THE HARBOR OF KHUFU
on the Red Sea Coast at Wadi al-Jarf, Egypt

Overview of the camp with the Red Sea and the Sinai Peninsula in the background. Photograph by G. Marouard.

Pierre Tallet and Gregory Marouard

After a decade of investigations on the Red Sea Coast, at Ayn Sukhna (Suez area), in the southern Sinai Peninsula and the Northern part of the Eastern Desert (Wadi Araba), a joint team of the University Paris-Sorbonne and the French Institute in Cairo discovered a new harbor complex from the Old Kingdom at Wadi al-Jarf in 2008. The site is located on the western coast of the Gulf of Suez, about twenty kilometers south of the modern town of Zafarana (fig. 1). It is situated approximately 100 km south of Ayn Sukhna, another anchorage point of Pharaonic times on the Red Sea shore, which was used regularly during the second half of the Old Kingdom and the Middle Kingdom (from 2550 to 1700 B.C.E.).

Probably brought into operation during the reign of king Snofru (ca. 2620–2580 B.C.E.) and particularly used by expeditions under king Khufu (ca. 2580–2550 B.C.E.), the site of Wadi al-Jarf was apparently occupied exclusively at the very beginning of the 4th Dynasty in order to reach by boat the Sinai Peninsula, the main mining area operated by the ancient Egyptians. It is situated exactly opposite of a contemporary coastal fortress, which has recently been identified on the western coast of the Sinai at El-Markha (see Mumford 2006), on the other side of the Gulf of Suez, in an area where the stretch of sea does not exceed fifty kilometers in width. From this point of disembarkation, the royal expeditions which had departed from the Wadi al-Jarf harbor reached the copper and turquoise mines in the southwestern part of the peninsula, particularly the Wadi Maghara region as attested by the official inscriptions of Snofru and Khufu found in this area (see Gardiner, Peet, Černy 1952, n° 5–7, pl. II–IV).

The port facilities at Wadi al-Jarf are quite extensive and multipolar; they cover an area of ca. 6 km (3.7 mi.) from west to east, from the first foothills of the mountains of the Eastern Desert (Southern Gebel Galala) to the shore of the Red Sea. It is possible to observe, from west to east, the following components (fig. 1): Inland and in the immediate proximity of an essential water spring (actual Deir St. Paul), there is a vast complex of storage galleries carved into low limestone hills (Zone 1), a warehouse system that is comparable to those which have recently been discovered at the two other Egyptian port sites presently known, Ayn Sukhna (10 galleries) and Mersa Gawasis (at least 6 or 8 galleries). There are thirty galleries here, nineteen of them being arranged around a small rocky promontory, while ten others are carved on one side of a small *wadi* with a northern orientation (fig. 2). The average gallery length is about 15 to 20 m (ca. 50 to 65 ft.) and the largest galleries are over 34 m (112 ft) in length. They are 3 m wide and 2.5 m (ca. 8 ft.) high.

In each case it was possible to recognize at the entrances the remains of a complex and massive closing system. The access to

local production of coarse containers and cooking or serving wares (see Marouard forthcoming). However, the repertory of types is dominated by the overwhelming presence of thousands of large globular storage jars (fig. 5) found in all parts of the site and also at Al-Markha fortress on the opposite shore of the Gulf of Suez, as well as in some of the earliest occupation levels at Ayn Sukhna.

A few hundred meters east of the galleries area (Zone 1) and on the top of the last limestone outcrops overlooking the vast coastal plain, several areas reserved for housing and stewardship have been found (Zones 2–4). A wide range of camps stand out showing at least two major phases of successive facilities all dating to the beginning of the Old Kingdom (see Tallet, Marouard, and Laisney 2012, pp. 402–3, figs. 5–6).

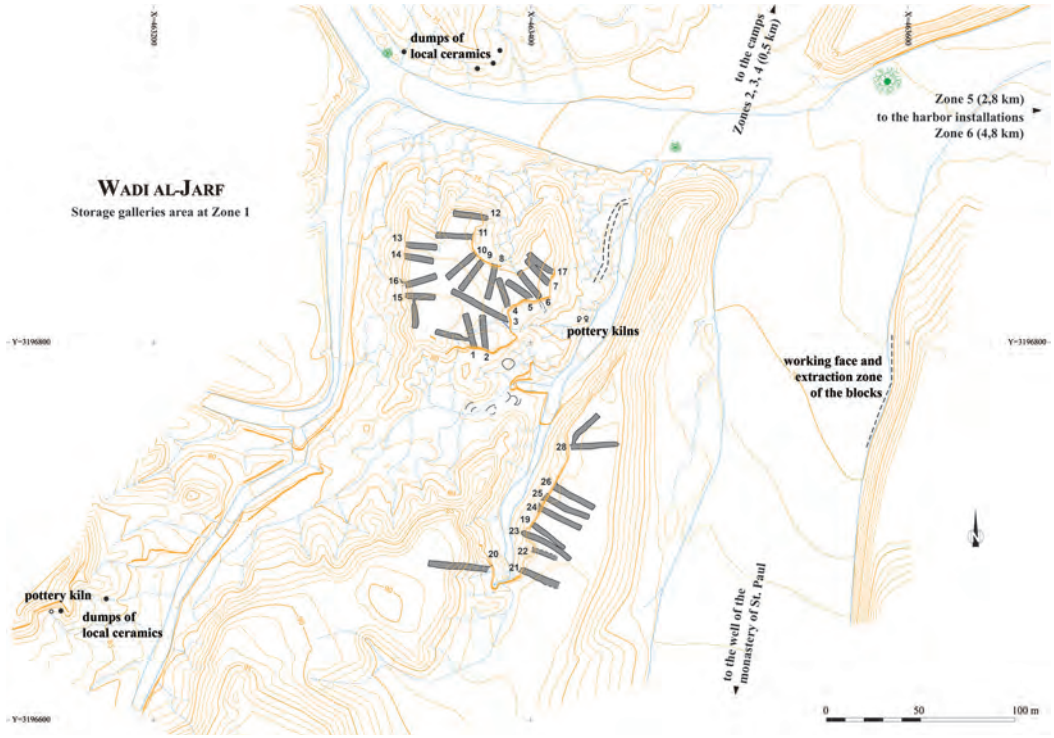
Halfway between the camps and the coast, in the heart of the coastal plain (Zone 5), is a large rectangular building made of stone which has been entirely buried by sand, measuring 60 m by 30 m. It is internally divided into thirteen transversal spaces (see Tallet, Marouard, and Laisney 2012, p. 403, figs. 7-8). The precise function of this building, so far the largest Pharaonic construction discovered on the coast of the Red Sea, has still to be defined.

