

# Late Roman Amethyst and Gold Mining at Wadi el-Hudi

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## **Abstract:**

Wadi el-Hudi, a geologically diverse region covering an area of some 300 sq. km in north-eastern Lower Nubia, lies approximately 35 km to the south-east of Aswan. Gold and amethyst mining at Wadi el-Hudi during the Roman period is discussed in terms of the overall strategies of mineral procurement adopted in Lower Nubia and the Egyptian Eastern Desert during the Roman period.

## **Introduction**

This paper is a study of several late Roman gold and amethyst mining and processing sites in Wadi el-Hudi, an extensive and geologically diverse region covering an area of some 300 square kilometres in north-eastern Lower Nubia. As a foray into post-pharaonic Nubia, it seems an appropriate offering to a volume dedicated to a scholar who has frequently eloquently bridged the gap between pharaonic and Greco-Roman Egypt and Nubia.

Wadi el-Hudi lies approximately 35 kilometres to the south-east of Aswan (see Figure 1). The archaeological remains were first examined by Ahmed Fakhry (1952), and the associated rock-cut inscriptions were published by A.I. Sadek (1980–5). In November 1992 I undertook a preliminary season of survey of the Middle Kingdom and Roman-period sites in the area (see Shaw and Jameson 1993 and Shaw in press, for the three Middle Kingdom sites at Wadi el-Hudi). The precise location of Wadi el-Hudi is perhaps significant in that it lies essentially at the interface of the Egyptian mines in the Eastern Desert and the Nubian mines further to the south. The Wadi el-Hudi mines were therefore in some respects a stepping stone between the more familiar territory of the Eastern Desert and the more distant gold mines of the Wadis Allaqi and Gabgaba. G.W. Murray's map of Roman roads and stations in the Eastern Desert shows that one Roman road passes southeastwards from Syene (or Aswan) down via Wadi el-Hudi towards Wadi Allaqi (see Murray 1925: Pl.XI).

The Wadi el-Hudi region is situated in the southern section of the Arabo-Nubian massif, which stretches from the north-eastern Sudan up through the Eastern Desert to the Gulf of Suez. The Arabo-Nubian massif consists of a series of deformed and metamorphosed sediments with numerous igneous intrusions. Like many other parts of the Eastern Desert the Wadi el-Hudi

