School* (Boston, 2015), 15–31 (see 16–19, figs. 1–4 to 1–9). Similar imprints in simple ash layers have been observed at al-Sheikh Said near Deir el-Bersha; Stefanie Vereecken, "About Bread Moulds and Bread Trays: Evidence for an Old Kingdom Bakery at Al-Shaykh Sa'id," in Bettina Bader and Mary Ownby, eds., *Functional Aspects of Egyptian Ceramics in Their Archaeological Context: Proceedings of a Conference Held at the McDonald Institute for Archaeological Research, Cambridge, July 24th–July 25th, 2009, OLA 217* (Leuven, 2013), 53–71 (see 58, pl. 2).



Fig. 8. General map of the large harbor facilities, Buildings 1 and 2, and reoccupations in Zone 6 (plan: D. Laisney, G. Marouard, and P. Tallet /Wadi al-Jarf archaeological mission).

Building 1, on the north, occupies only half of the length of the previous structure (fig. 8). It measures 20 m in length and 12.25 m to 15.00 m wide, and consists of five long parallel rooms, four identical ones (11.50 m by 3.05 m to 3.20 m) devoted to storage and one eastern command room, which controlled the access to those spaces (fig. 11).

This last one was significantly longer (13.70 m) and shows a subdivision into two to three internal spaces with two lateral doors, one outward on the east side, the other opens out westward onto a large space facing the storerooms. All of these five rooms had a single layer of a very thick yellowish clay floor with five to six postholes in the central axis, which indicate here again a light roof. Except for a few pounders of black diorite, flint blades, two fireplaces located at the rear of Rooms 3 and 4 and numerous large fragments of local storage jars, the floors of the storerooms were found in a very good condition and relatively clean.

The systematic sieving of occupation layers and an attentive excavation of the interior floors and the circulation levels in the open area immediately to the west have led to the discovery of hundreds of small fragments of clay sealings, several bearing the Horus name or the royal cartouche of King Khufu (fig. 12). Those sealings were found both in the last occupation levels as well as being trapped inside the mud used to build the floors, indicating a relatively short period and especially a highly homogeneous function of this area, which was apparently used only during the reign of Khufu. Their formulation confirms what is now well known from the study of the papyri: the Wadi al-Jarf harbor must probably be regarded as a remote dependency of the big building project of the pyramid of the king at Giza. Thus

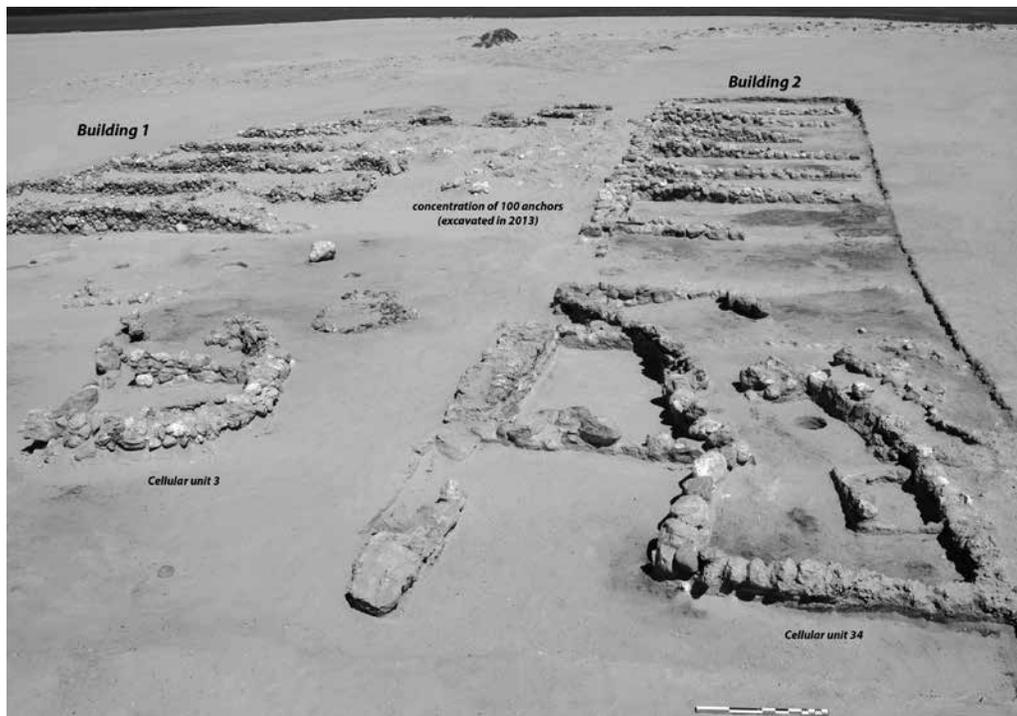


Fig. 9. General view of the large harbor facilities, Buildings 1 and 2, and reoccupations excavated in 2014 in Zone 6, from the east (photograph: G. Marouard/Wadi al-Jarf archaeological mission).



Fig. 10. A large ashy fireplace with several negative imprints of bread mold bulbs, Room 8 of Building 2 in Zone 6 (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

Fig. 11. View of the long eastern command room, Room 5, of Building 1 in Zone 6, from the north (photograph: G. Marouard/Wadi al-Jarf archaeological mission).



it is not surprising that some of the officials whose titles appear on those sealings would be linked with the funerary complex of *Akhet-Khufu*, the “*Horizon of Khufu*” (fig. 12, SC1 and SC2).

From a material point of view, two categories of sealings become apparent: some of them are made with a fine brown and dark silt clay from the Nile Valley and the others are coarser and made with a yellowish sandy clay from a local source (fig. 12, SC57 and SC58). Quantitatively, the first group dominates the assemblages and this indicates activities linked to the opening of various kinds of containers—as demonstrated by different types of imprints on the back—such as bags, baskets or wooden boxes that were sealed beforehand in the Nile Valley. Nevertheless, the second group emphasizes that some activities such as the sealing of containers and the packing or repackaging have also been carried out here, as evidenced by numerous modeled pellets of yellowish local clay regularly found in the same levels. Those findings tend to confirm that official storage and administrative activities took place within Building 1. These functions have already been indicated by the architectural layout including a large control room. The chronology of the associated ceramic assemblages also confirms the dating to the time of Khufu, which is the only reign attested by the sealings.

Under the original storeroom floors, several light fireplaces have been observed directly set onto the surface of the natural sand, indicating a previous ‘bivouac style’ occupation but not necessarily very ancient as pointed out by numerous fragments of locally produced ceramics.



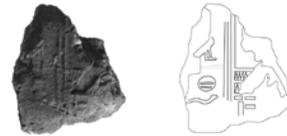
SC 1 (US 173 - Building 1 - Western space - alluvial clay)
hry- 'z3b jmy-[r] jhw nb n [T3-mhw]
[3ht ?] Hwfw
 the substitute, the dignitary, the director of all the flocks of Lower Egypt
 [Horizon of ?] Khufu



SC 24 (US 173 - Building 1 - Western space - alluvial clay)
(Hnm-hwef-wj)
 Khnum protects me (Khufu)



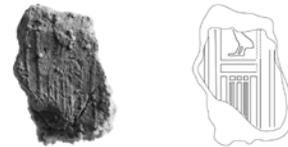
SC 8 (US 173 - Building 1 - Western space - alluvial clay)
[...hry] sst3 [Hr] Mddw
 [...] [the superior] of the secret of [Horus] Medjedu



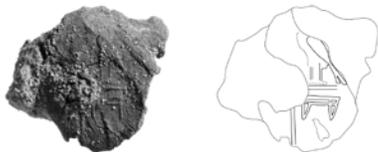
SC 2 (US 173 - Building 1 - Western space - alluvial clay)
[3ht?] H[w]f[w]
 [Horizon of ?] Khuf[u]



SC 19 (US 173 - Building 1 - Western space - alluvial clay)
[Hr] Mddw
 [Horus] Medjedu



SC 57 (US 183 - Building 1 - Room 1 - local yellow clay)
[Hr Mdd]w
 Horus [Medjedu]



SC 38 (US 173 - Building 1 - Western space - alluvial clay)
Hr Mdd[w]
 Horus Medjed[u]



SC 58 (US 119 - Building 1 - Room 2 - local yellow clay)
Hr Mddw
 [Horus Medjed]u

Fig. 12. Selection of fragments of clay sealings from Building 1 in Zone 6, bearing the Horus name or the royal cartouche of King Khufu (SC57 and SC58 have been made with a local yellow clay) (photographs: G. Pollin, drawings: P. Tallet/Wadi al-Jarf archaeological mission).

Building 1 is finally characterized by a rather exceptional closure phase marked by the storage of a hundred boat anchors in the empty space located at the entrance of the four storerooms (fig. 13). By moving them through the wide passage located south of the command room, they have been carefully stored, some grouped together and arranged in a circle around the posts supporting the roof (fig. 8), which was only dismantled after. This is the most important assemblage of anchors ever discovered in

Fig. 13. View of the final deposit of a hundred anchors, grouped in circles around the posts that originally supported the roof of Building 1, from the south (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

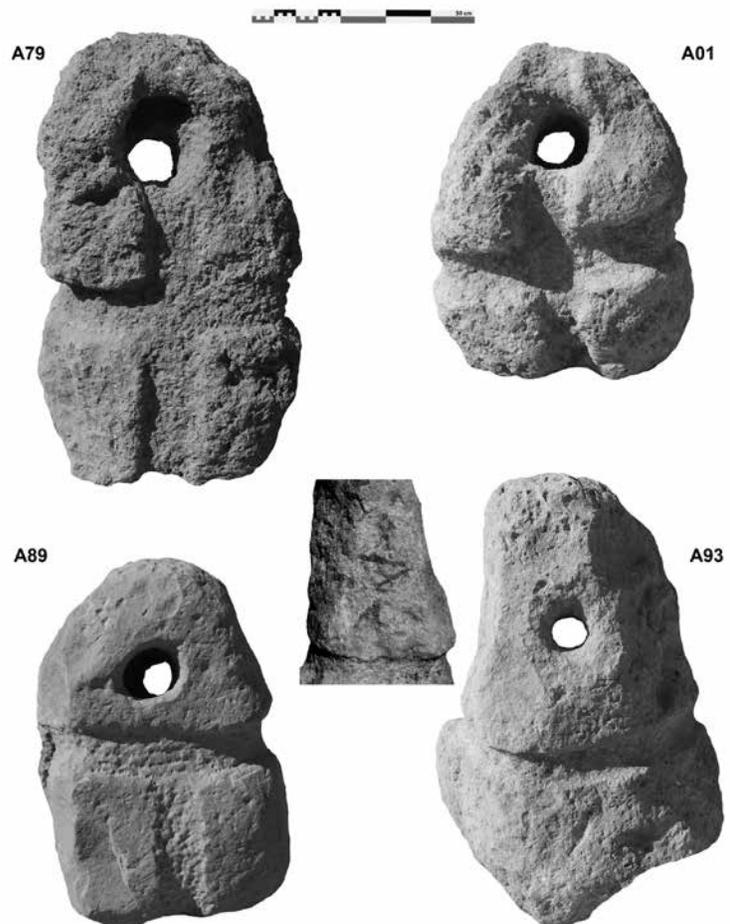
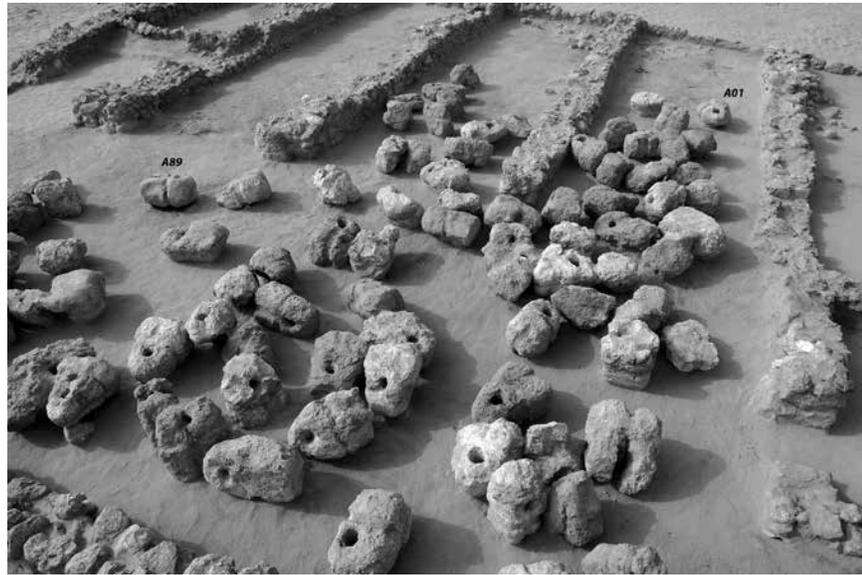


Fig. 14. Selection of four anchors from the final deposit in Building 1. A89 is made with sandstone and the three others are in limestone. The red ink inscription is located on the left side of anchor A93 (photographs: G. Pollin/Wadi al-Jarf archaeological mission).

a primary context of use (130 anchors including those underwater) and the oldest examples found in Egypt. They were carved in limestone or sandstone blocs, with coarse and irregular shapes and varying sizes and weight (between 100 and 320 kg). They show almost always a perforation in the upper part with cross-shaped and lateral grooves to maintain ropes in place around all sides, that several anchors still preserved *in situ* during the excavation (fig. 14). As shown by shells of sea urchins still adhered on the surface, some of them seem to have been pulled out after an extended stay in the sea. A significant number of them also have hieroglyphic marks in red ink, generally two to three signs that refer probably to the name of the boat¹³ to which they were attached to or to the name of the team that was responsible for them.¹⁴ On six of them, the formula $\Delta \text{ q3j h}d.t$ “the One who exalts the White Crown” can be read, this royal epithet gives by itself another strong dating criterion because it seems to have been particularly in use during the end of the Dynasty 3¹⁵ up to the beginning of the Dynasty 4¹⁶ (fig. 14).

This massive storage of boat anchors marks the final phase of occupation of both Buildings 1 and 2, which were no longer in use thereafter. This closure has been followed by a massive windblown sand deposition on the entire area that led to the nearly complete disappearance of the storage building. Then in a third phase, small cellular installations still clearly from the Pharaonic period and well dated to Dynasty 4, appear on the western and eastern sides (fig. 8). They are sometimes directly reconstructed on the previous structures by reusing their building materials (fig. 9). These later installations are composed by two cells side by side, forming an enclosed space—equipped with a bin—and a more open space with the usual fireplaces and cooking facilities. At three locations the presence of multiple human bones has been observed.

According to the excavation results from the seashore area (Zone 6) several conclusions can be proposed here:

- The level of the Red Sea has slightly changed in historic times with a slight regression of about 30 to 50 centimeters at least in the immediate vicinity of the port area since the mid-third millennium BC.
- The presence of highly structured harbor facilities, characterized by a unique example of an underwater pier, several storage and administrative buildings and a large number of nautical elements, clearly emphasize the former presence here of several boats and a regular rotation in the direction to the Sinai shoreline during short but large-scale expeditionary operations.
- There was a transit of goods—by using storage jars of local production which can be found everywhere in the area and even under water—and administrative activities comprising the opening and the closing of various containers as evidenced by numerous clay sealings that bear the names of Khufu, some even mention the Great Pyramid construction site (fig. 12, SC1 and SC2), which is the obvious final destination for the products—such as the copper—were brought back from the Sinai.
- At the end of the reign of Khufu, a final and perhaps official closure operation of the port site has been conducted, characterized by the storage of about hundred anchors inside the Building 1. The area may have been shut down with the prospect of a future use and return that for some reason never occurred.
- The presence of limited reinstallations that follow a short time after the closure and abandonment of the port indicate that the starting point towards the Sinai Peninsula was punctually

¹³ Tallet and Marouard, “The Harbor of Khufu,” 12; Tallet, “Les ‘ports intermittents’ de la mer Rouge,” 52.