Finally, on the shoreline is a set of harbor facilities (Zone 6). We can observe, in particular at low tide, an L-shaped pier (fig. 6), which is immersed for the most part, but whose western end is clearly visible on the beach (fig. 7). The pier extends underwater to the east over a length of about 160 m, then turns southeast for about 120 m where it is marked by a less regular layout (fig. 8). Its visible part shows a fairly regular construction composed of limestone blocks and large pebbles from adjacent *wadis*, providing a mole with breakwater function that created

Figure 1 (above). Location of the port site installations at Wadi al-Jarf. Map G. Marouard, satellite pictures © Google Earth.
Figure 2 (below). General map showing the area of the storage galleries, Zone 1. Plan by D. Laisney.

each gallery was narrowed by a series of large blocks of limestone and sealed by a last block arranged as a sort of portcullis (fig. 3). This part of the site was reserved for the storage of equipment, including parts of boats and associated tools, as well as the food and water supplies required for the seafaring expeditions.

There is also evidence in this area for other major logistical activities including local ceramic production as evidenced by the discovery of several pottery kilns in the vicinity of gallery G6 (fig. 4). This production, carried out by specialized potters who came from the Nile Valley with the expeditionary troops, led to an important



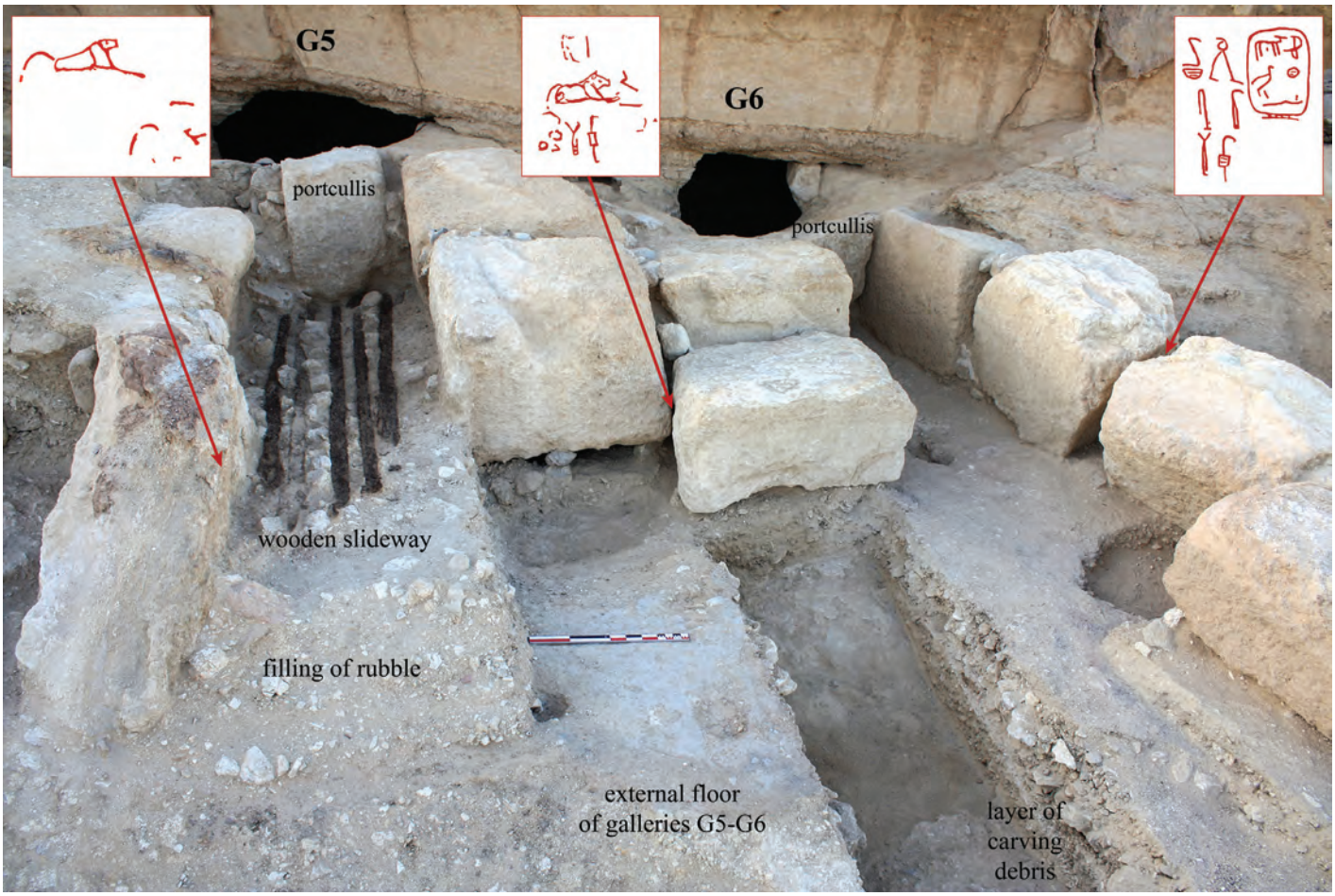
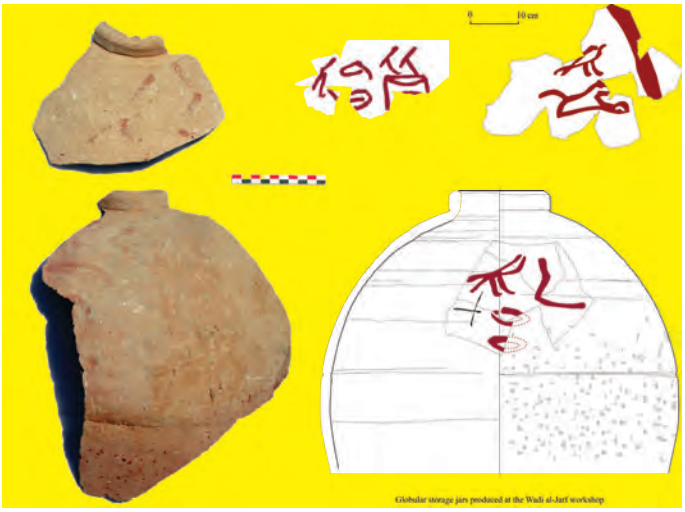


