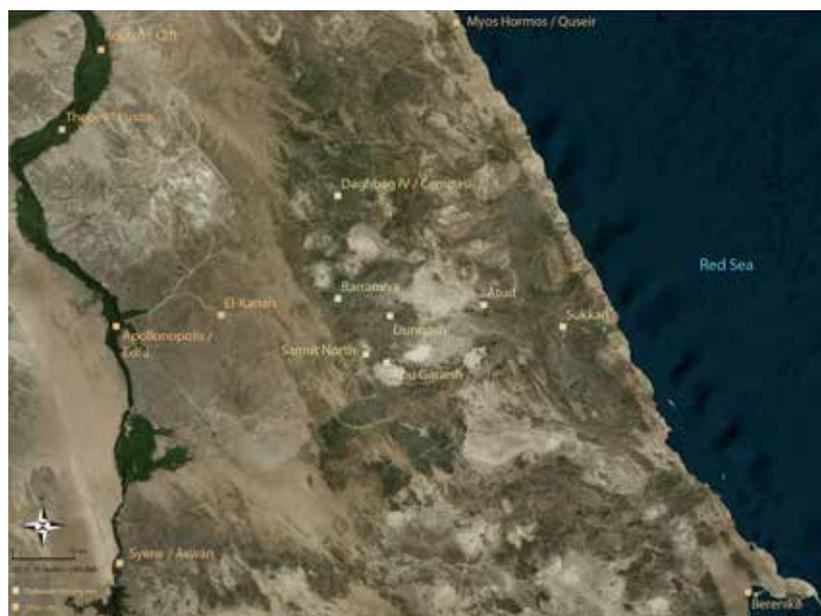


Samut North: ‘heavy mineral processing plants’ are mills

In January 2014, the French Eastern Desert mission under **Bérangère Redon** and **Thomas Faucher** discovered two ‘heavy mineral processing plants’ at Samut North. Yet as further work has now shown, the structures are, in fact, mills of outstanding proportion.

Since early 2014 the French Archaeological Mission of the Eastern Desert has been working in the Samut district, with the aim to close gaps in our knowledge of the mining, production and circulation of gold in Ancient Egypt up to the Ptolemaic Period. During the course of the season, two large round structures were cleared and, tentatively, identified as mineral processing plants – though with the proviso that further excavations were needed to verify their function. And indeed, as more recent works shows, the original assumptions now need to be revised.



Right: the Eastern Desert and the Samut district (Image: Bérangère Redon/HiSoMa).



General view of the Samut North mills, from north-east (Photo: G. Pollin).



*Trace of wear on the pavement of the western rotunda
(Photo: A. Bülow-Jacobsen).*

The two rotundas are about 10 m in diameter; their floor is entirely paved with large stone slabs, although the eastern structure suffered depredations that occurred either in medieval times (an Umayyad jug was found last year in its filling), or early in the twentieth century.

They are both surrounded by a peripheral wall of 50 to 80 cm in height, made of large blocks and small stones bound with clay; its inner face is slightly sloping into the interior of the structure. Inside, the floor consists of large slabs near the wall, and smaller slabs in the central space. The stones are filled in with clay, forming an extremely smooth horizontal surface. In the centre of the west rotunda (the eastern counterpart is destroyed), there is a cavity delimited by large stone slabs, probably a posthole.

A few centimetres off the peripheral wall, a clear trace of wear is visible on the pavement of the two rotundas (more perceptible in the western one), 10-15 cm wide and perfectly circular in shape. Certainly caused by the frequent passage of a wheel, it explains the special layout of the floor slabs: the biggest and most resistant slabs were placed where the mill ran, to support its weight.

The grinding mills of Samut North were most probably used to reduce the ground ore into powder, after the first

stage of crushing the quartz blocks just extracted from the mine. This was a necessary step before the washing and melting operations to extract gold from the quartz ore. During our excavations, quartz powder was indeed discovered between the slabs of the western structure, along with two modern nails. These objects probably date back to the occupation of the site by English miners in the early twentieth century. This proves that the structure was open and completely empty at that time and probably means that the English miners, who had definitely (and correctly) identified the structure as a mill for grinding quartz, cleared it out in order to recover remaining ore powder, ready for washing and melting. Examples of such recoveries of ore are known from Attica: while not high enough in gold content for ancient miners, who therefore left the powder behind, it was profitable to exploit for their modern successors.

At present, it is difficult to propose a reconstruction of the operation of the two mills discovered in Samut North, since they are almost unparalleled. The field observations led us to restore a wooden arm, stuck in a central axis and fitted with a stone wheel (or two diametrically opposite wheels) at its extremity. It was probably moved by men or animals, almost certainly walking inside the two rotundas, between the central

Cavity in the center of the western rotunda (Photo: A. Bülow-Jacobsen).



post and the grinding wheel. It seems indeed impossible that the two mills were powered by people or animals walking outside the rotundas because they are tangential; one might imagine them walking on the peripheral wall but this would require a very large wheel (more than 1.20 m) and, since the walls are not wide enough for more than a single animal or person to walk, their power would probably not have been enough to move the heavy wheel.