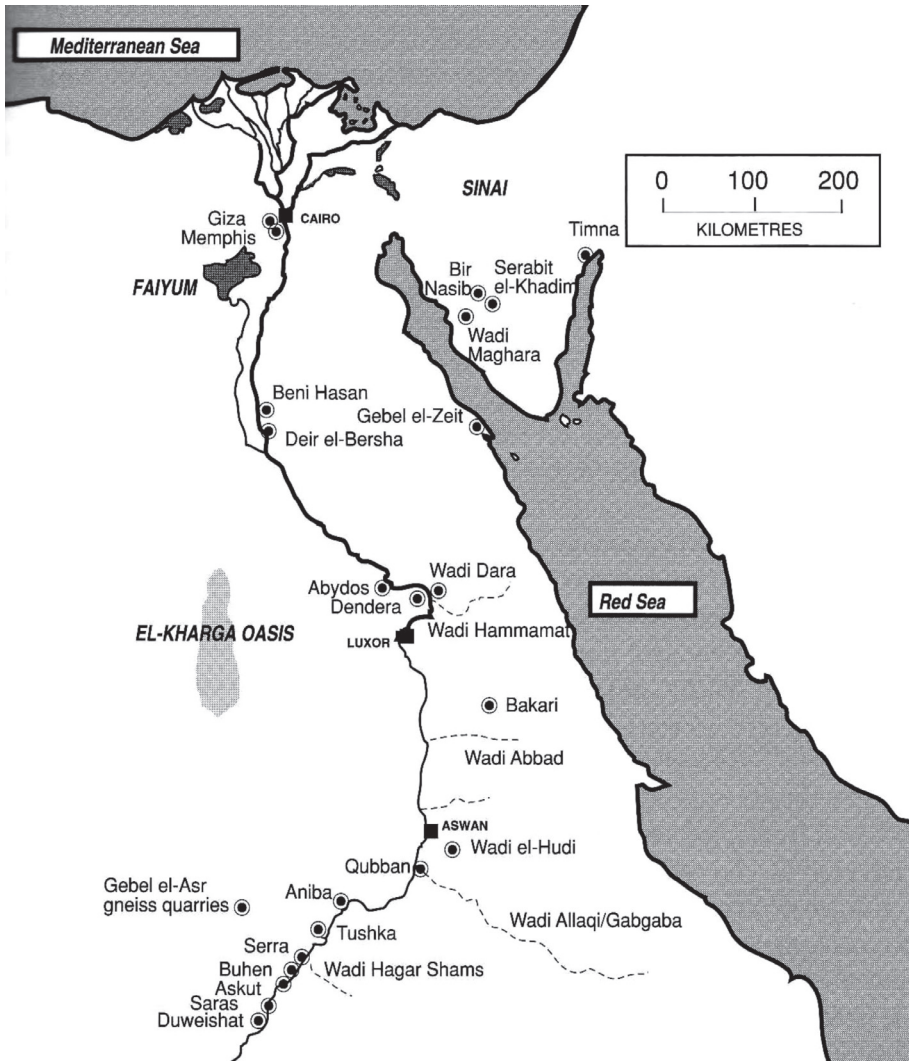


Figure 1: Map of Egypt showing the location of Wadi el-Hudi.

region includes deposits of auriferous quartz. The region has been exploited for its minerals (including mica, barytes, gold and amethyst) since at least the early 2nd millennium BC, and modern miners and quarriers were still extracting haematite and building stone from the immediate area in the early 1990s.

The main valley at Wadi el-Hudi stretches for about 12 km from north-west to south-east (with the large hill of the Gebel el-Hudi located roughly in the centre). The main wadi is surrounded by a network of ridges and smaller wadis spreading out across the surrounding area to the west and the east. The traces of ancient mining and quarrying expeditions are scattered throughout this adjacent region of smaller valleys rather than on the floor of the main wadi itself (see Figure 2).

### The Gold Mines and Miners' Settlements (sites 1–4 and 13–14)



Figure 2: Schematic map of Wadi el-Hudi, showing the location of sites 1–14, which are all late Roman or early medieval unless otherwise indicated: 1=Middle Kingdom(?) 'barytes' mine, 2=hill fort, 3=miners' settlement, 4=partially brick-built miners' settlement, 5=11th-Dynasty hill-top settlement and amethyst mine, 6=peak with rock-drawings and inscriptions, 7=road running between sites 4 and 11, 8=well and associated settlement, 9=12th-Dynasty fortress and amethyst mine, 10='mica' mine, 11=hilltop settlement, 12=amethyst mine, 13=small mining encampment, 14=gold mine.

The mineral resources of the Eastern Desert were extensively exploited during the Ptolemaic and Roman periods, particularly in the form of gold-mining expeditions and settlements. Surveys undertaken between 1989 and 1993 by a combined Egyptian Geological Survey and Munich University team studied over 130 ancient gold mining sites in the Eastern Desert over an area roughly between the 22nd and 28th parallels (Klemm and Klemm 1994, 1998, 2002a). This research revealed extensive mining activity in the Eastern Desert from Predynastic time onwards and showed how the types of gold deposit exploited changed with time as recovery techniques improved.

Gold-working sites of all periods have a distinctive appearance, usually comprising a nucleus of clusters of small dry-stone huts surrounded by heaps of debris, while the desert surface in the immediate vicinity is usually covered with the equipment used to crush the quartz from which the ore was extracted (see Meyer 1995 for instance). Circular grinding stones, perhaps mainly dating to Ptolemaic and Roman times, can be found in large numbers in the gold mining regions of the Eastern Desert. The extremely hard work and the division of labour depending on age and gender at Ptolemaic gold mines were vividly documented by the Greek geographer Agatharchides in the 2nd century BC (see Oldfather 1935: 121).

There are five ancient mining sites in the eastern part of the Wadi el-Hudi region, and all but one of these can be fairly certainly dated to the late Roman period or later (site 1 being the possible exception). From north to south they

comprise a barytes mine (site 1), a small hill-fort dating to the Roman period (site 2) and two gold mines with associated settlement areas (sites 3, 13 and 14).