Figure 3 (above). The closure system and marks on the blocks at the entrances of galleries G5–G6. Photograph by G. Marouard, drawings by P. Tallet.
Figure 4 (bottom left). Two of the pottery kilns used for local ceramic production. Photograph by G. Marouard.
Figure 5 (bottom right). Locally produced storage jars and the three main types of inscriptions. Photograph by G. Marouard, drawings by P. Tallet.



an artificial and well-protected anchorage area covering more than 2.5 hectares. A preliminary underwater exploration confirmed the port function of this installation: at least 22 limestone ship anchors have been found *in situ* in this mooring area, south of the east-west branch of the pier (fig. 8). This is the most important discovery of ancient anchors in a primary context of use in all Egyptian waters so far. Several large storage jars of local production are also part of the archaeological material found underwater, indicating that these containers – and their contents packed on site – were actually part of the shipment on the boats which made the crossing in the direction of the Sinai. So far the Wadi al-Jarf coastal installations constitute the most complete and the oldest port complex ever discovered in the world (ca. 2600–2550 B.C.E.).

After three campaigns of excavations since 2011, thirteen of the thirty storage galleries have been fully cleared. Three of them contained practically undisturbed archaeological remains such as a very large deposit of several dozens of large locally made storage jars, which probably served as water containers (fig. 9). Those jars have also received almost always an inscription in red ink indicating their destination (see Tallet, Marouard, and Laisney 2012, pp. 418–20, fig. 25). Inscribed on the upper part of the jars prior to their firing, three recurring formulas invariably name teams who worked on the site (fig. 5). Other excavated galleries seem to have been assigned to the conservation of parts of disassembled boats, including long hull pieces cut into logs of cedar from Lebanon. Very little remains of the original deposit, which appears to have been fully removed or reused shortly after the last closure of the galleries but before the definitive abandonment of the site. Hundreds of wood fragments and wood shavings, which indicate an operation of recarving, in addition to the presence of tenons in acacia used for fixing parts of the hull, as well as numerous fragments of oars or parts of deck fittings and various sections of ropes provide good evidence for the presence of boats that were stored in pieces in these galleries (fig. 10). They were probably stored here according to a process identical to that found at Ayn Sukhna for a boat from the late Middle Kingdom (see Pomey 2012).

The systematic excavation of access ramps situated in front of the storage galleries – especially galleries G1–G2 and G3–G6 – provide extensive information about the various phases of use of the site. All of the galleries seem to have been dug at the same time and the debris from this digging activity was used to level the natural slope and create a functional platform in front of the entrances. On this first terrace several levels of occupation have been found which are contemporary to the functioning of the galleries. They are characterized by fireplaces and significant accumulations of ashes and organic materials. During the final phase of occupation of the site, the final closing of the galleries necessitated a major work operation. On this occasion several large quadrangular blocks of limestone weighing several tons – a size worthy of the pyramid builders – were used to frame a kind of access ramp on both sides of the entrance (fig. 11). Each gallery was then finally closed by one large limestone block placed in the axis of their entrances, which was dragged with ropes and pushed in position on a wooden slideway (reusing boat pieces) and a sliding fresh mud level, like a portcullis system (fig. 3). This closure was sealed by the addition of a clay mortar positioned along the joints, indicating that the entries were deliberately sealed hermetically in order to protect their contents, apparently of great value, from moisture.