¹⁴ The teams are usually named in relation to the boat with which there are linked, which is for example the case of the *m3 wrrt*-team whose name appears on some of the Wadi al-Jarf jars—its full name being *m3<=s> wrrt Hnm-hw=f-wj*, lit. “its prow is the ureaus of Khenemkhuefuj (Khufu),” Pierre Tallet, “Des serpents et des lions: la flotte stupéfiante de Chéops en mer Rouge,” in *Du Sinaï au Soudan, itinéraires d’une égyptologie. Mélanges D. Valbelle* (Paris, 2016), 243–53.

¹⁵ Michel Baud, *Djésér et la III^e dynastie* (Paris, 2002), 40–42.

¹⁶ Palermo Stone sixth register, year 14–15 of King Snefru, Toby Wilkinson, *Royal Annals of Ancient Egypt* (London-New York, 2000), 144.



Fig. 15. Aerial view by kite of the “workmen barracks” building excavated in 2016 in Zone 5 (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

reused, but only during Dynasty 4. This third phase could possibly be linked to a late and light expeditionary operation, as suggested below by some reoccupations observed in 2016 at Zone 5 and now well dated from the reign of King Khafra (fig. 17).

3. A Large “Workmen’s Barracks” Building at Zone 5

Zone 5 (fig. 1) is characterized by a large rectangular building, to date the largest Pharaonic structure known on the shore of the Red Sea. The area had never been explored by the first visitors in 1823 or 1950s and the building was only discovered in 2008 by using remote sensing and satellite images.

It is situated in a peculiarly isolated location within the wide coastal plain, halfway between the sea-shore (Zone 6, ca. 3.3 km) and the area of the storage galleries and camps (Zones 1–4, ca. 2.2 km).¹⁷ The area is relatively flat with multiple shallow drains which, during the rain phases of the Pleistocene, have carted away many large boulders of limestone, an abundance of construction materials, which has probably motivated the choice of this area.

Since the first survey in 2011, the area appeared untouched, deeply buried in sand and showing very few archaeological artifacts and only very eroded fragments of pottery from the local production, some superficial Bedouin installations (tents emplacements and fireplaces) to the west and traces of modern

¹⁷ Tallet, Marouard, “An Early Pharaonic Harbour,” 2, 5; Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 403, figs. 7–8.



Fig. 16a. View of the entrance of the elongated Room 3, Zone 5, with broken in situ a large globular storage jar imported from the Nile Valley (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

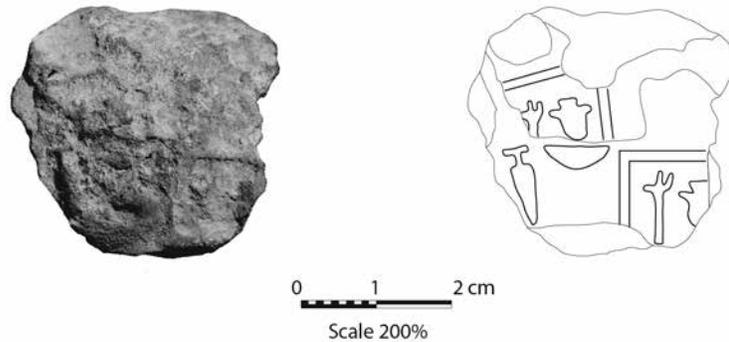


Fig. 16b. View of the entrance of the elongated Room 2, Zone 5, with in situ blockage of stones and pebbles used in order to closed its door (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

oil exploration in the wider periphery. The area has thus remained unoccupied since the Old Kingdom and the first excavation work undertaken last 2016 season have shown exclusively three phases, all from Dynasty 4: the building itself and one construction underneath that predates the building, both can be dated to the reign of Khufu, the third phase corresponds to light and opportunistic reoccupations inside of the abandoned building, already quite silted up. The latter can be dated to the reign of Khafra according to several clay sealings (fig. 17).

The main phase of the building (Phase 2) is composed of thirteen long parallel rooms (fig. 15) visibly built starting from the eastern side by groups of two or three rooms. The construction has a vaguely rectangular shape which measures 56.00–57.00 m in length (east-west) and 29.00–33.50 m in width (north-south). The elongated rooms are quite variable in their interior dimensions, between 22.50–27.20 m in length to 3.00–4.20 m in width. Due to the width of the spaces which always exceeds 3.00 m, a roof made with wooden beams and light materials had been placed on five to seven wooden posts per unit whose negative imprints were found on the floor. The filling was exclusively of sterile windblown sand and the good state of preservation of the postholes indicate that the roof had been carefully dismantled before the closure of the building (the holes were kept ready to receive new posts). The access to the rooms was controlled by an entrance space along the southern side (Room 14), which measures

Fig. 17. Fragment of clay sealings from reoccupation level in Zone 5, bearing two times the Horus name of king Khafra–Wsr-Ib (photograph: G. Marouard/Wadi al-Jarf archaeological mission).



Khafra's sealing (Zone 5, US 504 - Phase 3 - alluvial clay)

52.00 m in length and 3.80–4.70 m wide. This space was also covered with a light roof as evidenced by a dozen postholes (fig. 15).

The walls of this building are well-made of large limestone boulders and pebbles collected in the area¹⁸ and a dense yellowish clay mortar with numerous inclusions of shell fragments that can be found along the coastal/lagoon area. No demolition was found in the lowest levels and the conservation level of the walls currently reaches between 1.10 m to 1.90 m in elevation. The door jambs had been built with much care and each entry has a pivot hole dug into the ground or a stone door socket, indicating the existence of a closure system which was also methodically dismantled just before the final closure of the building. Only four eastern rooms, the entrance room and all surroundings of the building were excavated during the 2016 season. In all of those spaces two successive phases of a hard yellowish clay floor were found. If the first phase was very thick and compacted by a regular circulation, the second one was like new, a kind of unspoiled renovation, where finger traces of the smoothing were still visible. The floors have been found in an astonishing state of cleanliness, with only a few fragments of storage jars from the local production. Only the southern entrance room contained more abundant materials, some flint blades, a few bones, a carved piece of wood, and especially four complete globular storage jars, two from the local production (fig. 30/1) and two in mixed clay imported from the Nile Valley (fig. 16a and fig. 31/12).¹⁹ Several traces of fireplaces were also found, corresponding to very limited and punctual fireplaces. Before the abandonment of the building, all the doors to the elongated rooms were closed off by using a systematic closure system consisting of a dry stack of large boulders (fig. 16b). Then, all internal spaces were naturally and rapidly filled with more than 30 to 50 cm of windblown sand.

Several transversal walls, initially identified as internal subdivisions,²⁰ correspond in fact to a light but homogeneous reoccupation (Phase 3). They were installed directly onto the natural sand deposit and constructed with blocks retrieved from the previous walls of the main building, which was completely out of use at that time. The occupation level of this third phase are very limited, generally marked with a slightly indurated floor surface and large fireplaces set up on the sand. In those contexts, the fragments of the local pottery production are still very numerous, but most of the sherds were reused here for building the base of cooking fireplaces. The volume of imported ceramics from the Nile Valley is also more significant and some shapes are slightly different from those marking the occupation phases of

¹⁸ An extensive survey conducted in 2016 has highlighted on the east of this area a vast concentration of about three hundred little piles of stones and pebbles, probably formed by collecting activities for the construction of the building.

¹⁹ Tallet, Marouard, and Laisney, "Un port de la IV^e dynastie," 411, fig. 21. This shape is considered as the prototype for the globular jars produced at Wadi al-Jarf and is a known form in several archaeological contexts in the Nile Valley as such as Buto, Giza, or Dahshur (see below nn. 95 to 105).

²⁰ Tallet, Marouard, and Laisney, "Un port de la IV^e dynastie," 403, figs. 7–8.



Fig. 18. The rectangular cell (left) and open area (right) from the first phase of occupation in Zone 5, under the mud floor levels of elongated Rooms 2 and 3 (Phase 2) (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

Khufu. In two separate locations, fragments of sealings made of dark alluvial clay from the Nile Valley were found, each time impressed with a cylinder seal bearing a *serekh* with the Horus name of Khafra *Wsr-Ib* (fig. 17).

A trench opened in the northern third of Rooms 2 and 3 with the aim to test the flooring led to the discovery of an earlier phase (Phase 1) which consists so far of a large rectangular stone cell oriented to the north, and which internally measures 7.50 m to 3.00 m (fig. 18). It contains cooking spaces on the outside to the west and the internal and external postholes indicate a light roofing structure. The pottery from this first phase consists for 95% of local Wadi al-Jarf production, particularly globular storage jars, bowls for bread dough preparation or *bedja* bread molds smashed up *in situ* on the floor. It is the same production that can be found for the Phase 2—occupation of the main building—which has been well dated from the reign of Khufu.

The function of the large building in Zone 5 remains uncertain considering the number of rooms still to be excavated and the small number of artifacts found. No trace of malachite ore nor any other activity related to the copper and turquoise brought back from the Sinai have been found so far and containers used for storage such as the globular jars are very few in comparison to the large numbers found in several storage galleries in Zone 1 such as G16 and G23 (fig. 19).²¹ Mark Lehner recently and correctly emphasized many similarities between the large building of the Zone 5 and the gallery complex excavated at el-Heit Gohrab.²² It appears quite possible to consider here also a dormitory function

²¹ Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 409, 420, figs. 18–19.

²² Mark Lehner, “The Name and Nature of the Heit el-Ghurab Old Kingdom Site: Workers’ Town, Pyramid Town, and the Port Hypothesis,” in *The Pyramids: Between Life and Death, proceedings of the Workshop held at Uppsala University, May 31st–June 1st 2012*, forthcoming (we would like to thank Mark Lehner for having provided us with this forthcoming paper); idem, “The Heit el-Ghurab Site Reveals a New Face: The Lost Port City of the Pyramids,” *AERAGRAM* 14–1 (2013), 2–7; idem, “Labor and the



Fig. 19. Gallery G23 before excavation with a deposit in situ of 220 local storage jars, in Zone 1 (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

for some specific part of the expeditionary troops, which transited through the Wadi al-Jarf before traveling to the Sinai mining area. The small volume of archaeological objects and the lack of fireplaces and production dumps might indicate a rather limited use of the structure and probably acted as a supply base for the occupants with food already stored in the galleries of Zone 1 or produced in the extensive camps of Zone 2.

From an architectural standpoint, this building at Wadi al-Jarf shows many more similarities with the double set of workmen barracks located immediately south of the Red Pyramid at Dahshur. Recently prospected in a geomagnetic survey by Nicole Alexanian and Tomasz Herbich,²³ its plan also contains at least 13 to 14 rooms, similar in size but slightly wider, and all fireplaces here seem to be concentrated inside the longitudinal entrance space along the southern facade. As already pointed out for the pottery, Snofru contexts at Dahshur seems to be again the main reference site for the Wadi al-Jarf, whose functioning is restricted to the reign of Khufu and which seems to be very much and unsurprisingly influenced by the organization of the main projects of his predecessor.

So far, from this area, where excavations are not yet finished, three major points of information can be summarized:

Pyramids: The Heit el-Ghurab 'Workers Town' at Giza," in P. Steinkeller and M. Hudson, eds., *Labor in the Ancient World* (Dresden, 2015), 397–522.

²³ N. Alexanian and T. Herbich, "The Workmen's Barracks South of the Red Pyramid at Dahshur," *MDAIK* 70/71 (2016), 13–24; Dina Faltings, "Die Keramik aus den Grabungen an der nordlichen Pyramide des Snofru in Dahschur Arbeitsbericht über die Kampagnen 1983–1986," *MDAIK* 45 (1989), 133–54; Rainer Stadelmann, et al., "Pyramiden und Nekropole des Snofru in Dahschur: Dritter Vorbericht über die Grabungen des Deutschen Archäologischen Institute in Dahschur," *MDAIK* 49 (1993), 259–94, esp. 291–94, fig. 21; Nadine Moeller, *The Archaeology of Urbanism in Ancient Egypt: From the Predynastic Period to the End of the Middle Kingdom* (Cambridge, 2016), 126, figs. 5–8 and 5–9.

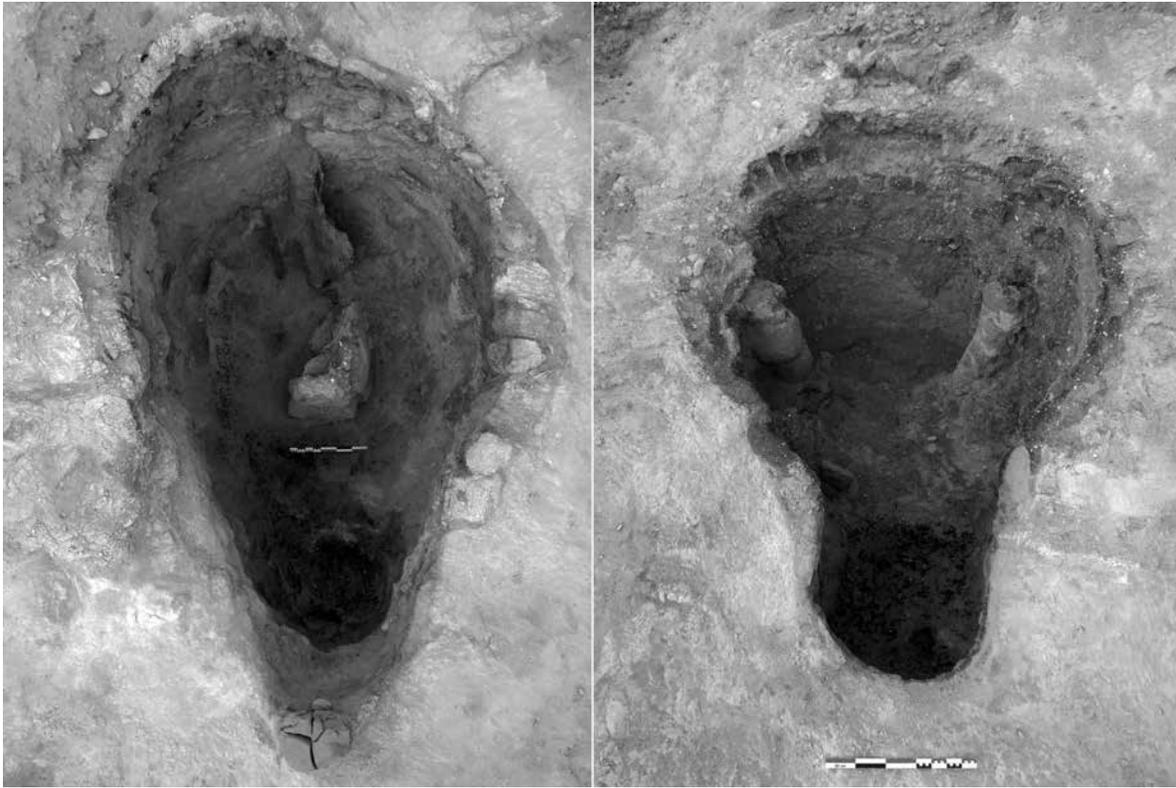


Fig. 20. Two of the four pottery kilns used for the local ceramic production, excavated in 2015 in Zone 1 (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

- The kind of building discovered for the main Phase 2 has parallels exclusively in the context of the pyramid complexes of Dynasty 4, an observation that establishes both a significant chronological congruence but also, such as the seal impressions found in Building 1 at Zone 6, a direct link to the major royal construction projects in the Nile Valley.
- There are two phases, well-dated to the time of Khufu, with the first phase being limited and built as a pioneering structure; this would tend to explain the choice of this intermediate isolated zone for the establishment of a much larger and monumental structure during the second phase, but with a short life and little use.
- The end of the second phase is characterized by the dismantling of roofs and doors and by a systematic closure of all the accesses by a thick stone fill. Comparable to the massive final closure of the galleries in Zone 1²⁴ or the final storage of about a hundred anchors in Zone 6, it perhaps also marks here an official closure of the structure—at the end of reign of Khufu—which was never to be reused in a similar way later and was rapidly covered with aeolian sand.
- A third phase indicates a short and opportunistic reoccupation of the rooms—already heavily buried in sand—well-dated by a few sealings marked with in the Horus name of Khafra. Approximately fifteen to twenty years would separate in that case the final closure of the main building from this brief passage in the area. Attested for the first time at Wadi al-Jarf, this small expedition under the reign of Khafra could correspond to the reopening operation of the massive

²⁴ Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 406–7, figs. 10, 13–16; Tallet and Marouard, “The Harbor of Khufu,” 4–5, fig. 3; Tallet, “The Wadi al-Jarf Site,” 81.