Fakhry (1952: 7) describes site 1, the barytes mine, as 'four trenches for working the barytes and the remains of a few huts for workmen'. Although the ancient site has been damaged by 20<sup>th</sup>-century barytes mining, Fakhry records the presence of two damaged stone stelae, one uninscribed and the other bearing a largely illegible inscription incorporating the cartouche of the 12th-Dynasty ruler Senusret II; Fakhry also identified some pottery associated with the huts as Middle Kingdom in date. Whether these finds can be taken to indicate Middle Kingdom activity at the site, or simply the re-use of Middle Kingdom material from the amethyst-mining sites in western Wadi el-Hudi, is debatable. Site 3 is said to be a collection of workers' stone huts, grinding mills and pottery associated with a gold mine, while the supposedly contemporary settlement at site 4 is described by Fakhry (1952: 9) as 'one of the largest sites in the neighbourhood which contains many remains of buildings carefully built, and some of the walls are of burnt bricks'. We were unable to examine sites 1, 3 and 4 in the 1992 survey, therefore a fuller discussion of these must await future fieldwork.

We were, however, able to examine sites 2 and 13 in the 1992 survey. Site 2, described by Fakhry (1952: 8) as 'a small fortress of roughly built walls on the top of an easily accessible hill', was probably occupied by late Roman (or early medieval) gold-miners, judging from the presence of part of a roughly made sandstone hand-mill of the type that was introduced in the Roman period to enable the auriferous quartz to be finely ground down. The elliptical dry-stone enclosure wall was entered via a gap at the western side (see Figure 3) and contained only about five rough stone shelters, suggesting both the short-lived use of the site and the likelihood that only small numbers of workers were involved.



Figure 3: External wall of the late Roman hill-top fortress in the north-eastern part of Wadi el-Hudi, photographed from the west. (WH92/77).

Site 13, the small gold-mining encampment at the south-eastern end of the main wadi, consists of an unusual combination of stone-built huts and shelters partly formed by caves in the rock-face. There are also numerous remains of basalt hand-mills (see Figure 4), similar to those found in the vicinity of the gold mines at Bir Umm Fawakhir (Meyer 1995).



Figure 4: Basalt hand-mills at site 13, a late Roman miners' encampment in south-eastern Wadi el-Hudi. (WH92/81).

### **The Miners' Well (site 8)**

There is also a site at the western edge of the Wadi el-Hudi consisting of an ancient well and associated stone-built structures (site 8), which can be approximately dated to the late Roman period (see Figure 5). This site is at the far western edge of the Wadi el-Hudi region, about 8 km due west of the 12th-dynasty fort (site 9). The well-depression, now silted up, is surrounded by about 17 dry-stone structures, including one built on a low hill of debris which may have served as some form of watch-tower. The surviving remains in these buildings include a large hemispherical stone and pounder (of uncertain purpose) and an uninscribed round-topped stele. The small quantity of associated pottery appears to date the site to the Roman period, despite Fakhry's suggestion that it belonged to the pharaonic period (Fakhry 1952).

Large amounts of water would have been required in order to separate the pay dirt from the gangue and some sites, such as Abu Zawal near Mons Claudianus, have a large well at the centre of the area of mines and settlement. In other cases the crushed rock would have been taken away and separated elsewhere. The techniques used to extract the gold have been described by Ag-



Figure 5: Buildings beside the late Roman well (site 8) at the western edge of the Wadi el-Hudi region. (WH92/85).

atharchides, apparently on the basis of at least one visit to mines in the Eastern Desert (Oldfather 1935: 121). He suggests that the rock was broken (by fire setting and the use of hammers) then crushed in large stone mortars to the size of a pea. It was then ground to a fine powder in hand mills before being washed with water on a sloping surface to separate the gold and country rock. It is thought likely that the saddle querns, found at many Egyptian mines in the Roman period, were used in the final grinding.

### **The Late Roman Amethyst Mine and Settlement (sites 11–12)**

Whereas gold was almost certainly being mined and utilized to varying extents throughout the pharaonic and Greco-Roman periods, the procurement and use of amethysts primarily took place primarily during two specific phases: the Middle Kingdom (2055–1650 BC) and the Greco-Roman period (332 BC–AD 311). Although amethysts were being used in Egyptian jewellery from the late Predynastic period onwards, no pre-Middle Kingdom mines have yet been identified, a survey in the Wadi Abu Had, in the northern part of the Eastern Desert has revealed a likely source dating at least as early as the 1st Dynasty (Bomann 1995).