A majority of these limestone blocks show large control marks in red ink dating back to the reign of Khufu, which offer an accurate terminus for the implementation of this final closing system. Among the various formulas, which refer to teams of quarrymen, the most remarkable one was found at least five times on different blocks and mentions one team whose name is formed on the birth name of the King (fig. 3).

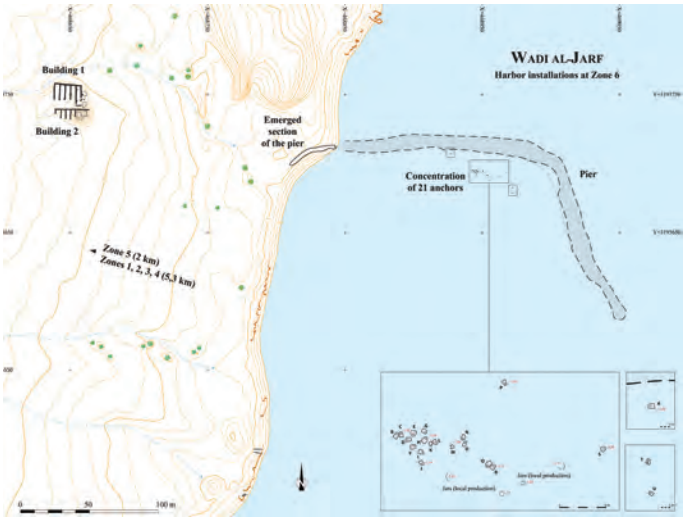


Figure 6 (top left). View of the submerged pier at low tide. Photograph by G. Marouard.
Figure 7 (top right). View of the emerged part of the pier at low tide. Photograph by P. Tallet.
Figure 8 (below). General map of the harbor facilities at Zone 6. Plan by D. Laisney and G. Marouard.

Figure 9 (above). Gallery G23 before excavation with the deposit of complete storage jars in situ. Photograph by G. Marouard.

Still in this part of the site, the 2013 campaign has led to an even more remarkable discovery in front of galleries G1 and G2, where a large concentration of several hundreds of papyrus fragments has been found, some measuring over 80 cm in length. These documents had apparently been deposited between the blocking stones during the last phase of occupation of the site (figs. 11–12). These papyri are in hieratic, some of them are very well dated to the end of Khufu's reign – the date of the year after the 13th cattle count appears on one of the best-preserved examples (fig. 13). This means that we are dealing with Khufu's regnal Year 27 – the cattle count was held every second year – the highest year currently attested for his reign. This information makes these documents the oldest inscribed papyri that have ever been discovered in Egypt.[1]

While being significantly older than any other Old Kingdom papyri known up to now, these documents are very similar, both in their presentation and their administrative content, to their counterparts dating to the end of the 4th Dynasty and the end of the 5th Dynasty discovered at Gebelein and Abusir. This is probably the archive of one of the teams present at the site and mainly includes two categories of documents. First, there are a large number of accounts organized in tables, which correspond to daily or monthly deliveries of food from various areas including the Nile Delta (fig. 14a). This archive has expanded considerably the documentation of papyri known for the entire Old Kingdom and confirms that the operation and control of Egyptian administration was already extremely structured and fully operational by the very beginning of the 4th Dynasty.

To these "bureaucratic" accounts another exceptional type of document can be added of which more than a hundred fragments of varying sizes (some over 50 cm in length) have been discovered. It is a personal logbook that records every day activities of a team led by a Memphis official, the inspector Merer (sḫd Mrr), who was in charge of a team of about 200 men (fig. 14b).

Figure 10 (above). Debris of ship pieces, oars and ropes at the entrance of gallery G4.
Figure 11 (below). Location of the main deposits of papyrus at the entrance of galleries G1 and G2. Photographs by G. Marouard.