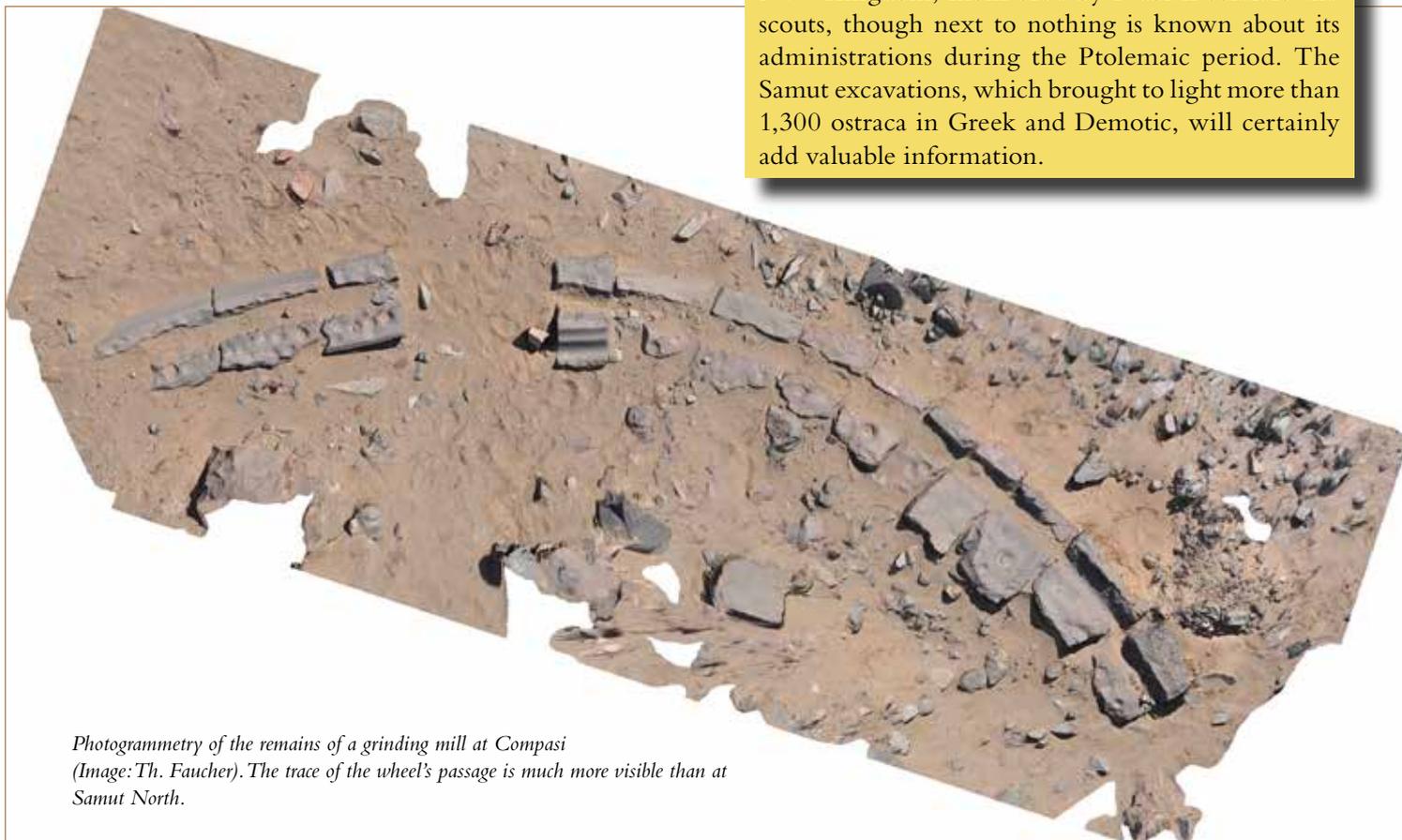
Other examples, which share some similarities with the Samut North mills, do exist, in particular in the nearby Eastern Desert site of Compasi and in the Laurion mining district, near Athens. But most of them are poorly studied and preserved (the Samut North examples are both the largest and the best preserved mills of their kind), which led the archaeologists to their misidentification with mineral processing plants, as we did first at Samut North. Still, these circular mining structures have been attracting renewed interest in recent years, and their review, in light of our findings in the Egyptian Eastern Desert, will probably lead to a better understanding of their operation and evolution.

Keyword: Mining in the Eastern Desert

The area between the River Nile and the Red Sea, today known as the Arabian Desert, has been a source of stone, minerals and ores since before Pharaonic times, lasting well into the Roman Period. Some of the principal deposits of gold as well as copper were located in the Eastern Desert, but it was also a source of limestone, sandstone, calcite and granite – all relatively close to the Nile valley and accessible by a number of *wadis*, but also to harbours on the shores of the Red Sea, such as Berenice.

Over 150 ancient gold mines are known in the Eastern Desert. Extraction was a hard and laborious process, involving the panning of alluvial gold or the crushing, grinding and washing of gold-bearing rock – work often done by convicted criminals, slaves or war captives, and for many of them often in effect a death sentence.

The Egyptian state kept mining areas under careful control. The ‘gold of Coptos’ – the region including Samut – was administered from Thebes during the New Kingdom, monitored by Nubian soldiers and scouts, though next to nothing is known about its administrations during the Ptolemaic period. The Samut excavations, which brought to light more than 1,300 ostraca in Greek and Demotic, will certainly add valuable information.



Photogrammetry of the remains of a grinding mill at Compasi (Image: Th. Faucher). The trace of the wheel's passage is much more visible than at Samut North.

□ Bérangère Redon (CNRS-HiSoMA, Lyon) and Thomas Faucher (CNRS-IRAMAT-CEB, Orléans) have been the director respectively deputy director of the Eastern Desert mission since 2013. The mission is funded by the French Foreign Office and the French Institute of Oriental Archaeology (IFAO), with the participation of the CNRS and the ‘Fondation du Collège de France’. We thank the Ministry of Antiquities for their authorisation and help. Images: © The French Archaeological Mission of the Eastern Desert.