There are both Middle Kingdom and Roman mines at Wadi el-Hudi (see Shaw and Jameson 1993; Klemm and Klemm 2002b), and there are also Ptolemaic and early Roman mines at Wadi Abu Diyeiba (in the Safaga region, midway between the phosphate mines of Wasif and Umm Huetat), where the amethyst formed in quartz veins which are said to have extended for hundreds



Figure 6 The late Roman amethyst mine at Wadi el-Hudi (site 12, WH92/88).

of metres (Lucas 1962: 389, Sidebotham & Harrell 2006, Harrell et al. in press). In AD 200, Clement of Alexandria listed amethysts among the gemstones worn by women of the time in their necklaces (*The Paedagogus* II: Chapter XIII, see Roberts and Donaldson 1885). Amethysts were most often used for beads both in the pharaonic and Greco-Roman periods, the most typical types of the late Ptolemaic and early Roman period being truncated biconical beads often of a very dark colour (in contrast to some of the paler pharaonic varieties), whereas those of the 6th and 7th centuries AD were characteristically pear-shaped.

On the western side of the Wadi el-Hudi there are a number of areas of archaeological interest, clustering together amid a succession of high rocky ridges and valleys. These include three mining settlements, two of which (sites 5 and 9, see Figure 2) are dated both by inscriptions and pottery to the Middle Kingdom, but about 3 km to the south of the two Middle Kingdom quarries is another hilltop settlement (Fakhry's site 12: Figure 6) and a possible amethyst mining area surrounded on three sides by a low perimeter-wall. The Roman hilltop settlement (site 11: Figure 7) is similar in basic appearance to the 11th-dynasty hilltop settlement (site 5), although it is somewhat smaller and all of the sherds examined proved to date to the Roman period.

The walled mining area at the foot of the hill is enclosed to north, east and south but there is no wall on the western side, where the ground slopes steeply upwards to a ridge. Five stone shelters have been erected at regular intervals around the mine's circumference, as well as about twenty low stone windbreaks scattered throughout the enclosure. The site contains only a small number of potsherds, primarily along the northern edge of the enclosure and mostly Ro-

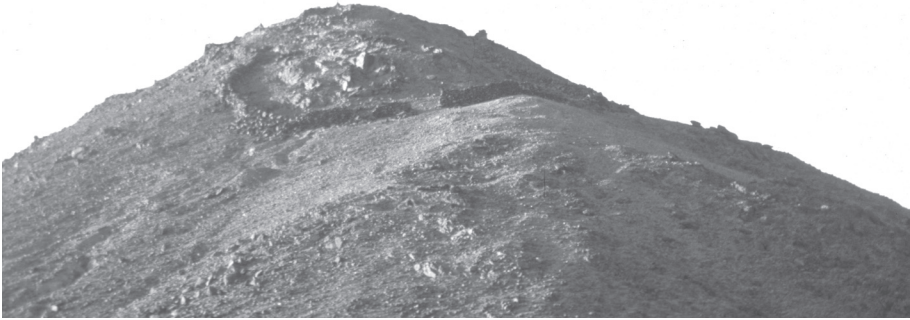


Figure 7 The late Roman hilltop miners' settlement (site 11), located beside the amethyst mine (site 12, WH92/105).

man in date. The roughly D-shaped area enclosed by the wall appears to have been a working area around the mine rather than an actual settlement, since the houses of the workers were located further to the north, in the hilltop settlement (site 11). The spoil heaps from the mine are situated immediately outside the enclosure wall to the north and east.

### Conclusions

The gold and amethyst mines and associated settlements at Wadi el-Hudi appear to date largely to the late Roman and Byzantine periods, although the surface pottery should ideally be studied in greater detail in future, in order to obtain a more precise date. The processing equipment is similar to that in use at the Bir Umm Fawakhir gold mines in the 6th and 7th centuries AD, but the hilltop settlements have more in common, both architecturally and topographically, with the nearby early Middle Kingdom amethyst-mining settlements (sites 5 and 9) than with the Byzantine gold- and emerald-mining settlements at Bir Umm Fawakhir and Wadi Gimal respectively. This perhaps suggests that local workers were being used to some extent in Lower Nubian mines, and that these workers were creating settlements that drew on local traditions rather than those of Roman Egypt itself.

From an historical point of view, Wadi el-Hudi lay within the territory of the Christian kingdom of the Nobatae, although for at least part of the period it might well have lain within the territory of the Blemmyes, the nomadic group in the Eastern Desert who appear to have gained control of the Egyptian emerald mines in the late Roman and early Byzantine period. None of the surface pottery studied in the 1992 season appeared to be of the type sometimes associated with the Blemmyes (whereas some of this type of pottery has been found at a Wadi Gimal emerald mining settlement, see Shaw et al. 1999), but it is nevertheless possible that the Wadi el-Hudi mines also fell within Blemmyes control in the early 5th century AD.



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