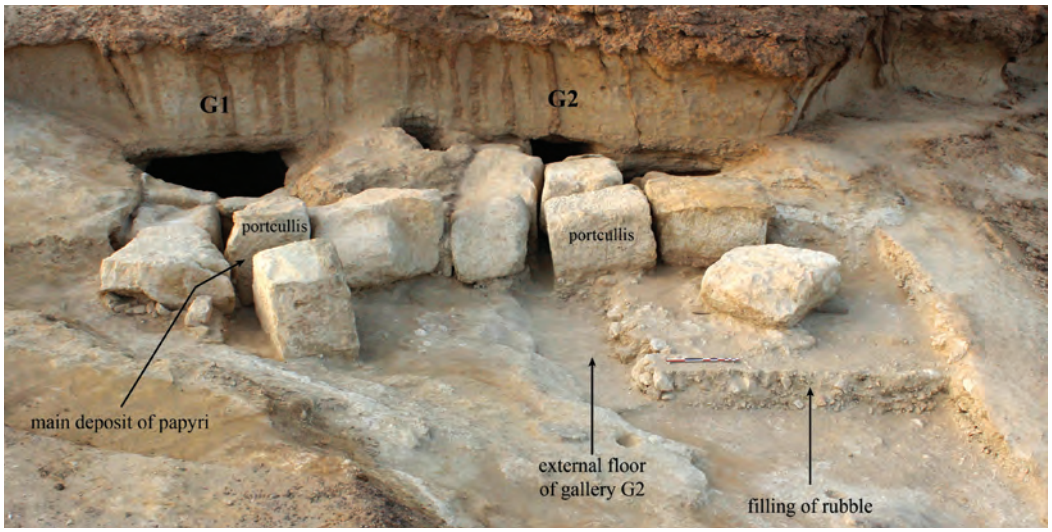
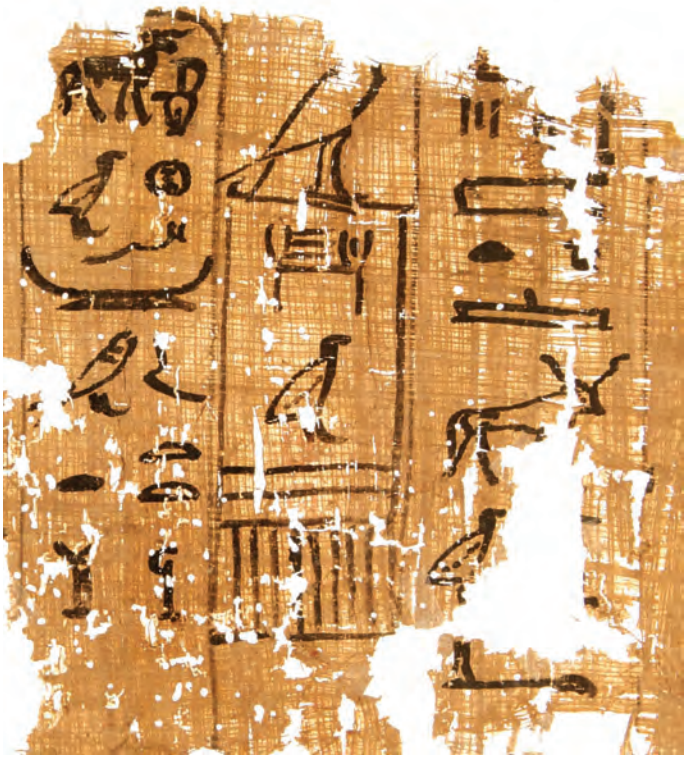
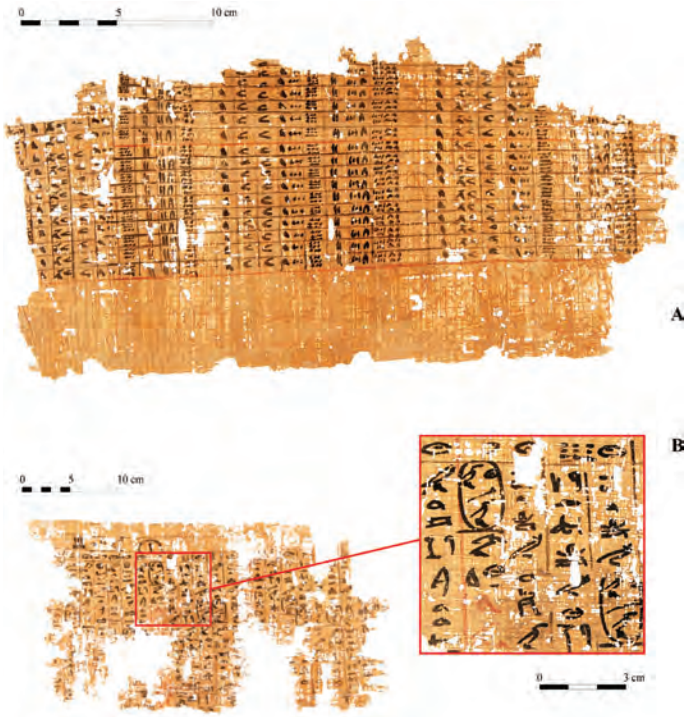


Figure 12 (above). Concentration of papyri in the rubble filling at the entrance to gallery G1. Photograph by P. Tallet.
Figure 13 (bottom left). Part of a papyrus inscribed with an account dating to the reign of Khufu (13th cattle count). Photograph by G. Pollin.
Figure 14 (bottom right). Account on a papyrus (A), same as the one in situ in fig. 12, and a detail of one page of inspector Merer's "diary" (B), mentioning the "Horizon of Khufu." Photographs by G. Pollin.





The most surprising is that this document, in the section that has been best preserved, does not report anything about the activity of this group on the site at Wadi al-Jarf where Merer obviously intervened at some point. Over a period of several months, it reports – in form of a timetable with two columns per day – many operations related to the construction of the Great Pyramid of Khufu at Giza and the work at the limestone quarries on the opposite bank of the Nile. On a regular basis, there are also descriptions concerning the transportation, on the Nile and connected canals, of stone blocks, which had been extracted from the northern and southern quarries of Tura (r-3w rsj and r-3w mḥtj). These blocks were delivered within four days at the pyramid construction site – called the *"Horizon of Khufu"* (3ḫt Ḫwfw) and were probably used for the external casing of the Great Pyramid, made of fine limestone.