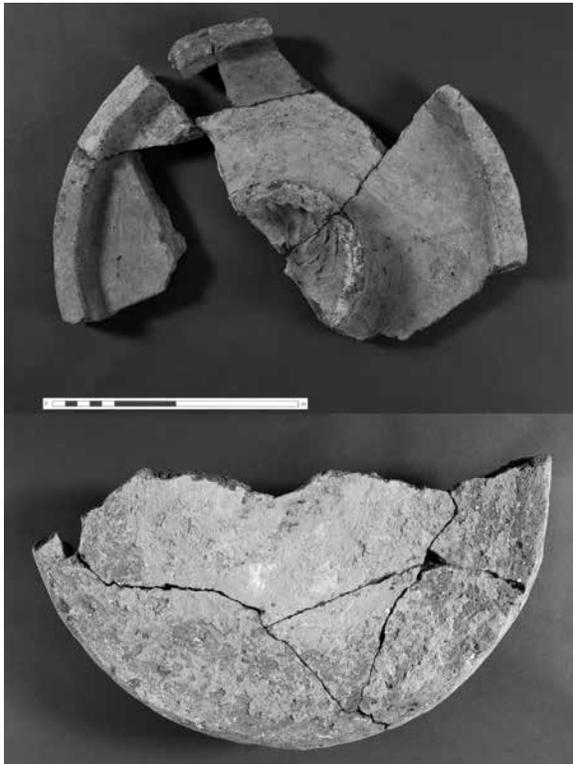


Fig. 21. Two complete profile of potter's tables found in Zone 1, the one below shows important residues of local marl clay on its working surface (photographs: G. Pollin/Wadi al-Jarf archaeological mission).



Fig. 22. Three decantation and clay preparation pits found in 2015 at the entrance of galleries G8 to G11 in Zone 1 (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

closure systems in Zone 1—which marks the recuperation of the boat pieces from the storage galleries²⁵—and maybe to the small cellular constructions which mark the late reoccupation in Zone 6.

4. Progress on the Study of Local Pottery Production in Zone 1

From the first visit to the site, the visible remains of pottery kilns and a considerable amount of globular jars storage made with an unusual marl fabric have indicated a significant local production of pottery, which was regularly mentioned since 2012 in the publications.²⁶ Besides the uniqueness of this very complete workshop, an update is needed here inasmuch as this production can establish a direct link between the site at Wadi al-Jarf and the fortress at Tell Ras Budran, where those very same containers apparently represent 80–90% of the discovered ceramics.²⁷

²⁵ Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 405–6, n. 13; Tallet and Marouard, “The Harbor of Khufu,” 7, fig. 10.

²⁶ Tallet and Marouard, “An Early Pharaonic Harbour,” 4–5; Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 407–11, figs. 17, 20, 21; Tallet and Marouard, “The Harbor of Khufu,” 5, figs. 4–5; Gregory Marouard, “Un nouvel atelier de potiers de la ive dynastie au ouadi al-Jarf (mer Rouge),” in Teodozja Rzeuska and Anna Wodzinska, eds., *Studies on Old Kingdom Pottery 2*, forthcoming.

²⁷ Mumford and Hummel, “Preliminary Findings,” 70–71, Tables 1 and 3; Mumford, “Tell Ras Budran (site 345),” 32–33. An

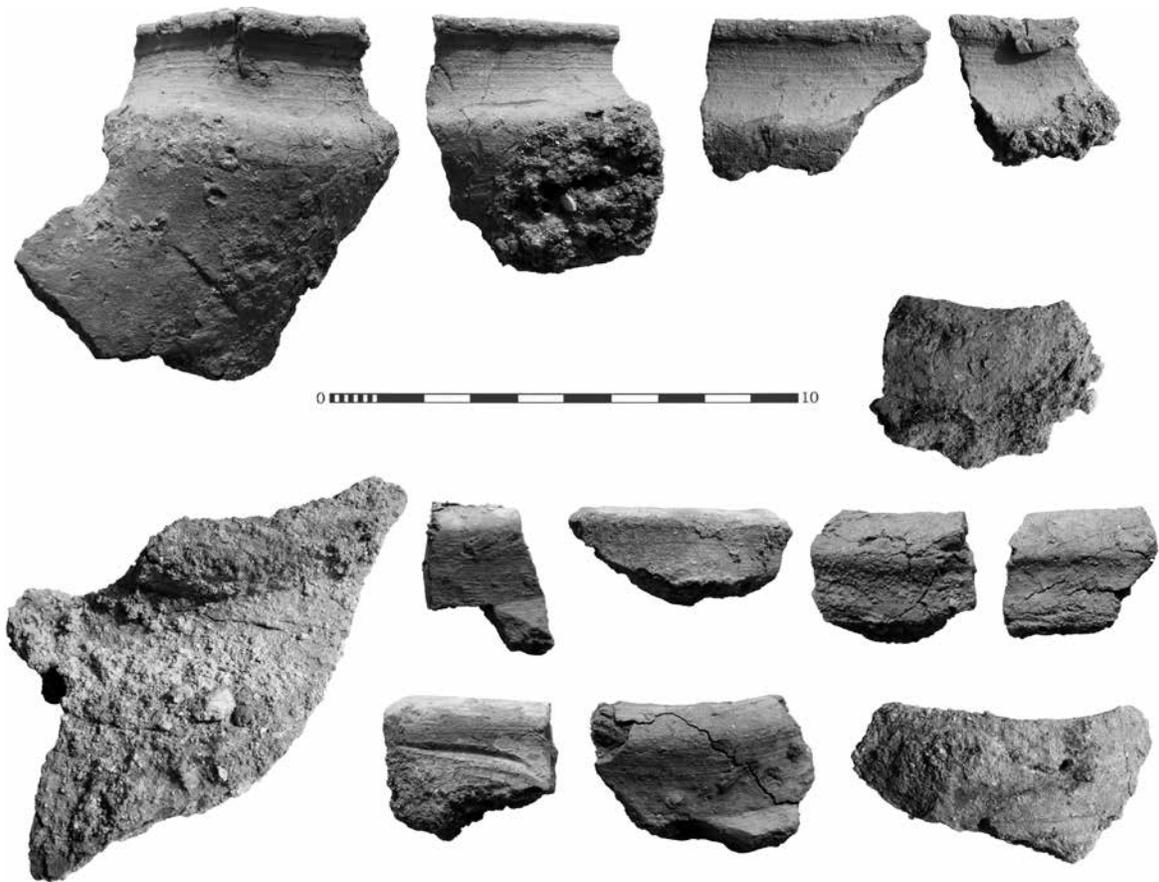


Fig. 23. Unfired and distorted fragments of carinated bowls (so-called Meidum bowl) and rims of large globular jars in local marl clay found in one of the clay preparation pits (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

The recent excavations at Wadi al-Jarf have highlighted two groups of two pottery kilns, the largest about 3.20 m in length, is so far one of the largest kilns ever excavated for Pharaonic times (fig. 20). All are located close to the gallery area in Zone 1.²⁸ In addition to their somewhat unique mounting in a pit using a casing of limestone blocks and a mixed elevation made with stone and mudbricks,²⁹ two points are important to keep in mind about those kilns at Wadi al-Jarf.

First, the closest archaeological equivalent in terms of size and architecture can be found in the immediate vicinity of the Red Pyramid at Dahshur³⁰ with a date to the very beginning of the Dynasty 4.

unpublished report by Rexine Hummel, *Ras Budran Ceramic Report 2008 Season*, contains also an important reference in order to make this comparison between the pottery found at the two sites. This report was posted by G. Mumford on his Academia account: https://www.academia.edu/9276133/REPORT_by_R._Hummel_Ras_Budran_ceramic_report_2008_season_June_1_-_July_4_RAS_BUDRAN_REPORT_2010_11_pages_4_198_words_3_plates_ (accessed 15 October 2016).

²⁸ Tallet, Marouard, and Laisney, "Un port de la IV^e dynastie," fig. 3. Another set, still unexcavated, of two or three kilns is located further west of the galleries. One of those kilns has been unfortunately destroyed very recently by the construction of a high-power line that passes near the Zone 1.

²⁹ Tallet, Marouard and Laisney, "Un port de la IV^e dynastie," 408, n. 24, fig. 17; Marouard, "Un nouvel atelier de potiers," forthcoming. A draft version of this article (May 2014) is available online: <https://www.academia.edu/28822674/> (accessed 15 October 2016).

³⁰ Rainer Stadelmann, "Die Pyramiden des Snofru in Dahshur Zweiter Bericht über die Ausgrabungen an der nordlichen

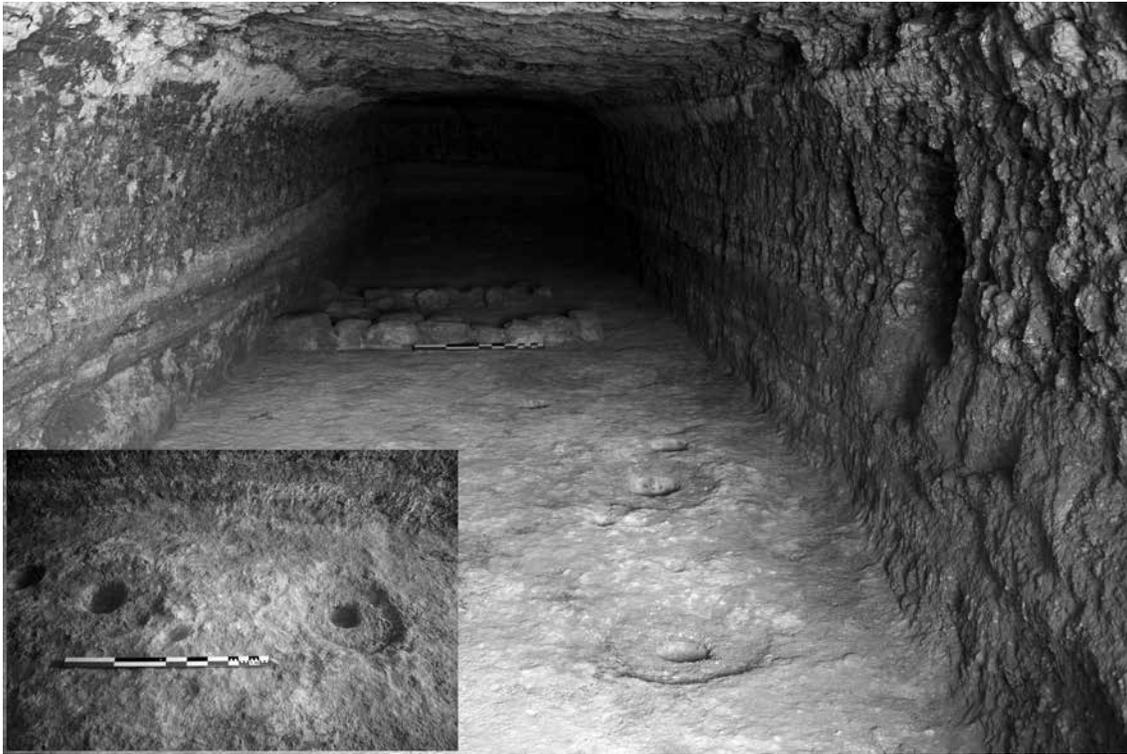


Fig. 24. Two circular holes located within the first meters inside the gallery G4, maybe used for keeping a hand-spun table on a tournette stone pivot. Both have significant local clay residues trapped inside (photograph: G. Marouard/Wadi al-Jarf archaeological mission).

Second, the upper chambers of the pottery kilns have been systematically dismantled during the closure phase of the site and the debris of the kilns has been retrieved within the mixed blockage used for the massive closing system at the entrances of the storage galleries in Zone 1. This last operation constitutes an official and massive closure which, like for Zone 5 and 6, mark the final abandonment of the site and maybe from near the end of the reign. This specific context is particularly well-dated by the stratigraphy and obviously by the deposit of hundreds of papyri from the year 26 or 27 of Khufu discovered in 2013.³¹ This exceptional *terminus post quem*, emphasizes that after the shutdown of the site was accompanied by a drastic and systematic dismantling of the production installations, no more potters' activities took place thereafter at the Wadi al-Jarf. It also demonstrates—as indicated also by the pottery shapes and the red inscription on the globular jars locally produced—that the Wadi al-Jarf pottery workshop was exclusively active during the reign of Khufu, and most likely earlier in the reign at the time when the site was commissioned.

Numerous fragments of about twenty different potters' tables—low-speed wheels—have also been discovered in the same contexts, discarded and broken in the mixed filling of the closure system of the galleries entrances. Several still preserved a complete archaeological profile (fig. 21) and the vast majority of those wheels were produced with alluvial clay,³² which therefore indicates that the potters

Steinpyramide: Scheintur oder Stelen im Totentempel des AR," *MDAIK* 39 (1983), 225–42 (see 228–33, figs. 2, 3, pl. 68.a, b, c).

³¹ Tallet and Marouard, "The Harbor of Khufu," 8–12, figs. 11–14; Pierre Tallet, "Les papyrus de la mer Rouge (ouadi el-Jarf—golfe de Suez)," *CRAIBL 2013* (2013), 959–68; idem, "Des papyrus du temps de Chéops au ouadi el-Jarf (golfe de Suez)," *BSFE* 188 (2014), 25–49; idem, *Les papyrus de la mer Rouge I. "Le journal de Merer" (papyrus Jarf A et B)*, in print, IFAO.

³² It should be also mentioned that at least four others examples of tables have been locally made with the local marl clay and



Fig. 25. A globular jar (type T2) in local marl clay (F1) with a red ink mark *rhw bjk.wy nbw* on the body (photograph: G. Pollin/Wadi al-Jarf archaeological mission).



Fig. 26. Left, a globular jar (type T3) in local marl clay (F1) with a red ink mark *m3 W[rr]* on the shoulder. Right, body sherd of globular jar with a *m3 W[rr]* mark, on which the green discoloration and cracks indicate that it was applied on a fresh clay before being overfired in the kiln (photograph: G. Pollin/Wadi al-Jarf archaeological mission).

came from the Nile Valley with their own professional equipment. Local production was obviously not an improvised activity but well-planned in advance, implying that the first expeditions at the site had a good knowledge of the local resources especially water, fuel and local clay.

In 2015, a set of three decantation and clay preparation pits were found at the exterior of galleries G8 to G11 (fig. 22). All the pits were installed in the thick spoil material that had been generated during the process of cutting of the galleries and all three were sealed beneath the walking levels that had slowly formed at the entrances of the galleries. This stratigraphic position underlines that those pits were only used at the beginning of the occupation at the site, just after the digging of the galleries but prior to their use as storage space and prior to their massive closure, another point that emphasizes that the potters' activities were discontinued before the site closure.

One of those pits still contained thousands of fine mud scrapings produced by the final trimming of the pottery surface, in addition to tools (cutting strings, polishing pebbles, scrapers) and complete forms that have accidentally collapsed during the shaping process. There were also unfired fragments such as dozens of rims of carinated bowls (so-called *Meidum bowl*) including rims and hundreds of body sherds of the large globular storage jars (fig. 23). A coarser and very sandy mix of local marl clay was also found in another pit, together with several fragments of unfired *dokka* trays and *bedja* bread molds. This indicates a functional differentiation of the pits, with different fine and coarse clays, that were intended for the production of different pottery shapes.

In the immediate vicinity of the kilns and clay pits, another important element is the systematic presence of unusual circular holes located within the first meters inside the galleries (fig. 24). Maybe used for setting the potter's tables, they seem to designate the long caves as the location for the pottery throwing activities as well as the storage area for the still unfired ceramics during the long drying process, which is always done in the shade. Possibly used initially by the pottery workshop just after their excavation, the galleries then reportedly took their main function as storage spaces for the boat parts and for the water and food containers during the expeditions' operational phases.

usual inclusions typical for the Wadi al-Jarf production. About the potters' wheel in Egypt see Sarah Doherty, *The Origins and Use of the Potter's Wheel in Ancient Egypt*, Archaeopress Egyptology 7 (Oxford, 2015).