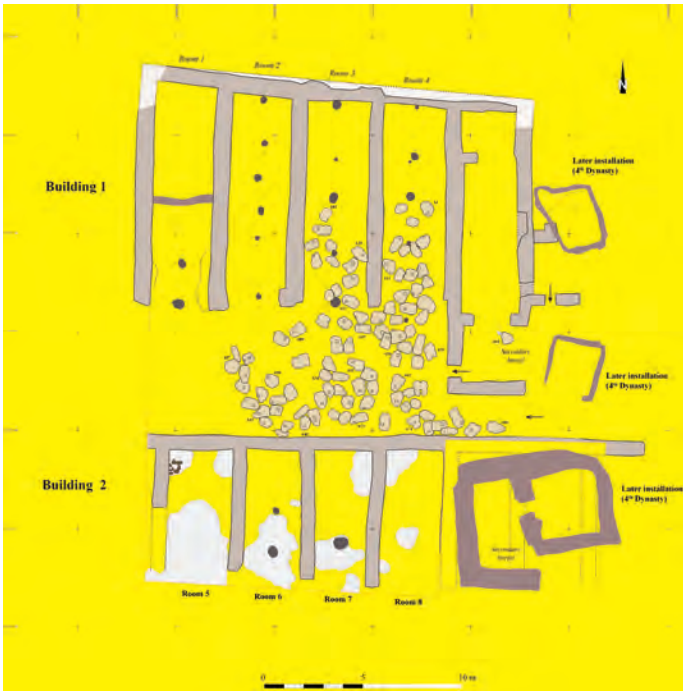


Figure 15 (above). Two large storage buildings of the harbor facilities at Zone 6. **Figure 16** (below). Overview of storage building 1 and the deposit of anchors, view from the north. Photographs by G. Marouard.

Merer's journal also mentions a regular passing by an important administrative center, *"Ro-She Khufu"* (*R3-š Ḫwfw*), which seems to have functioned as a logistical stop point, one day before his arrival at the construction site on the Giza plateau. It is especially specified that this site is under the authority of a high ranking official, Ankh-haf, half-brother of Khufu, who was his vizier and "chief for all the works of the king."[2]

This diary, found in the same archaeological context as the administrative accounts dating to regnal Year 27, highlights two major facts: it confirms that Ankh-haf was effectively vizier and in charge of some of the final steps of the construction of the Great Pyramid at Giza,[3] and it verifies that the pyramid was clearly at a final stage of the construction project at the very end of the Khufu's reign.

The surprising presence of these documents on the Red Sea site at Wadi al-Jarf is

Figure 17 (above). The deposit of anchors, grouped in circles around the posts that originally supported the roof.
Figure 18 (below). A boat anchor of sandstone with residues of ropes preserved in the lateral grooves. Photographs by G. Marouard.

most likely explained by the fact that the same specialized teams that worked on the construction of the royal tomb were also responsible for some operations at this port facility. In this context, the installations at Wadi al-Jarf should probably be considered as a distant dependency of the project of the Great Pyramid and an essential technical extension in order to obtain, from the mines of the southern Sinaï, the large amount of copper necessary for the tools and some specific equipment used at Giza. Also, the team of quarrymen led by inspector Merer could have performed the final closing of the galleries here with the monumental blocks, an operation that occurred at the

Figure 19. Ongoing excavation of a secondary burial in Zone 6. Photograph by G. Marouard.

very end of the reign, around Year 27, a fact that confirms the last occupation of the port site, possibly indicating a temporary interruption of the copper exploitation in the southern Sinai, and maybe the final stage or the imminent completion of the construction project of the Great Pyramid.

In 2013, research also focused on the harbor facilities on the coastline (Zone 6), which are situated in an area located less than 200 m from the seashore and the pier area (fig. 8). Many confusing traces of walls were visible here prior to the excavation and a single boat anchor was spotted on the surface in 2011. A systematic excavation of an area of approximately 1000 m^2 showed two successive phases of occupation that are not necessarily very distant in time and both correspond to the very beginning of the Old Kingdom.

The earliest phase corresponds to the installation of two large buildings measuring 30 m in length and 8 to 12 m in width. They have low walls built of stone and pebbles and a floor plan characterized by five or six long cells arranged in parallel lines (fig. 15). Both structures were built adjacent to one another, along a north-south axis and only open to the south in order to protect the internal spaces from the prevailing northern winds and the risk of quick filling in by wind-blown sand. Their overall plan is characteristic for storage buildings that are known from Old Kingdom mining sites (eg. in the Wadi Araba) and are reminiscent to some extent of the big storage galleries (or dorms?) found by M. Lehner at the pyramid town of Heit el-Ghorab at Giza. For the northern building, the four storage cells measure approximately 3 m in width and were originally covered with a roof made of light organic materials, supported by wooden posts, as has been revealed by a line of postholes (fig. 16). This group of elongated spaces devoted to storage was controlled by a fifth space, divided into two parts and probably devoted to administration and housing as evidenced by the numerous fireplaces and traces of cooking activities.

An exceptional deposit of 99 boat anchors was found in the empty space between the two structures. They had been stored carefully during the final phase of occupation, some grouped together and arranged in a circle around the posts of the roof, which disappeared thereafter (fig. 17).

These anchors show very varied forms, frequently coarsely carved in limestone blocks or more rarely made of sandstone. Most of the anchors have a hole in the upper part with cross-shaped and lateral grooves to maintain ropes in place all around sides, mostly in order to handle them more easily and get them back on board (fig. 18). A significant number of them also have hieroglyphic marks in red or black ink, which probably report the name of a boat or a team. Several anchors preserved shells and sea urchins adhered on the surface, providing good evidence that they had been used and were even submerged in water. Therefore, this installation was not a workshop for producing the anchors but the hundred anchors were deliberately collected and stored here. Similar to the cautious closing measures observed at

the galleries, it seems that this careful storage indicates an official closure of the port facilities with the prospect of future use and return that, however, ultimately never occurred.