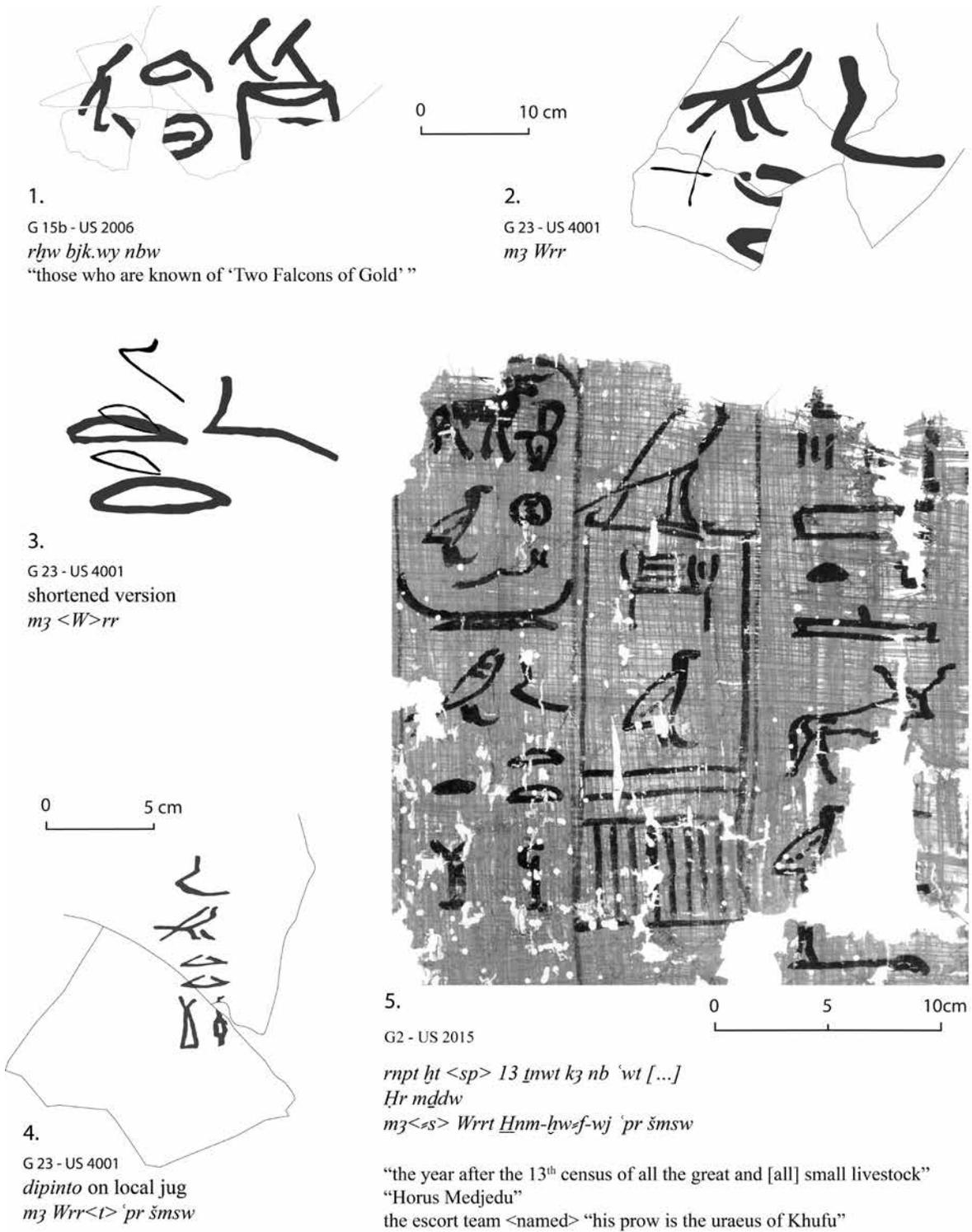


Fig. 27. Selection of red marks on local jars (1, 2, 3), dipinto (4) and papyrus fragment (5) from Zone 1 that show the same team name *m3 Wrr<t> [pr šmsw]* (photograph: G. Pollin, drawings P. Tallet/Wadi al-Jarf archaeological mission).

The two types of local clays, one coarser (fabric F9) and one finer (fabric F1) found in the pits can be clearly recognized in the local pottery production.

Fabric F9, very coarse and sandy, was reserved only for the forms used for bread baking such as the *dokka* trays, the deep oval and circular trays and the *bedja* bread mold (fig. 30). The clay is a marl basis that is characterized by an abundant quantity of large angular or round sand and by the very angular and flaky siliceous platelets that can also be regularly observed in the fine clay F1. The production is usually poorly fired, especially for the forms that have an important thickness of their vessel walls such as the bulbs of the bread molds, and it crumbles easily, especially after a having been in wet archaeological contexts.

The fabric F1³³ was used for the production of at least twenty-five different forms copied from the pottery corpus found in the Nile Valley, especially open forms for food consumption like the so-called “*Meidum Bowls*,” in addition to small closed forms used for storage, small juglets, deep bowls with spout for food and dough preparation and cooking pots. As previously mentioned, the F1 clay was mainly used for the production of thousands of short-neck globular storage jars, handmade in two parts and assembled by hand.³⁴ This very peculiar fabric does not have any equivalent within the usual classifications such as the Vienna system. It is a very characteristic marl clay, close to a Marl A3, which can be easily collected all around the site in multiple sedimentary deposits concentrated in the bed of the surrounding flash flood wadis. It presents, depending of the firing intensity, significant variations in its color, ranging from a buffy yellow and light pink to an orange-pink (Munsell 5YR 6/4) and sometimes an intense green when overfired in the kiln (Munsell 5Y 7/6 to 6/6). The dense and hard matrix is immediately recognizable thanks to the presence of a specific kind of temper of small round sand and a very large quantity of a very particular mineral stabilizer: large siliceous platelets, very angular and flaky such as mudstone or shale fragments, brown to reddish brown in color, sometimes exceeding 5 mm side. Those are always visible in an important quantity on the external surface, especially in the lower part of the storage jars due to a wet smoothing operation of the surface carried out at the end of the mounting process of the two different parts (figs. 5, 25, 26, 28, and 30).

The local storage jars are found in archaeological contexts in a proportion of about 80% to 90%, all over the site and also in the areas along the seashore, such as in Zone 5 in the earlier level (Phase 1) as well as on the floor of the entrance Room 14 of the main building (Phase 2). Some fragments can be also found inside the construction itself, reused to wedge the blocks. In Zone 6, there are important jars fragments in the floor level of Building 1 which can be associated with the clay sealings that bear the name of Khufu and they can also be found underwater on the bottom of the harbor (fig. 5). That last point strongly underlines that these containers were part of the cargo loaded onto the boats that have departed from the Wadi al-Jarf for the Sinai Peninsula, and it should not come as a surprise to find the same pieces in significant quantity on the other side of the Gulf of Suez, at the disembarkation point at Tell Ras Budran.

The numerous *in situ* containers found at Zone 1 inside galleries G15 A-B (134 jars) and G23 (223 jars, fig. 19)³⁵ show regularly on their shoulder simple signs and glyphs engraved after firing and marking the owners or teams' names. Some are marked with charcoal and show multiple attempts at repair, emphasizing that those jars were used for several times and probably brought back from the expedition before being stored here at the end of the last campaign.

³³ Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 408; Marouard, “Un nouvel atelier de potiers,” forthcoming. It should also be noted that the fine local marl clay F1 has regularly served for the production of sealing jar-stoppers.

³⁴ Tallet and Marouard, “An early pharaonic harbour,” 4–5; Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 405; Marouard, “Un nouvel atelier de potiers,” forthcoming. In 2015, the excavation of Kiln 3052 (fig. 20 left) revealed that this installation was specifically used for firing the large storage jars which constitute 100% of the pieces (some overfired and completely deformed) found inside the lower chamber and in the large production dump preserved in the immediate vicinity.

³⁵ Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 409, 420, figs. 18–19.

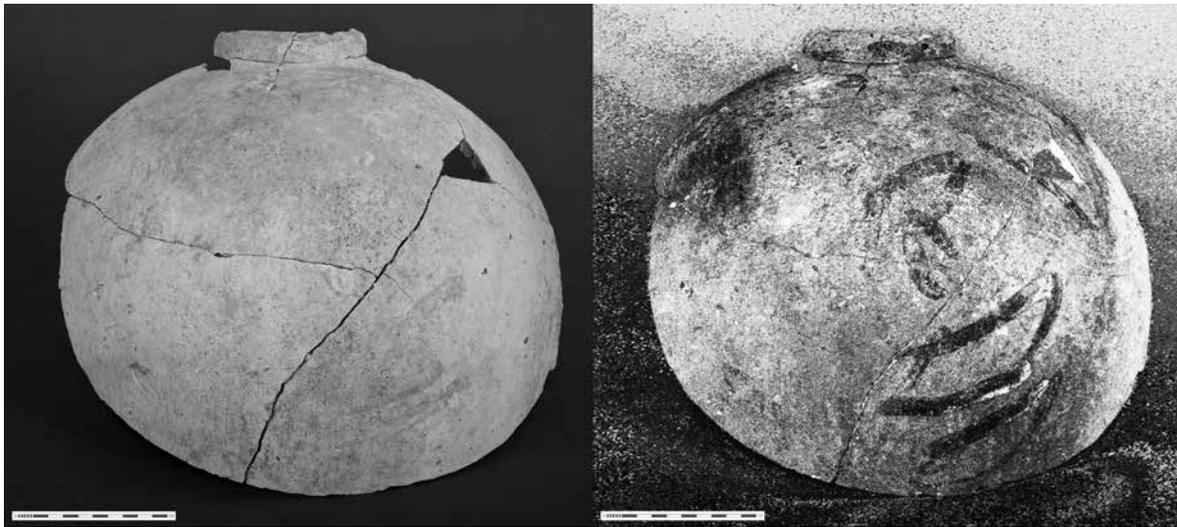


Fig. 28. Chipped off red inscriptions on the body of a local jar (type T3) found on the seashore, in building 1 in Zone 5. The use of D-Stretch software (right) helps to reveal the red color and bring out a mark almost invisible to the naked eye (photograph: G. Pollin/Wadi al-Jarf archaeological mission).

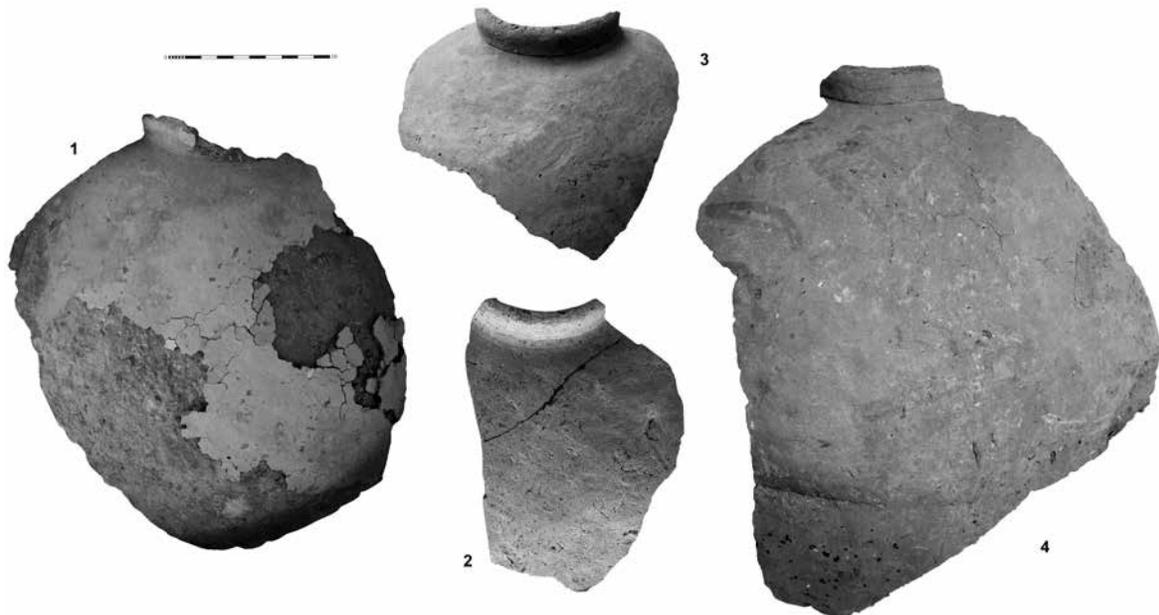


Fig. 29. Comparison of globular jars discovered at Tell Ras Budran, identified as so-called "Sinaitic ware," and two examples of local jars from the workshop at Wadi al-Jarf (type T2 and T3). The shoulder of example 3 shows two signs *m3* and *w* of *m3-wrr* mark, well visible thanks to the deep traces left in the fresh clay by the brush hairs (1 and 2 after Mumford, "Ongoing investigations," fig. 7, and Mumford, "Preliminary Findings," fig. 20; 3 and 4 photograph: G. Marouard/Wadi al-Jarf archaeological mission).

Those storage jars were also regularly (about 40%) marked before firing, not only with potters' incised marks (fig. 30), but also with red inscriptions that correspond to several teams' names.³⁶ Two of the three identified marks do not leave any doubt about the date of these containers:

- One is a formula built on the Golden Horus name of Khufu:  *rhw bjk.wy nbw*, "those who are known of 'Two Falcons of Gold (Khufu)'" (figs. 25 and 27.1).³⁷
- The other, by far the most common on the site, is the team name:  *m3-wrr (m3<=s> wrrt Hmn-hw=f-wj)* also constructed with the name of King Khufu (figs. 26, 27.2, 27.3, 28).³⁸ This one also appears on several *dipinti* (fig. 27.4) and at least on one of the papyri that also mentions the latest known regnal year (Year 26 or 27) of Khufu (fig. 27.5). These markings give us an exceptional *terminus* that ensures one more time that the pottery production dates at the very last to the end of the reign of Khufu and under no circumstances beyond that date.³⁹

In the coastal area, as a result of salt incrustations and the long time spent in moist conditions, those red inscriptions have frequently chipped off despite their durability. The use of the free software called D-Stretch© enables us to clearly demonstrate that the red marks always remain in an altered but perceptible form (fig. 28).

As far as the Old Kingdom or the Nile Valley are concerned, no ceramic production has been as well-dated before and by as many convergent archaeological and epigraphic elements as the pottery produced at the Wadi al-Jarf workshop. It can therefore be summarized as follows:

- There is for this ceramic production a peculiar and so far unique kind of marl clay, specific for this site and with no equivalent in the Nile Valley or in the Sinai area (where, unlike at Wadi Jarf, which is in a limestone environment, the landscape is dominated by sandstone and metamorphic rocks from the Precambrian and Paleozoic deposits).
- This local production appears at the very first phase of occupation in all the areas of the site and it can be found already during the excavation and commissioning phase of the galleries in Zone 1, where the workshops had been settled.
- The markings on the jars, *dipinti*, or red marks made before firing, emphasize a production exclusively linked to teams of workmen involved in the site activities and mining expeditions during the time of Khufu.
- The destruction of the kilns and the discards of potters' tables denote a definitive production shutdown at the time of the final closure of the galleries, at the extreme end of that reign (ca. year 26–27) as demonstrated by the *terminus* in the papyri.
- Because the occupation at the site is limited to the single reign of Khufu and considering that the local workshop did not functioned beyond the end of this reign, the Wadi al-Jarf offers a unique snapshot (non-existent in funerary and other contexts from the Nile Valley) for the ceramic assemblages from early Dynasty 4 (over a short period of 25 years at most), which proves to be valid for both imported ceramics from the Nile Valley as their copies that had been produced locally.
- The periodic retrieval and reuse of complete containers during subsequent expeditions remains a strong possibility, but this probably does not extend beyond the reign of Khafra which is the very last Pharaonic ruler attested at the Wadi al-Jarf.

³⁶ Those marks have been made on the jars, generally on the shoulder area, before that they were placed in the oven. The scribes used a liquid clay, rich in iron oxides and originally greenish in color, that turns red to reddish brown or dark green when over fired (fig. 26). For a preliminary analysis of the incised potters' marks, Marouard, "Un nouvel atelier de potiers," forthcoming.

³⁷ Tallet, Marouard, and Laisney, "Un port de la IV^e dynastie," 418–19, Table 1, fig. 25; Tallet, "The Wadi al-Jarf Site," 81, fig. 8; idem, "Ayn Soukhna and Wadi el-Jarf," 153, fig. 23.

³⁸ Tallet, Marouard, and Laisney, "Un port de la IV^e dynastie," 419–21, Table 1, fig. 25; Tallet, "Des serpents et des lions," 248–50.

³⁹ As mentioned above, the pottery kilns had been destroyed at the latest during the final closure of the galleries, the chronological *terminus* offered by the papyri therefore applies also for them.

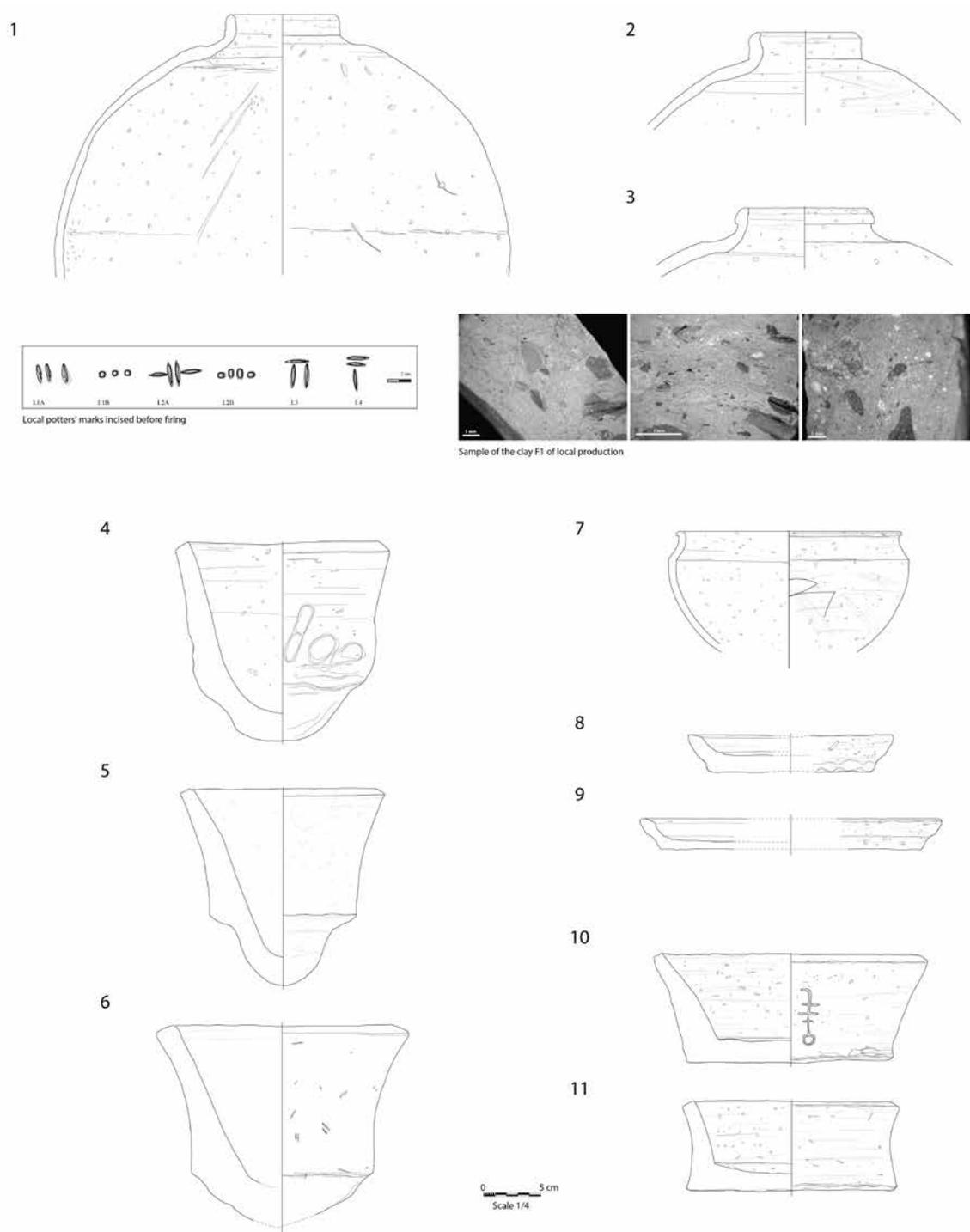


Fig. 30. Selection of pottery locally produced at Wadi al-Jarf found at Zones 5 and 6 (drawings: A. Bats and G. Marouard/Wadi al-Jarf archaeological mission).

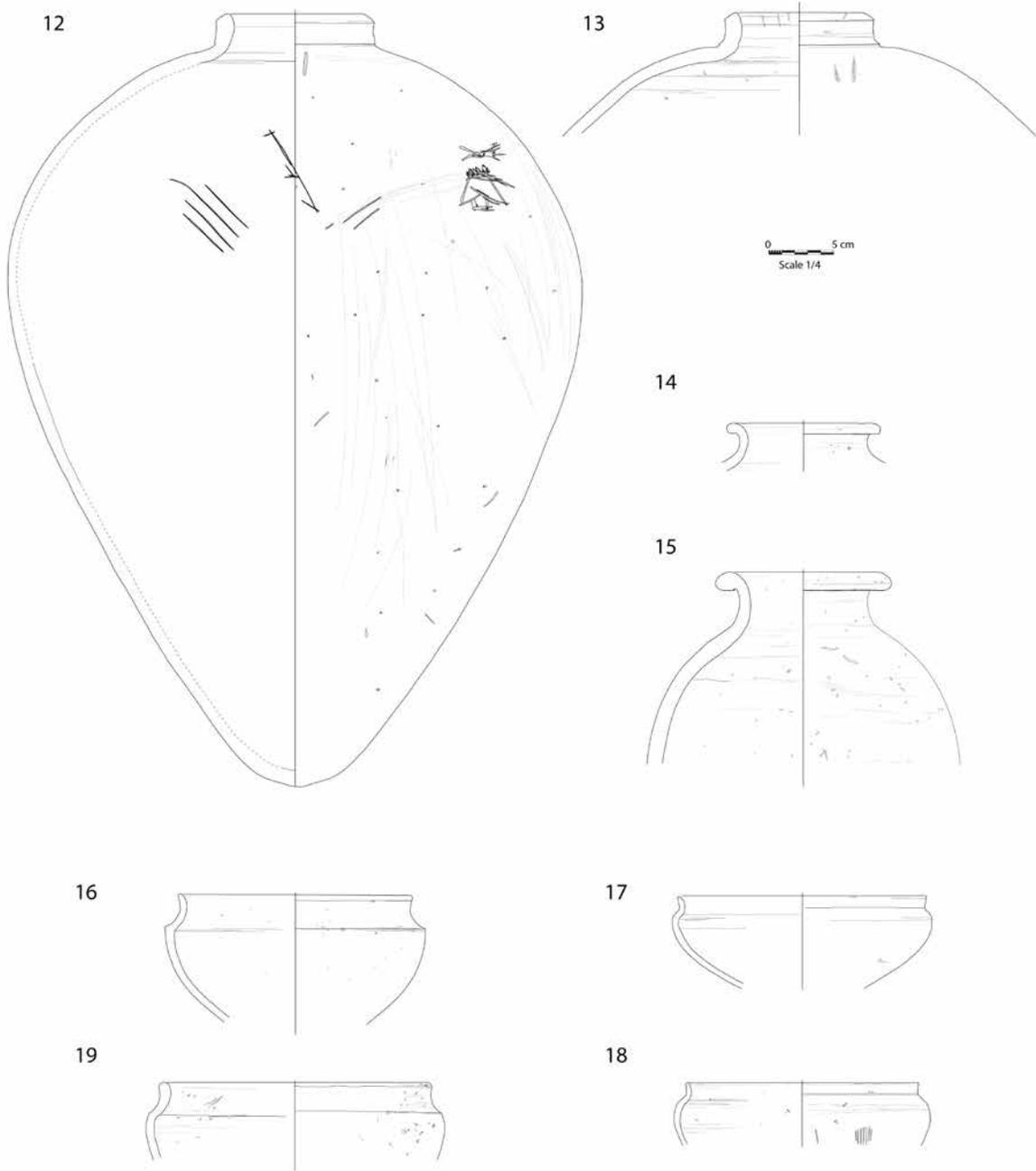


Fig. 31. Selection of pottery imported from the Nile Valley found at Zones 1, 5 and 6 (drawings: A. Bats and G. Marouard/Wadi al-Jarf archaeological mission).

Table 1. Summary table of the pottery presented in figures 30 and 31.

| # | Nomenclature | Zone | Unit | Context | Dimensions | Fabric | Parallels |
|----|---|------|--------|-----------------------|-------------------------------|---------|--|
| 1 | Globular storage jar (type T1) | 5 | 509-05 | Room 14 - Phase 2 | Rim 10.2 cm Ø max 40.0 cm | F1 | Prototypes : # 12 and # 13. |
| 2 | Globular storage jar (type T2) | 6 | 166-05 | Cell 4 - Phase 2 | Rim 9.9 cm | F1 | |
| 3 | Globular storage jar (type T4) | 6 | 151-07 | Building 1 - Phase 2 | Rim 12.2 cm | F1 | Hartung, et al., "Tell el-Fara 'in-Buto 9," fig. 12/3; Bréand, "Prefiring Potmarks," fig. 9/8. |
| 4 | <i>Bedja'</i> bulbous base bread mold | 6 | 177-01 | Building 1 - Phase 1b | Rim 18.4 cm height 17.4 cm | F9 | Alexanian, <i>Dahschur II</i> , fig. 51. |
| 5 | <i>'Bedja'</i> bulbous base bread mold | 6 | 176-01 | Building 1 - Phase 2 | Rim 18.0 cm height 17.3 cm | F9 | Faltings, "Die Keramik," fig. 3/c; Willems, et al. "An Industrial Site," fig. 11/a. |
| 6 | <i>'Bedja'</i> bulbous base bread mold | 6 | 120-01 | Building 1 - Phase 2 | Rim 22.1 cm height 17.8 cm | F9 | Vereecken, "About Bread Moulds and Bread Trays," fig. 2/a (type BM1.A); Wodzinska, "Domestic and funerary," fig. 2 (type F2B); Baue <i>et al.</i> "Le cimetièrre F," fig. 15/33. |
| 7 | Sharp shouldered carinated bowl ('Meidum bowl') | 6 | 162-03 | Building 2 - Phase 1b | Rim 19.8 cm Ø max 21.1 cm | F1 fine | Köpp, "Die rote Pyramide," fig. 1 (Z549); shape similar to the WCB in Vereecken, "About Bread Moulds and Bread Trays," fig. 8. |
| 8 | <i>Dokka</i> bread tray small diameter | 6 | 152-03 | Building 2 - Phase 2 | Rim 18.1 cm height 3.3 cm | F9 | Vereecken, "About Bread Moulds and Bread Trays," fig. 5/a (type BT1); Baue, et al. "Le cimetièrre F," fig. 14/21-22; Willems <i>et al.</i> "An Industrial Site," fig. 11/c. |
| 9 | <i>Dokka</i> bread tray large diameter | 6 | 162-01 | Building 2 - Phase 1b | Rim 26.5 cm height 2.7 cm | F9 | Wodzinska, "Domestic and funerary," fig. 19 (type F1A); Willems, et al. "An Industrial Site," fig. 11/d. |
| 10 | Deep bread tray | 6 | 117-01 | Building 2 - Phase 1b | Rim 24.0 cm height 9.7 cm | F9 | Willems, et al. "An Industrial Site," fig. 11/f. |
| 11 | Deep bread tray | 6 | 107-01 | Building 1 - Phase 1b | Rim 19.0 cm height 7.9 cm | F9 | Vereecken, "About Bread Moulds and Bread Trays," fig. 5/d (type BT4); Rowland, et al., "Old Kingdom Settlement," fig. 17b. |

Local production

| Nile Valley production | | | | | | | | | |
|------------------------|--|---|---------|-----------------------|--|--|-----|--|--|
| 12 | Globular storage jar (type T40) | 5 | 509-01 | Room 14 - Phase 2 | | Rim 12.2 cm Ø max 44.3 cm height 59.7 cm | F14 | Hartung, et al., "Tell el-Fara 'in-Buto 9", fig. 10/6, 12/1; Faltings, "Die Keramik," fig. 12-C/A54; Stadelmann and Alexanian, "Die Friedhöfe," fig. 6/9; Alexanian, <i>Dahschur II</i> , fig. 44/S.5, 47/G6, 57/M.68, M69, M78, M89; Alexanian "Knrickpyramide in Dahschur," fig. 19/o and t; Köpp, "Die Rote Pyramide," fig. 5/Z551. | |
| 13 | Globular storage jar(type T40) | 1 | 4000-01 | Gallery G23 | | Rim 11.6 cm | F14 | | |
| 14 | Ovoid jar with short neck and rolled rim | 6 | 108-01 | Building 1 - Phase 2 | | Rim 11.8 cm | F11 | Marchand, "Abou Rawash," Class 22 (Ifao 277). | |
| 15 | Ovoid jar with short neck and rolled rim | 6 | 162-02 | Building 2 - Phase 1b | | Rim 13.6 cm Ø max 24.1 cm | F8 | Kaiser, et al., "Stadt und Tempel von Elephantine," fig. 40/5. | |
| 16 | Sharp shouldered carinated bowl (' <i>Meitum bowl</i> ') | 6 | 162-01 | Building 2 - Phase 1b | | Rim 18.1 cm Ø max 20.1 cm | F2 | Hartung, et al., "Tell el-Fara 'in-Buto 9," fig. 11/9; Vereecken, "About Bread Moulds and Bread Trays," fig. 6/b; de Meyer, et al., "The Early Old Kingdom at Nuwayr t," fig. 4 (N2/A); Kaiser, et al., "Stadt und Tempel von Elephantine," figs. 38/1, 39/1. | |
| 17 | Carinated bowl | 6 | 151-02 | Building 2 - Phase 2 | | Rim 19.2 cm Ø max 20.0 cm | F2 | Köpp, "Die rote Pyramide," fig. 5/Z594; Stadelmann and Alexanian, "Die Friedhöfe," fig. 3/14. | |
| 18 | Carinated bowl | 1 | 1038-03 | Gallery G5 | | Rim 18.0 cm Ø max 19.8 cm | F2 | Stadelmann and Alexanian, "Die Friedhöfe," fig. 8/DAS38. | |
| 19 | White carinated bowl (type CD 7 elongated) | 1 | 1038-01 | Gallery G6 | | Rim 21.1 cm Ø max 23.0 cm | WCB | Wodzinska, "White Carinated Bowls," fig. 10; Vereecken, "About Bread Moulds and Bread Trays," fig. 8. | |

It is not surprising also that this production has modestly been distributed along the routes used by the mining expeditions of the beginning of Dynasty 4 (fig. 2). Satellite remote sensing and ground survey conducted in 2015 in the Southern Wadi Araba, led to the discovery of the access road from the Nil Valley (from the Meidum area) to Wadi al-Jarf.⁴⁰ At least on three different stopping points along this trail, pottery assemblages from the early Dynasty 4 have been found, which include several fragments of ceramics produced at Wadi al-Jarf. More recently other fragments were also identified in several cellular installations (WS10) excavated in the Wadi Sannur area,⁴¹ mainly sherds of small-size pots and easily transportable functional forms such as the carinated bowls.

The close comparison of the storage jars manufactured at Wadi al-Jarf to the two published examples of a jars identified as so-called “*Sinaitic ware A*” by G. Mumford and R. Hummel,⁴² clearly demonstrates that the containers found on both sides of the Gulf of Suez are the same types made with the same peculiar marl clay (fig. 29).

In our opinion, it is beyond any doubt that the identical jars found at Tell Ras Budran, which constitute more than 80% of the pottery found there, came directly from the Wadi al-Jarf harbor, which implies a Dynasty 4 date for the fortress site, and not exclusively a late Old Kingdom date as has been previously suggested by archaeologists.