Still at the beginning of the 4th Dynasty, but after an intense phase of aeolian sand deposition that led to a nearly complete disappearance of the storage building and anchors, a smaller rectangular structure was built southeast of the area with stone blocks taken directly from the walls of the earlier buildings. To this second phase also correspond, on the northeastern area, various light installations in the form of "hut" foundations with mud floors and several bivouac and cooking areas. If the port facility at Wadi al-Jarf was reoccupied very sporadically with limited staff at this ultimate phase, a last phenomenon precedes the final abandonment of the coastal zone. In two different points some secondary burials were found (fig. 19). They correspond to shallow pits dug into the sand in which the long bones of the arms and legs put together in bundles were buried, including sometimes also the fragments of skulls, from several different individuals. It could be possible that the bones of these individuals, some of them quite young adults, who obviously died in another place, were maybe brought back and reburied on this Egyptian side of the shore of the Gulf of Suez, a peculiar type of post-mortem manipulation probably unique for the archeology of Pharaonic times.

After three seasons of excavations, our knowledge of the port at Wadi al-Jarf has made significant progress and all the archaeological data seem to emphasize the massive size of the fleet that has used this harbor, the high complexity of the organization of the early royal expeditions and the close relationship with the large funerary projects in progress in the Nile Valley at the beginning of the Old Kingdom. There are also strong indications about the relative brevity of the use of this port facility that was apparently only occupied during two major phases, over a period of time that it is still difficult to estimate more precisely. The maritime operations seem indeed limited to the beginning of the 4th Dynasty, and especially the reign of Khufu, the majority of the inscribed artifacts discovered – *dipinti* on jars, control marks, sealings, papyri – bearing the name of this king.

It is probably at the end of the reign of Khufu, ca. Year 27, that an end is put to the occupation of this port site. These installations may thus be part of the first harbor on the Red Sea coast in Egyptian history, predating the port site at Ayn Sukhna, which will be used for a much longer and regular occupation (fig. 20). The latter, located in a closer position to the administrative capital at Memphis, would then have taken over, from the reign of Khafra onwards (attested there by dozens of clay sealings) then persisting for several centuries, throughout the Old Kingdom until the end of the Middle Kingdom.

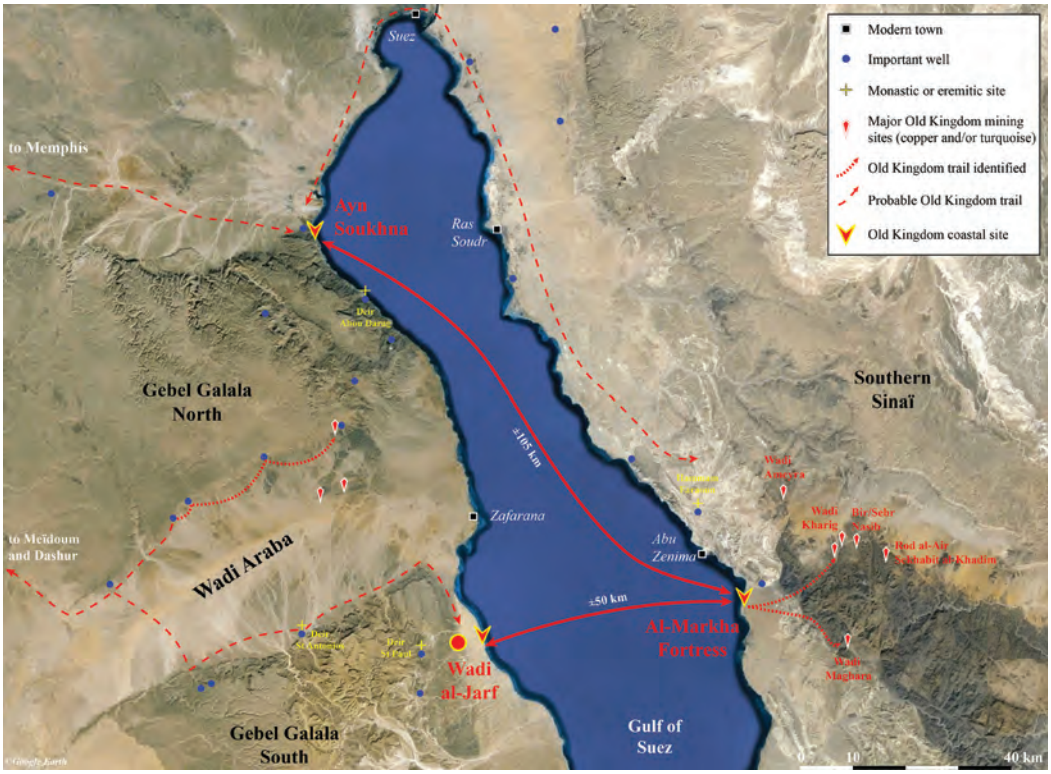


Figure 20. Comprehensive map of royal expeditions and possible trails leading to the southern Sinai copper and turquoise mining sites during the Old Kingdom. Map G. Marouard, satellite pictures © Google Earth.

The importance of these facilities and resources deployed to the Wadi al-Jarf site seem quite proportionate to the gigantic funerary projects at the same time in progress in the Nile Valley. But we are also entitled to ask if such an installation, four times larger and more complex than the other harbors known at Ayn Sukhna or Mersa Gawasis, was used solely for the crossing of the Gulf of Suez toward the Sinai or if more ambitious expeditions conducting longer seafaring journeys were also carried out from here, maybe even towards the distant land of Punt.