5. Tell Ras Budran, the Logical Extension of the Wadi Jarf Harbor System

The fortified structure at Tell Ras Budran had already been the subject of several presentations, therefore, we will not repeat here in detail its architectural specifications, but we will focus instead on its chronology and function that must be reconsidered.

Discovered by B. Rottenberg in 1967–1968,⁴³ it was explored by G. Mumford and S. Parcak during three seasons of survey and excavation in 2002, 2004, and 2008, and a study mission in 2010.⁴⁴ Now located 200 m from the shoreline it takes the shape of a large circular structure, measuring 44 meters in diameter with a usable internal space of 22 m in diameter (ca. 1250 m²). The enclosure wall has been preserved at about 3.5 m high in the less destroyed portions and it has a considerable width of 7 m in at the base.⁴⁵ Mumford also mentions two main architectural phases, the construction of the precinct, then a consolidation phase characterized seemingly by a sloped interior wall lining built on the inner face with a second row of different blocks that form a retaining wall in order to reduce the instability of the first one.⁴⁶ Facing the sea, a complex entrance system has been found, with a gate built into the

⁴⁰ Yann Tristant and Gregory Marouard, “Rapport d’activité 2014–2015. Le Survey du Ouadi Araba 2015,” *Supplément au BIFAO* 115 (2015), 20–24.

⁴¹ François Briois and Béatrix Midant-Reynes “Rapport d’activité 2014–2015. Ouadi Sannur 2015,” *Supplément au BIFAO* 115 (2015), 49–55.

⁴² Mumford and Hummel, “Preliminary Findings,” 66–67, 70–71, fig. 20; Gregory Mumford, “Ongoing Investigations at a Late Old Kingdom Coastal Fort at Ras Budran in South Sinai,” *JAES* 4.4 (2012), 20–28 (see fig. 7). See also the report by Roxine Hummel, *Ras Budran Ceramic Report 2008 Season*, 1–2 (available online, see *supra* n. 27).

⁴³ Benno Rothenberg, “An Archaeological Survey of South Sinai. First Season 1967/1968. Preliminary Report,” *PEQ* 102 (1970), 4–29 (see 18, 25, fig. 5).

⁴⁴ Mumford, “Tell Ras Budran (site 345),” 13; idem, “Ongoing Investigations,” 20; Mumford and Hummel, “Preliminary Findings,” 52–53. See also, Gregory Mumford and Sarah Parcak, “Pharaonic Ventures into South Sinai: El-Markha Plain Site 346,” *JEA* 89 (2003), 83–116; Mumford, “Ras Budran and the Old Kingdom Trade,” 107–45; idem, “Explorations in El-Markha Plain,” 91–115.

⁴⁵ Mumford, “Tell Ras Budran (site 345),” 16, 22,

⁴⁶ Mumford, “Tell Ras Budran (site 345),” 24, figs. 13 and 15; Mumford and Hummel, “Preliminary Findings,” 55, figs. 4 and 7. Even though the idea of the two building phases is attractive, the exact date of when this strengthening wall had been added remains uncertain. The lack of details in the published reports allows for the possibility to consider such a doubling of the wall as another example for the technique of “accretion layers” (several walls layers, all of them are synchronous but generally with different foundation levels) that is a typical characteristic for the architecture of enclosure walls since the early Old Kingdom. The lining represents in that case only one step in the construction process of the enclosure and should not be considered necessarily as a second rebuilding phase.

thickness of the enclosure that is marked by a long corridor roofed with monolithic limestone lintels. On the southern side of this entrance a long perpendicular wall was built outside of the precinct, a sort of long bastion which measures 11 m in length and 4 m wide. If a defensive function of the entrance had been originally intended, the current interpretation by the excavators of this wall as a “quay” wall and a “shelter” place for boats, seems largely overestimated considering the distance from the seashore and the relatively modest dimensions of this wall.⁴⁷ Inside, on the southern side of the entrance gate, a straight staircase was found—with six steps preserved—allowing access to the top of the enclosure wall.⁴⁸ As evidenced by multiple postholes, at least in the western half, a structure of beams on posts apparently stood inside, with the aim to provide some shade. This part is combined with negative prints of storage jars bases on the floor. It appears that this lightweight construction was voluntarily dismantled.⁴⁹ At some point, the main entrance corridor had been closed at both its western and eastern end with a wall carefully mounted with limestone blocks and *muna* mud-mortar.⁵⁰ Inside the fortress, the face of the eastern closing wall was finally covered with a thick and sloping layer of large pebbles, that gives the appearance of a coarse ramp,⁵¹ but this is an unlikely function and therefore this interpretation remains quite unsatisfactory.

It must be underlined that the choice of the fortress location is not at all “a poor placement” as emphasized by the excavators.⁵² Placed exactly opposite to the harbor at the Wadi al-Jarf, this location is ideal for several reasons:

- The Al-Markha plain is the only possible point of disembarkation after a lengthy series of cliffs—the mountain of Hamman Fara’un—which prohibits any disembarkation further north along a stretch of over 30 km in length.
- The structure at Tell Ras Budran is located in one of the few places in this part of the Al-Markha coastline which is characterized by a sandy seabed, with no coral reefs as can be seen further south. Therefore, the area can be considered here (and for about 3 km) as a place for safe berthing and easy anchorage.
- Another important strategic element is the presence of a water source at Bir Markha, perhaps significant in ancient times, situated a little more than 4 km to the northeast, as well as multiple water resurgences and large draining *wadis*.

As for the harbor area of Wadi al-Jarf, the choice of the fortress location seems to be the conjunction of several favorable conditions: good environmental factors, an immediate proximity to the access points towards the mining sites, and as pointed out by Mumford, the proximity of construction materials.⁵³ For all these reasons it seems also hard to imagine the existence of a group of such structures throughout the Al-Markha plain area, especially if visible circular anomalies on satellite photos, interpreted somewhat hastily by S. Parcak as possible other fortresses, did not result in any archaeological confirmation on the ground.⁵⁴ While the idea that the “*Wadi al-Jarf is closely linked with the Old Kingdom turquoise mining*

⁴⁷ Mumford, “Ongoing Investigations,” 20; Mumford and Hummel, “Preliminary Findings,” 64. Even with a sea level that had been about 30 to 50 cm higher—as was demonstrated at the Wadi al-Jarf—the door of the fortress would still be 2.40 m above sea level and situated at a distance of about 150 m from the shore (200 m today).

⁴⁸ Mumford, “Tell Ras Budran (site 345),” 23, figs. 4 and 6.

⁴⁹ Mumford, “Tell Ras Budran (site 345),” 25–26; Mumford and Hummel, “Preliminary Findings,” fig. 2.

⁵⁰ Mumford, “Tell Ras Budran (site 345),” 24–25, 29, figs. 13 to 16 and 15; Mumford and Hummel, “Preliminary Findings,” 59, 63–64, figs. 13–14 and 16–18.

⁵¹ Mumford, “Tell Ras Budran (site 345),” 17, 28–29, figs. 12–16; Mumford, “Ongoing Investigations,” 20–21; Mumford and Hummel, “Preliminary Findings,” 64, fig. 17.

⁵² Mumford and Hummel, “Preliminary Findings,” 52.

⁵³ Mumford, “Tell Ras Budran (site 345),” 47; Mumford and Hummel, “Preliminary Findings,” 64, fig. 19.

⁵⁴ Mumford and Parcak, “Pharaonic Ventures,” 102, 112–16, pl. 7; Gregory Mumford and Sarah Parcak, “Satellite Image Analysis and Archaeological Fieldwork in El-Markha Plain (South Sinai),” *Antiquity* 76, no. 294 (2002), 953–54; Parcak, “A Satellite Survey of El-Markha Plain,” 84–88, figs. 3–4. In this regard, the assertion for many years now by Parcak about the existence—according to Google Earth images—of two other potential fortresses in the Al-Markha plain require stringent field verifications because these installations seem highly questionable and are probably modern (i.e., wells or depressions in relation to the intense

anchorage at Ras Budran, which is 50 km to the east across the Red Sea and has yielded many identical examples of marl storage jars,”⁵⁵ as was mentioned by Mumford in 2012, he also constantly maintains the idea of a long duration for the occupation at the Wadi Jarf and the exclusively late Old Kingdom date for the Tell Ras Budran fortress.⁵⁶ This last hypothesis has unfortunately by now become deep-rooted assumption and is repeated even in the secondary literature about the history of Egyptian fortifications.⁵⁷ As demonstrated above, the occupation at Wadi al-Jarf is only limited to the reign of Khufu with an ultimate final appearance at the site under the reign of Khafra, at least 250 years earlier than the dates proposed by Mumford for the fortress. We are seeking to demonstrate here that the suggested late Old Kingdom date must be reconsidered.

The fortress at Tell Ras Budran is, on the western shore of the Sinai, the natural extension and the secure beachhead of the port site at Wadi al-Jarf. They are both parts of the same expeditionary complex with a symmetrical history. This construction is under no circumstance a purely military structure related to a phenomenon of “*fortification of Egypt*” and even less related to “*the collapse of Levantine cities at the end of the Old Kingdom*” as suggested in Mumford’s publications and lectures.⁵⁸ This argument should be firmly abandoned for two principal reasons:

- The “*collapse of the cities in the Levant*” has been debated and can now be re-dated, according to new calibrated C14 dates, as has convincingly been demonstrated by F. Höflmayer who places this episode much earlier than before, ca. 2600 to 2500 BC.⁵⁹ This proves that there is no link at all between the collapse in the Levant and the end of the Old Kingdom Egypt, and there was no need for a fortification on the western coast of the Sinai at this time.
- Almost all of the ceramics published from the excavation of the fortress date back mainly to the Dynasty 4 and over 80% of the pottery found at this site⁶⁰ show a peculiar fabric which correspond to the workshop at Wadi al-Jarf described above.

It has been correctly mentioned in the early reports of Tell Ras Budran that the fortress only sees a “*short term occupation, perhaps of a year.*”⁶¹ The chronological sequence presented in the 2006 and 2015 preliminary reports highlights at least three important phases.⁶²

oil activities in this area). In her most recent article, the precise location of these structures with coordinates could probably have been helpful to the reader in order to form his/her own opinion. So, after rechecking the images available on Google Earth but also on the Corona satellite images online (08/13/1968), which have revealed absolutely nothing at these locations, her two examples can be found respectively at coordinates 28°57'18.24" N–33°10'22.24" E and 28°50'56.80" N–33°10'34.57" E. For the structure that she shows on figure 4, which was cleverly framed and which is designated as “does not seem to be a recent construction,” the previous snapshot (07/23/2003) to the one published (12/25/2005) indicates the presence of many modern peripheral activities, or stagnant water inside these dug holes, visibly mechanically produced as underlined in the parallel tracks left by bulldozers. Furthermore, it seems worthy of note that this structure is now (02/22/2016) partially destroyed by the same bulldozer activities. For comparison, a similar modern hole appeared in the area around 2010, visible at the following coordinates: 28°56'17.21" N–33°10'53.14" E.

⁵⁵ Gregory Mumford, “Ras Budran and the Old Kingdom Trade in Red Sea Shells and Other Exotica,” *BMSAES* 18 (2012), 107–45 (see 112).

⁵⁶ This exclusive date is repeated innumerable times in each one of his publications. For the latest conclusions about the chronology at Tell Ras Budran, Mumford and Hummel, “Preliminary Findings,” 52, 75 (“None of the other pottery shapes from either the floor surface or in the overlying campsites contradict the Late Old Kingdom [to First Intermediate Period] date”).

⁵⁷ Franck Monnier, *Les forteresses égyptiennes: du pré-dynastique au Nouvel Empire* (Brussels, 2010), 39, 168–70; Carole Vogel, *The Fortifications of Ancient Egypt 3000–1780 BC* (Oxford, 2010), 6–7.

⁵⁸ Mumford, “Tell Ras Budran (site 345),” 55–59; Mumford and Hummel, “Preliminary Findings,” 64, fig. 19.

⁵⁹ Felix Höflmayer, “Dating Catastrophes and Collapse in the Ancient Near East: The End of the First Urbanization in the Southern Levant and the 4.2 ka BP Event,” in Lorenzo Nigro, ed., *Overcoming Catastrophes, Essays on Disastrous Agents Characterization and Resilience Strategies in Pre-classical Southern Levant*, ROSAPAT 11 (Rome, 2014), 117–40; idem, “The Southern Levant, Egypt, and the 4.2 ka BP Event,” in 2200 BC, *A Climatic Breakdown as a Cause for the Collapse of the Old World? Tagungen des Landesmuseums für Vorgeschichte Halle* 12/1 (2015), 114–30.

⁶⁰ Mumford and Hummel, “Preliminary Findings,” 70–71.

⁶¹ Mumford, “Tell Ras Budran (Site 345),” 28.

⁶² Mumford, “Tell Ras Budran (Site 345),” 22–29, Mumford and Hummel, “Preliminary Findings,” 53, 55.

- A phase anterior to the construction of the fortress (Phase 1), which would only slightly precede it in time.
- The first phase of occupation (Phase 2a), which follows naturally the construction of the fortress, marked by a layer of occupation containing ashes and organic debris. This floor level was then covered with a compacted natural layer of windblown sand which marks a *hiatus* in the occupation.
- A subsequent floor phase (Phase 2b) must be regarded as the second stage of the main occupation, at least the last one that has left any significant *in situ* traces before the abandonment. It is not guaranteed that this phase should correspond to the doubling of the internal face of the wall but it was at least curiously associated with the closure of both sides of the entrance corridor, which means—according to the archaeologists—that the fortress would have remained in use and was only accessible at that point by using a ladder (?).
- Under the so-called “*repeated blows of Bedouin*” or “*waves of assaults*” on the fort, a third sub-phase (Phase 2c), undated and with no apparent occupation, would have seen the deposition of a thick layer of large pebbles against the internal face of the eastern closing wall of the corridor.
- Finally, after the final abandonment of the site (Phase 3a), followed immediately by a massive natural sand filling of the entire structure, a series of light campsite installations mark a later re-occupation, a third possible expedition, which is dated one more time like all the previous phases of occupation to the late Old Kingdom by Mumford. This would have also involved a partial dismantling of the structure with a recovery of building materials.⁶³

If one attempts some adjustments, this sequence seems quite similar to the one presented above for the seafront installations and Zone 5 building at Wadi al-Jarf. The main difference would probably be the general chronology and the interpretation of the closure of the main entrance door at Tell Ras Budran. It is evident that this is not a closure made in haste but a carefully prepared closing, certainly made during the departure with first a blocking to the east of the corridor, with a final sealing by adding a thick layer of cobblestones,⁶⁴ then a hermetic wall that closed off the western end of the corridor. The argument that the closure of the corridor would be a safety measure against the attacks quickly occurred after the initial construction and was then compensated by the use of a ladder to climb into the enclosure seems extremely unlikely and does not follow any logic in polioretic strategy. This closure of the fortress without any signs for the reopening clearly suggests a definitive abandonment which shows similarities with the massive closure system of the storage galleries in Zone 1 at Wadi Jarf, at the end of the reign of Khufu,⁶⁵ and the systematic blocking of the entrances of the ‘dormitory’ building in Zone 5 or else the storage of one hundred boat anchors in Building 1 in Zone 6. All these operations at Wadi al-Jarf belong to the same official shutdown event and such a phenomenon is likely, therefore, found on the other side of the Gulf of Suez.⁶⁶

⁶³ Mumford, “Tell Ras Budran (site 345),” 29; Mumford and Hummel, “Preliminary Findings,” 53, 60. The reader should refer to the article in *BASOR* to form an opinion about the organized dismantling of the fort, already filled with natural sand, in order to prevent its recovery by the “Bedouins” against the interests of the Egyptians. As observed at Wadi al-Jarf, an opportunistic dismantling for the reuse of blocks in neighboring installations would be a more reasonable interpretation. The “new idea” of a closure of the corridor in order to use it as storage space as has recently been proposed by Mumford also appears unlikely and is largely extrapolated on the basis of an inadequate comparison to the storage galleries that can be found at port sites (Mumford and Hummel, “Preliminary Findings,” 64). This is also the case for his suggestion of an “early protection to prevent sea sprays or waves” (Mumford and Hummel, “Preliminary Findings,” 63) considering the distance (150 to 200 m) of the seashore.