Acknowledgments

The site is currently being investigated by a joint mission of the University of Paris-Sorbonne and the French Institute in Cairo (IFAO). The IFAO, the CNRS and the French Ministry of Foreign Affairs provide institutional funding. The mission received a significant private endowment from the Aall Foundation and logistical assistance from the companies Vinci and Colas Rail.

The following have contributed to the fieldwork of the 2013 campaign: Damien Laisney, topographer (MOM), Georges Castel, architect (IFAO), Mohamed Abd el-Maguid, underwater archeologist (MSA), François Briois, archaeologist (CNRS),

Jean-Pierre Peulvast, geomorphologist (University of Paris-Sorbonne), Aurore Ciavatti and Serena Esposito, Ph.D. students (University of Paris-Sorbonne), Hassan Mohamed, conservator (IFAO). Hassan Mohamed Abdel Aziz Mohamed, from the Suez Inspectorate, represented the Ministry of State for Antiquities.

Notes

1. A blank sheet of unwritten papyrus has been discovered at Saqqara in the tomb of the Chancellor Hemaka (1st Dynasty), which shows that this type of support was already used by the Egyptian administration from the beginning of the Pharaonic state (Emery, Saad – *The Tomb of Hemaka*, Cairo, 1938, p. 41).
2. Ankh-haf's *mastaba* (G7510), the second largest tomb at Giza, was excavated by G. Reisner in 1925. The spectacular bust of this high ranking notable is kept at the Museum of Fine Arts, Boston.
3. Considered by G. Reisner as vizier during the reign of Khafra, the chronological position of Ankh-haf can be securely repositioned at the end of the reign of Khufu and under his successor Radjedef (Djedefre). The mention of this notable on the Wadi al-Jarf papyri support several studies conducted by N. Strudwick (1985), M. Baud (1996) or L. Flentye (2007).

References

Gardiner, A., T. Peet, and J. Černy. 1952. *Inscriptions of Sinai Part I (2nd edition)*, *EES Excavation Memoirs* 45.

Marouard, G. Forthcoming. Un nouvel atelier de potier de la IVe dynastie au ouadi el-Jarf (mer Rouge) in *Studies on the Old Kingdom Pottery* II, éd. Th. Rzeuska.

Mumford, G. D. 2006. 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: 13–67.

Pomey, P. 2012. Ship Remains at Ayn Soukhna in Tallet, Mahfouz 2012. *The Red Sea in Pharaonic Times. Recent Discoveries Along the Red Sea Coast*, *BdE* 155: 35–52.

Tallet, P. 2012. Ayn Soukhna and the Wadi el-Jarf: Two Newly Discovered Pharaonic Harbours on the Suez Gulf. *BMSAES* 18: 147–68.

——. 2013. The Wadi el-Jarf Site: A Harbor of Khufu on the Red Sea. *JAEI* 5/1: 76–84.

——. Forthcoming. Les papyrus de la mer Rouge (ouadi el-Jarf, golfe de Suez). *Compte rendus de l'Académie des Inscriptions et Belles lettres (CRAI)*.

——. Forthcoming. Un aperçu de la région Memphite à la fin du règne de Chéops selon le journal de Merer (P. Jarf I-III). Cl. Somaglino, S. Dhennin, eds., *Toponymie et perception de l'espace en Egypte de l'Antiquité au Moyen-Âge)* (IFAO).

Tallet, P. and E. Mahfouz. 2012. *The Red Sea in Pharaonic Times. Recent Discoveries Along the Red Sea Coast*, *BdE* 155.

Tallet, P. and G. Marouard. 2012. An Early Pharaonic Harbour on the Red Sea Coast. *Egyptian Archaeology* 40: 40–3.

Tallet, P., G. Marouard, and D. Laisney. 2012. Un port de la IVe dynastie au ouadi el-Jarf (mer Rouge). *BIFAO* 112: 399–446.

ABOUT THE AUTHORS

Pierre Tallet has been Associate Professor of Egyptology and Archaeology at the University of Paris Sorbonne since 2001. Since 2014 he has headed the section "Mondes Pharaoniques" of the CNRS Unit 8167 "Orient et Méditerranée." As the assistant for the publications at the IFAO during the late 1990s, he participated in many archaeological expeditions at Balat (Dakhla Oasis), Bahariya Oasis, Karnak temple, and Deir el-Medina. Since 2000, he has been the co-director of the excavations at Ayn Sukhna and since 2006 he has led an survey of the Southern Sinai mining areas around Sekhabit al-Khadim, whose results are currently in press at the IFAO. He has headed the French mission at Wadi al-Jarf since 2011.

Gregory Marouard is an archaeologist, specialist in domestic archeology and Egyptian urbanism. Since 2010, he has been Research Associate at the Oriental Institute, University of Chicago. He is co-director of the Tell Edfu Project and he has collaborated on the field with Pierre Tallet since 2002 at Ayn Sukhna and Wadi al-Jarf. After several years of experience in rescue archaeology in Europe, he has been involved since 2000 as senior archaeologist and ceramicist on several excavations in the Fayum area, at Buto, Karnak temple, Dendara, Abydos, and Bawit. He also participates in an extensive survey project in the Wadi Araba, investigating the access trails from the Nile Valley to the Wadi al-Jarf.