⁶⁴ It consists of small and medium pebbles, easy to pass from hand to hand by making a human chain, maybe thrown from the top of the wall and the top of the corridor in order to reinforce the inner part of the closure. Those pebbles have apparently given the impression to the archaeologist that the fortress was closed from the inside.

⁶⁵ Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 406–7, figs. 10, 13–16; Tallet and Marouard, “The Harbor of Khufu,” 4–5, fig. 3; Tallet, “The Wadi al-Jarf Site,” 81; idem, “Les ‘ports intermittents’ de la mer Rouge,” 63.

⁶⁶ It should also be noted that this careful closing of the doors was also observed at the Kom 14 sector at Ayn Soukhna for several Old Kingdom installations whose possible official occupation stretches from the middle of Dynasty 4 to the end of Dynasty 5

Indeed, the site of Tell Ras Budran was clearly marked by a short occupation, with at least two major phases of occupation⁶⁷ and then a final and careful closure, followed by a rapid sand encroachment and a very brief re-occupation, according to a process that corresponds fairly well to the occupation sequences recorded in Zones 5 and 6 at Wadi al-Jarf.

In addition to the stratigraphic sequences which are particularly close, the ceramic assemblages discovered at the site of Tell Ras Budran indicate, in our opinion, an exclusive date of the Dynasty 4 based on several published drawings. The pottery shapes presented in both *BASOR* 2006, *JAEI* 2015 and unpublished reports available online do not present any form that can reasonably be considered as a late Old Kingdom phase, unlike the strong conviction repeatedly stated by Mumford and Hummel.⁶⁸ Even though the ceramic corpus was for a long time underdeveloped for Dynasty 4 outside of the royal necropolis in the Memphite Region, this specific period has seen over the recent two decades a number of important studies and publications, for example from sites such as Dahshur,⁶⁹ Abusir,⁷⁰ Giza settlement areas,⁷¹ Abu Rawash,⁷² Deir el-Bersha area,⁷³ El-Kab,⁷⁴ Elephantine,⁷⁵ from Ayn Sukhna, and obviously Wadi al-Jarf for the Red Sea coast. They all offer a way to better characterize this period and in particular the transition between the end of the tradition characterizing the Dynasty 3 and the emerging tradition of Dynasty 4, which will develop later in Dynasty 5. It seems very difficult

(reign of king Unas). Mahmoud Abd el-Raziq, Georges Castel, Pierre Tallet, "Travaux de l'IFAO 2006–2007: 'Ayn Soukhna 2007," *BIFAO* 107 (2007), 328–29.

⁶⁷ Mumford and Hummel, "Preliminary Findings," 61.

⁶⁸ Mumford, "Tell Ras Budran (site 345)," 32–33, figs. 18–19; Mumford and Hummel, "Preliminary Findings," 66–75.

⁶⁹ Dina Faltings, "Die Keramik aus den Grabungen an der nordlichen Pyramide des Snofru in Dahschur Arbeitsbericht über die Kampagnen 1983–1986," *MDAIK* 45 (1989), 133–54; Rainer Stadelmann and Nicole Alexanian, "Die Friedhöfe des Alten und Mittleren Reiches in Dahschur," *MDAIK* 54 (1998), 292–317; Nicole Alexanian, *Dahschur II: Das Grab des Prinzen Netjer-aperf: Die Mastaba II/1 in Dahschur*. AV 56 (Mainz am Rhein, 1999); Nicole Alexanian, et al., "Untersuchungen am unteren Aufweg der Knickpyramide in Dahschur," *MDAIK* 68 (2012), 1–30; Heidi Köpp, "Die rote pyramide des Snofru in Dahschur: Bemerkungen zur keramik," in Teodozja Rzeuska and Anna Wodzinska, eds., *Studies on Old Kingdom Pottery* (Warsaw, 2009) 61–69.

⁷⁰ Katarína Kytarová, "Pottery from the Tomb of Hetepi," and "Pottery from the Anonymous Tomb AS 33," in Miroslav Bárta, et al., *Tomb of Hetepi (AS 20), Tombs AS 33–35 and AS 50–53*, Abusir 19 (Prague, 2010), 25–47, 82–107; idem, "Ceramic Finds," in Jaromír Krejčí, et al., *Mastaba of Werkaure*. Volume 1: *Tombs AC 26 and AC 32, Old Kingdom Strata* (Prague, 2014), 71–259. We wish to emphasize here that the catalog of the Mastaba of Werkaure proposed by K. Kytarová shows multiple forms strongly attributable to the Dynasty 4 and that some caution is needed about an exclusive Dynasty 5–6 date in light of the very recent discoveries of Dynasty 3 early 4 contexts in the area (such as the anonymous tomb AS33).

⁷¹ Anna Wodzinska, "Preliminary Report on the Ceramics," in Mark Lehner and Wilma Wetterstrom, eds., *Giza Reports: The Giza Plateau Mapping Projects*. Volume 1: *Project History, Survey, Ceramics, and the Main Street and Gallery III.4 Operations*, Giza Reports 1 (Boston, 2007), 283–324; idem, "Domestic and Funerary/Sacral Pottery from Fourth Dynasty Giza," in Teodozja Rzeuska and Anna Wodzinska, eds., *Studies on Old Kingdom Pottery* (Warsaw, 2009), 209–24; idem, "Work Organization in the Old Kingdom Pottery Workshop: The Case of the Heit el-Gurob Site, Giza," in Rzeuska and Wodzinska, *Studies on Old Kingdom Pottery*, 225–40; idem, "Khentkawes Town 2009: Pottery Overview," in Mark Lehner, ed., *Giza Plateau Mapping Project, Season 2009: Preliminary Report*, Giza Occasional Papers 5 (Boston, 2011), 173–82; idem, "Domestic and Votive Pottery from Giza: A View from Heit el-Ghurab Settlement and Khentkawes Town," in Bettina Bader and Mary Ownby, eds., *Functional Aspects of Egyptian Ceramics in Their Archaeological Context: Proceedings of a Conference Held at the McDonald Institute for Archaeological Research, Cambridge, July 24th–July 25th, 2009*, OLA 217 (Leuven, 2013), 165–84; Svetlana Malykh, "Pottery from the Rock Cut Tomb of Khafrankh in Giza," *CCE* 9 (2011), 185–213.

⁷² Sylvie Marchand, "Abou Rawash à la IV^e dynastie: Les vases en céramique de la pyramide satellite de Rêdjédef," in Rzeuska and Wodzinska, *Studies on Old Kingdom Pottery*, 71–94.

⁷³ Stefanie Vereecken, "An Old Kingdom Bakery at Sheikh Said South: Preliminary Report on the Pottery Corpus," in Nigel Strudwick and Helen Strudwick, eds., *Old Kingdom, New Perspectives: Egyptian Art and Archaeology 2750–2150 BC* (Oxford, 2011) 278–85; Marleen de Meyer, et al., "The Early Old Kingdom at Nuwayr t in the 16th Upper Egyptian Nome," in David Aston, et al., *Under the Potter's Tree: Studies on Ancient Egypt Presented to Janine Bourriau on the Occasion of Her 70th Birthday*, OLA 204 (Leuven, 2011), 679–702.

⁷⁴ Lies Op de Beeck, et al., "Early Old Kingdom Pottery from Excavations to the North of the Great Enclosure Wall at Elkab," in Wouter Claes, et al., eds., *Elkab and Beyond: Studies in Honour of Luc Limme*, OLA 191 (Leuven, 2009) 49–74.

⁷⁵ Dietrich Raue, "XVIII. Ägyptische und nubische Keramik der 1–4," in Werner Kaiser, et al., "Stadt und Tempel von Elephantine 25./26./27. Grabungsbericht," *MDAIK* 55 (1999), 173–89.

nowadays to hang on only to the typology established by Reisner for Giza,⁷⁶ and to invoke peculiar sites in the Dakhla Oases or to search in a preliminary article on West Saqqara⁷⁷ some forms from Tell Ras Budran that no longer existed during the late Old Kingdom and that did not even last beyond the end of Dynasty 4. The comparison made by Mumford and Hummel between an example of a carinated bowl⁷⁸ with a large mixing bowl from West Saqqara,⁷⁹ over 36 cm in diameter, illustrates the regular hesitations about the interpretation and the date of the ceramic assemblages from Tell Ras Budran.

On a functional point of view those two examples are not the same category of containers and, if the second example is undoubtedly attributed to the late Dynasty 5 and Dynasty 6 tradition, the example from Tell Ras Budran is particularly deep, of much smaller diameter (20 cm), with a carinated shoulder of a bigger diameter than that of the rim.⁸⁰ It presents a typical ‘Meidum Bowl’ profile still very marked by the tradition of Dynasty 3, which disappears after the reign of Khafra.⁸¹ This form is very common at Wadi al-Jarf, usually made with an alluvial clay, with a thick burnished red slip, and imported from the Nile Valley (fig. 31). It also appears to have been made in the Wadi al-Jarf workshop with the fine local marl clay F1 (figs. 23 and 30/7).⁸²

According to G. Mumford and R. Hummel the most prevalent ceramics at Tell Ras Budran are bread molds *bedja*, bread trays (*dokka*) and large storage jars both respectively made in so-called “*Sinaitic ware A and B*,” two marl clays which represent 85.5% of the sherds collected during the 2008 campaign (only 14.5% are imported from the Nile Valley).⁸³

The Sināi B fabric constitute only 3.87% of the potsherds and was “*used exclusively for manufacturing bread molds or basins.*” This clay is described as “*characterized by the presence of abundant angular sand [...] very poorly fired and tends to crumble easily.*”⁸⁴ The type of bread molds called ‘*bedja*’ found there have a large diameter (17–18 cm), a sort of conical profile, a beveled rim, a very marked and carinated lower contour with systematically a bulbous shape of the base that give them a very characteristic bell-shape. The assertion by Mumford and Hummel stating that these shapes “*remain unchanged unto the First Intermediate Period*” is a shortcut and the choice of low chronology is only intended to confirm the general

⁷⁶ George Reisner, *A History of the Giza Necropolis*, vol. 1 (Cambridge, MA, 1942); George Reisner and William Smith, *A History of the Giza Necropolis. Volume 2: The Tomb of Hetep-heres the Mother of Cheops* (Cambridge, MA, 1955).

⁷⁷ Teodozja Rzeuska, “West Saqqara: The Pottery, 2004,” *PAM* 16 (2004), 172–80. It should be mentioned that an extensive comprehensive catalog of her work on the late Old Kingdom pottery exists since 2006, idem, *Saqqara II. Pottery of the Late Old Kingdom: Funerary Pottery and Burial Customs* (Warsaw, 2006).

⁷⁸ Mumford and Hummel, “Preliminary Findings,” 75, figs. 26, 30/3, Table 4.

⁷⁹ Rzeuska, “West Saqqara,” fig. 9.

⁸⁰ Paradoxically, a very close example of a “Meidum Bowl” discovered in the western part of the fortress in 2004 and published in 2006 was properly dated to early Dynasty 4 with a comparison to examples from Giza and Kom el-Hisn, see Mumford, “Tell Ras Budran (Site 345),” 32, fig. 18/12, number 264.

⁸¹ Some recent studies on the carinated “Meidum Bowl” should be mentioned: Lies Op de Beeck, “Possibilities and Restrictions for the Use of Meidum-Bowls as Chronological Indicators,” *CCE* 7 (2004), 239–80; Anna Wodzinska, “Some Remarks on the So-Called ‘Meidum’ Bowls Found at Tell el-Fara’in-Buto,” in Joanna Popielska-Grzybowska, ed., *Proceedings of the First Central European Conference of Young Egyptologists: Egypt 1999: Perspectives of Research, Warsaw 7–9 June 1999* (Warsaw, 2001), 169–172. We should mention here that multiple fragments of the peculiar “white carinated bowl” (type CD7), a “reminiscences of the Meidum Bowl,” have been discovered in several areas of Wadi Jarf (fig. 31). This massive production from the Giza plateau has been dated so far to the end of Dynasty 4—Khafra and Menkaure—and has been discovered outside of the Giza necropolis only at Sheikh Said (Vereecken, “About Bread Moulds and Bread Trays,” 58, fig. 8). The main reference for this type is Anna Wodzinska, “White Carinated Bowls (CD 7) from the Giza Plateau Mapping Project: Tentative Typology, Use and Origin,” in Miroslav Bárta, Filip Coppens and J. Krejčí, eds., *Abusir and Saqqara in the Year 2005: Proceedings of the Conference Held in Prague, June 27–July 5, 2005* (Prague, 2006), 405–29; idem, “White Carinated Bowls and Dating of the Giza Plateau Mapping Project Site,” in Hana Vymazalová and Miroslav Bárta, eds., *Chronology and Archaeology in Ancient Egypt: The Third Millennium B.C.* (Prague, 2008), 111–23. More recently sherds of white carinated bowls have also been recovered at cemetery F at Abu Rawash (reign of Radjedef, mid-Dynasty 4), N. Moeller, personal communication.

⁸² Tallet, Marouard, and Laisney, “Un port de la IV^e dynastie,” 411, fig. 20.

⁸³ See *supra* n. 27. Mumford and Hummel, “Preliminary Findings,” 70–71, Table 1. These proportions are similar in the 2006 publication (Mumford, “Tell Ras Budran (site 345),” 32 and Table 2, for the description of the fabrics).

⁸⁴ Mumford and Hummel, “Preliminary Findings,” 66.

idea of a late Old Kingdom date for the fortress.⁸⁵ The very large majority of the bread molds dating to Dynasties 5 and 6, even more for the F.I.P., have a flat base and a gradually smaller diameter. The presence of a lower bell-shaped base is one of the main characteristics for the bread molds of Dynasties 3, 4 and a part of Dynasty 5. This bulbous base was produced during the mold shaping process over a wooden core and it is commonly agreed that this constitutes a major chronological criterion, generally in favor of the early Old Kingdom.⁸⁶

Even if ceramicists recently considered that the bulbous base still appears occasionally until the middle Dynasty 6 at the latest—and not the F.I.P.—with a majority of flat based bread molds, this assertion has been based on the now quite outdated context.⁸⁷ At Ayn Sukhna, all the bread molds from the mid-Dynasty 4 contexts present a bell-shape, in contrast to the Dynasty 5 contexts where all have a flat base and no coexistence of the two forms has been observed.

The bell-shaped bread molds at Tell Ras Budran are absolutely not an exception and they are undeniably a characteristic of the Dynasty 4 tradition.⁸⁸ All the examples published for this site present a bulbous base, all are locally made and no coexistence with flat base bread molds has been demonstrated so far, another point which increases the improbability here for a late Old Kingdom date.

At Wadi al-Jarf, all bread molds have been produced locally—in the sandy marl clay (fabric F9) as described above—and they present all without exception the same bell-shaped profile and the same dimensions between 16 to 18 cm in diameter (fig. 30).⁸⁹ Beside the poor clay preparation, a rather mediocre firing process was also regularly observed for these molds, that must have been naturally corrected by the bread baking process and their regular use in the fireplaces. This insufficient firing—also observed for the bread molds from Tell Ras Budran—gives them frequently the aspect of an unfired vessel, especially after an extended stay in moist and salty area on the seashore; a point that could probably explain the unique example of unbaked fragment discovered so far at the fortress.⁹⁰

Finally, the Tell Ras Budran ceramics are distinguished by a considerable volume of ovoid jars, which accounted for over 81.66% of the potsherds (4324 of the 5295 sherds) discovered during the 2008 campaign.⁹¹ Still according to the 2008 and 2010 reports, the jars were supposedly made with the so-called Sinai fabric A defined as follows:

⁸⁵ Mumford and Hummel, "Preliminary Findings," 71.

⁸⁶ This general shape corresponds to the types F2B of A. Wodzinska at Giza, type F1b of K. Kytarová at Abusir, or BM1 of S. Vereecken at Seikh Said. For some recent synthesis and recently published examples of bulbous base *bedja*: Dina Faltings, *Die Keramik der Lebensmittelproduktion im Alten Reich: Ikonographie und Archäologie eines Gebrauchsartikels*. Studien zur Archäologie und Geschichte Altägyptens 14 (Heidelberg, 1998), 125–55, figs. 9–10; Vereecken, "About Bread Moulds and Bread Trays," 55–57, figs. 2–3; Wodzińska, "Preliminary Report," 306–8, figs. 11–36 to 11–39; Leslie Anne Warden, *Pottery and Economy in Old Kingdom Egypt*, CHANE 65 (Leiden, 2014), 131–48, Stan Hendrickx, et al., "Milk, Beer and Bread Technology during the Early Dynastic Period," *MDAIK* 58 (2002), 277–304 (see 294–97, fig. 5); Katarína Kytarová, "Chronological Relevance of Bread Baking Forms: A Case Study from the Abusir South Cemetery," in Miroslav Bárta, et al., eds., *Abusir and Saqqara in the Year 2010*, vol. 1 (Prague, 2011), 200–222.

⁸⁷ The preliminary typology by Helen Jacquet-Gordon, "A Tentative Typology of Egyptian Bread Moulds," in Dorothea Arnold, ed., *Studien zur altägyptischen Keramik*, SDAIK 9 (Mainz am Rhein, 1981), 11–24, revised and augmented since by various other studies, considers Dynasty 6 as an extreme date for the *bedja* shape. But this study, like the recent study by Kytarová ("Chronological Relevance," 210), used the same reference: the publication of the work of F. Petrie and G. Brunton, *Sediment I*, pls. 29 and 32, for which archaeological contexts are really uncertain and cannot be considered as secured (pl. 29 used to illustrate a Dynasty 6 *bedja* shows an unsorted mix of potteries from the entire Old Kingdom).

⁸⁸ Mumford and Hummel, "Preliminary Findings," fig. 28.6. The recourse to the case of Ayn Asil/Balat—situated in the western desert oasis of Dakhla—is not admissible either. It is a peculiar oasis region that has experienced slower changes within the pottery corpus, where besides the bread molds never had bulbous bases in the late Old Kingdom either.

⁸⁹ Except for a few rare cases of large local oversized bread molds that are comparable to those found at Heit el-Ghorab/Giza (type F2c, Wodzińska, "Preliminary Report," 306, figs. 11–39), at Deir el-Bersha (type BM2, Vereecken, "About Bread Moulds and Bread Trays," 57, fig. 3) or very recently in still unpublished Dynasty 4 contexts from Dendara (Gregory Marouard, "Overview of the Site and Preliminary Results of the 2015 Oriental Institute Mission at Dendara," *The Oriental Institute News & Notes* 229 [2016], 4–16).

⁹⁰ Mumford, "Tell Ras Budran (site 345)," 33; Mumford and Hummel, "Preliminary Findings," 71, fig. 27.

⁹¹ Mumford and Hummel, "Preliminary Findings," 71. See *supra* n. 27.

Sinai A is a locally-made clay that is characterized by its abundant large, flat, slate inclusions. The matrix of the fabric is relatively well-levigated and dense and ranges in colour from pinky-orange (Munsell-5YR 6/4) to buff (Munsell 2.5YR 7/6). The core when visible is buff-coloured. The shale inclusions are often seen popping through the surface giving a decorative effect, somewhat like a terrazzo floor. This may have been intentional or just a product of local materials, but nonetheless attractive. The surface sometimes appears to have a white coating and it is unclear whether this is a result of the firing process, or the potter smearing water mixed with clay over the surface when he is finished producing the jar. The fired clay is soft and very light weight, and is used exclusively to make large neckless jars with wide shoulders and a rounded base.

The marl clay description above is really close, if not identical, to the F1 fabric from the Wadi al-Jarf which is primarily identifiable thanks to its abundant large and flat inclusions. Despite the lack of petrographic analysis,⁹² a significant proportion of the jars at Tell Ras Budran should consequently present regularly on the rim the potters' marks of the Wadi al-Jarf workshop (fig. 30) or fairly regular traces of the hieroglyphic red marks describe above.⁹³ As evidenced also by the stocky globular shape (ca. 55–60 cm high on 43–45 cm wide), round base and short rim (diam. 10–12 cm),⁹⁴ in all likelihood the storage jars at Tell Ras Budran were produced at Wadi al-Jarf and have come to the fortress with King Khufu's expeditions.

Even if the arguments of a same manufacture can still leave some doubts without a petrographic comparison, it is quite clear that this type of jar cannot in any way be considered as a form from the late Old Kingdom. The comparison made by Mumford between these large containers with very distant examples from Ayn Asil/Balat⁹⁵ (ca. 40 x 33 cm) or with an example of an ovoid jar from Saqqara⁹⁶ (ca. 30 x 26 cm) have to be rejected. Indeed, the examples from Tell Ras Budran—and therefore from Wadi al-Jarf—find their origins in an much older tradition that appears at least as early as Dynasties 2 and 3 and the most recent example ever discovered so far have been found in Djedefra's mortuary complex at Abu Rawash.⁹⁷ The prototype of this globular shape, usually made in a good quality marl clay or mixed clay, can be found at many sites of the Nile Valley, as such as at Buto (Dynasties 2 and 3),⁹⁸ Giza (Hetep-

⁹² Thirteen samples of the Wadi al-Jarf local clay are under treatment for petrographic study at the IFAO laboratory for material analysis. It may be added that the important similarities between these two fabrics on both sites have been confirmed to us several times by personal communication, in 2012 by R. Hummel in London, in 2016 by D. Donnelly (trench supervisor at Tell Ras Budran seasons 2002–2004) in Toronto, and in 2015 by the MoA inspector at Tell Ras Budran (seasons 2002–2004) Mr. Mustafa Rezk.

⁹³ A simple test made on digital photos from Tell Ras Budran for detecting eroded red marks is sufficient in order to confirm our hypothesis. In addition to D-Stretch, and because the jars were always marked before firing, it is very frequent to recognize the presence of a chipped off mark only with the deep traces left in the fresh clay by the brush hairs. Both *m3* and *w* signs of team *m33-wrr* mark are clearly visible on the shoulder of the jar on fig. 29.3 as it might be also distinguished on the jar of fig. 29.2 which comes from Tell Ras Budran.

⁹⁴ R. Hummel described those jars as follows: "The large, neckless jars with wide shoulders are handmade, a fact that is reflected in the rims that can vary in thickness and form on the same vessel. The rims do, however, appear to exhibit a standard aperture of nine centimeters. The fabric of the jars is very light weight, is porous to keep liquids cool but would break readily if handled roughly. [...] Their size and shape would make them excellent for storing water. Some of these jars have obscure signs incised into the exterior wall after they have been fired. Unfortunately, these marks have only been found on sherd fragments and are incomplete" (Ras Budran Ceramic Report Season 2008, 5, see *supra* n. 27).

⁹⁵ Mumford, "Tell Ras Budran (site 345)," 33.

⁹⁶ Mumford and Hummel, "Preliminary Findings," Table 2 (28:1 and 28:2), compared (?) with Rzeuska, "West Saqqara," 174, fig. 3 (this jar measures 29.5 cm high, 25.8 cm maximal diameter, rim 6 cm in diameter!).

⁹⁷ This unreleased material from the French Swiss excavations is being prepared for publication by Sylvie Marchand (IFAO).

⁹⁸ Christiana Köhler, *Tell el-Fara'in - Buto III: Die Keramik von der späten Naqada-Kultur bis zum frühen Alten Reich (Schichten III bis IV)*, AV 94 (Mainz am Rhein, 1998), 111, 136, pls. 3/9 and 53/7; Ulrich Hartung, et al., "Tell el-Fara'in-Buto 9. Vorbericht," *MDAIK* 63 (2007), 91–92, 95, figs. 10.6, 12.1 and 12.3.

Heres Tomb, early Dynasty 4),⁹⁹ El-Bersheh-Nuwayrat (Dynasties 3 and 4),¹⁰⁰ Abydos (Dynasties 1–3),¹⁰¹ Adaïma (Dynasty 3),¹⁰² El-Kab,¹⁰³ or at some Eastern Desert mining sites.¹⁰⁴ They are especially well-represented in several contexts at Dahshur,¹⁰⁵ a site which shows the closest comparison to the pottery assemblages found at Wadi al-Jarf. Jars identical to those from Dahshur were also found several times stored in small quantities with about 220 complete local jars in the G23 gallery (fig. 31/12)¹⁰⁶ or broken *in situ* at the entrance of Room 3 in the large building at Zone 5 (fig. 31/12).

At Tell Ras Budran there is also a very characteristic example of a rim of a prototype from the Nile Valley that appeared during the 2004 campaign.¹⁰⁷ This is evidently an extremely versatile kind of jar mainly assigned to the storage of water or dry food intended to be preserved in the galleries or protected from the sea water during the transportation across the Red Sea. Quite similar globular forms—all produced in the Nile Valley—occur in the earlier contexts at Ayn Soukhna, dating to the reign of Khafra,¹⁰⁸ and emphasize that these were a usual part of the equipment for the expeditionary operations during at least the first half of Dynasty 4.

The jars described above create a direct link between the two sites and especially certify that the fortress dates back from the beginning of Dynasty 4, emphasizing the fact that it was another component of the Khufu port complex; the bridgehead and the receiving hub of the Wadi al-Jarf harbor on the opposite shore and a logistic and secure rear base for the mining areas. After its abandonment, the fortress and the sandy seabed surrounding the area probably still served as a visual landmark and as a landing site.

6. Conclusion

The Tell Ras Budran/Wadi al-Jarf system should be considered as the first large-scale experimentation of an Egyptian harbor on the Red Sea, a development which was certainly too ambitious, overstated, and probably unsuited to the real needs of the royal expeditions at this period. Established just in front of the expeditions' target area, this harbor might have appeared, at the time of its creation, as a wise choice in order to cross quickly the sea (that not exceed 50 km here) and to get to the strategic area that

⁹⁹ Reisner and Smith, *Giza Necropolis II*, fig. 83.

¹⁰⁰ de Meyer, et al., "The Early Old Kingdom at Nuwayrat," 689–90, 699, fig. 4/N2–3 (comparable to the type T4 produced at Wadi al-Jarf).

¹⁰¹ Eva-Maria Mengel, "Abydos - Umm el-Qa'ab, Grab des Chasechemui," *BCE* 21 (2000), 50–58 (see 57, fig. 11).

¹⁰² Gaëlle Bréand, "The Corpus of Pre-Firing Potmarks from Adaïma," in Renée Friedman and Peter Fiske, eds., *Egypt at Its Origins 3: Proceedings of the Third International Conference "Origin of the State. Predynastic and Early Dynastic Egypt"*, London, 27th July–1st August 2008, OLA 205 (Leuven, 2011), 1015–41 (see 1023–24, 1034, figs. 2/8, 9/8 and 9/10). The same examples are published in idem, "The Corpus of Pre-Firing Potmarks from Adaïma (Upper Egypt)," *BMSAES* 13 (2009), 49–72.

¹⁰³ Op de Beeck, et al., "Early Old Kingdom Pottery," 68, fig. 4.3.

¹⁰⁴ A close example is signaled for the "Thinite period" in the South Gebel Mogul area, Mohamed Abdel Tawab, et al., "Archéo-géologie des anciennes mines de cuivre et d'or des régions El-Urf/Mongul-Sud et Dara-Ouest," *BIFAO* 90 (1990) 359–64 (see 364, fig. 17/3). Several similar examples from Dynasties 3 and 4 have been found in 2012 on a mining site (WAN002) in the Wadi Araba area (under publication by Yann Tristant and Gregory Marouard).

¹⁰⁵ Faltings, "Die Keramik," figs. 6-D/50, 12-C/A55, A54; Stadelmann and Alexanian, "Die Friedhöfe," figs. 6–9 N; Alexanian, "Dahshur II," 138–40, figs. 44/S.5, 47/G6, 57/M.68, M69, M78, M89; Köpp, "Die rote pyramide," fig. 1/Z551; Alexanian, Berbermeier and Blaschta, "Untersuchungen," figs. 19/O and 19/T.

¹⁰⁶ Tallet, Marouard, and Laisney, "Un port de la IV^e dynastie," 411, fig. 21 (type T40); Marouard, "Un nouvel atelier de potiers," forthcoming.

¹⁰⁷ Mumford, "Tell Ras Budran (site 345)," 33, fig. 18/7 (n°502) and maybe the shoulder and the jar base of fig. 18/1 (n°84) 18/11 (n°46) according to the clay description.

¹⁰⁸ About the evidence of Khafra at Ayn Soukhna, Tallet, "Les 'ports intermittents' de la mer Rouge," 41, 63, Table II; Mahmoud Abd el-Raziq, Georges Castel, Pierre Tallet, and Gregory Marouard, "The Pharaonic Site of Ayn Soukhna in the Gulf of Suez: 2001–2009 Progress Report," in Pierre Tallet and El-Sayed Mahfouz, eds., *The Red Sea in Pharaonic Times*, BdE 155 (Cairo, 2012), 3–20 (see 6); Mahmoud Abd el-Raziq, Georges Castel, Pierre Tallet, *Ayn Soukhna III : le complexe de galeries-magasins*, IFAO, in press.

lies southwest of the Sinai peninsula and to extract its abundant mining resources. But the remoteness of this place from the logistical centers of the Memphite area in addition to its scattered multipolar locations within a large space (5 kilometers between the galleries in Zone 1 and the Zone 6 on the seashore) quickly showed the disadvantages of this settlement, which was then replaced, as early as the middle of Dynasty 4, by the more compact and much better situated port site of Ayn Soukhna. Although the distance to sail on the Red Sea was significantly larger (about 120 km), the latter site, much closer to Memphis, was used intermittently for the rest of the Old Kingdom as the exclusive harbor in direction to the Sinai and Punt, from the reign of Khafra¹⁰⁹ throughout Dynasty 5 and into the second half of Dynasty 6.¹¹⁰ However, the typical ceramic assemblages corresponding to those expeditions are totally absent from the stratigraphy at Tell Ras Budran. No ceramics from the second part or from the late Old Kingdom have clearly been unearthed there at this point—according to the data that has been published up to now— although a punctual and discrete passing at a structure that was then largely filled by sand cannot be excluded. All of these elements underline very convincingly an ephemeral function and an abandonment early in Dynasty 4, that thereby makes Tell Ras Budran one of the oldest fortified systems known to date in Egypt proper,¹¹¹ which is much older, by more than 250 to 300 years, than what has been proclaimed by the archaeologists over the past decade.

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¹⁰⁹ Khafra is the first king attested at Ayn Soukhna so far and this reign could have been the precise time of switching and moving the expedition harbor. This official transfer from Wadi al-Jarf to Ayn Sokhna might be underlined by the fact that the ancient name of Ayn Soukhna, designated by the toponyme *Bat*, according to two inscriptions from the time of Djedkara-Isesi (Tallet, *Zone minière I*, doc. 249, 222–26, and doc. 250, 226–29), which have been found there and which seem to appear in some of the fragments of the logbooks found at Wadi al-Jarf. According to a phenomenon known elsewhere, the place name would have been kept and it would have migrated from the old to the new port on this occasion.

¹¹⁰ Tallet, “Les ‘ports intermittents’ de la mer Rouge,” 63–64, Table II. Almost all pharaohs are attested from Sahura up to Pepi II and at least six expeditions that have left Ayn Soukhna are certified by the epigraphic material. After a short hiatus the site was reopened by royal expeditions of the three first rulers of the Middle Kingdom (Mentuhotep IV, Amenemhat I, and Senwosret I). The potteries discovered by the same team northward of Tell Ras Budran, at Site 346 in a more protected area and closer to water points (Mumford, “Explorations in El-Markha Plain,” 91–115), correspond to those expeditions and underline that the Old Kingdom fortress was no longer operative nor used as a landmark during the Middle Kingdom.

¹¹¹ The Early Dynastic fortress at Elephantine is so far the most ancient example for Egypt (Nadine Moeller, *The Archaeology of Urbanism*, [Cambridge, 2016] 78, figs. 4–15).

