THE RED SEA IN PHARAONIC TIMES Recent discoveries along the Red Sea Coast

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Ancient Egyptian Stone Anchors from Mersa Gawasis

THE STUDY of ancient Egyptian stone anchors of the pharaonic period faces two major challenges: both the lack of clear representations in reliefs and model boats and the fact that anchors are usually found in land contexts, have given rise to a number of different interpretations concerning their use.

Objects with a shape similar to stone anchors, engraved or depicted on representations of riverboats, have been interpreted as bread to be used for offerings. Similar objects also appearing on models of river craft, such as those found in the tomb of Meketrê (ca. 1981-1975 BC), now in the Metropolitan Museum, could more likely be interpreted as sounding leads.

The discovery of stone anchors in land contexts has generated discussion on their function and use and/or reuse on land, as in the case of the stone anchors found at the Middle Kingdom fortress of Mirgissa, on the Second Cataract of the Nile.² The discussion also focused on their use in navigation by sea, as supported by Frost³ and Basch,⁴ or by river, as suggested by Nibbi,⁵ and on potential perceptions of their symbolic value.6

In 1976-1977, Abd el-Moneim M. Sayed discovered a group of stone anchors in the pharaonic harbour of Mersa Gawasis (SJww) on the Red Sea, some of which are re-used in the 'Ankhu and Antefoker monuments. In our opinion, this represents the first indisputable archaeological evidence of ancient Egyptian stone anchors used at sea. The anchors, however, have been at the heart of a major debate on ancient Egyptian navigation, with some scholars holding the view that Egyptians did not navigate by sea (Nibbi), while others believed the opposite to be true (Basch, Frost, Sayed). In the wake of this discovery, the main diagnostic characteristics of Egyptian stone anchors were individuated and compared with possibly Egyptian stone anchors found outside of Egypt.8

- 1. Casson 1995, fig. 19; Wachsmann 1997, p. 256-257.
- 2. Nibbi 1992, p. 260; Basch 1994, p. 226.
- 3. Frost 1979, p. 157.
- 4. Basch 1985, p. 457.
- 5. Nibbi 1984, p. 247-53; Nibbi 1992.
- 6. Frost 1996, p. 101; Zazzaro, Abd el-Maguid 2006, p. 144-147.
- 7. SAYED 1977, pl.14, fig. a, b, c, d; pl. 15, fig. d, e, f.
- 8. Frost 1969a, p. 241, 245; Frost 1969b, p. 430-31; STIEGLITZ 1972-1975, p. 42-43.

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At present, around 35 stone anchors ares acknowledged in archaeological contexts in Egypt, dating from the Old Kingdom to the New Kingdom, 28 of which were found at Mersa Gawasis by the University of Naples "l'Orientale" (UNO)/Boston University (BU) excavation project started in 2001.9 More recently, two stone anchors have also been found at Ayn el-Soukhna on the Red Sea coast, dating to the end of the Old Kingdom and the beginning of the Middle.¹⁰

Anchors used in the 'Ankhu and Antefoker monuments have been dated to the 12th dynasty, ¹¹ on the basis of associated inscriptions. Most of the stone anchors found by the UNO/BU excavation can be dated to the same period on the basis of associated pottery and comparisons in shape and dimension with the anchors found by Sayed. Middle Kingdom stone anchors from Mirgissa also correspond to the same shape and dimension. ¹²

The systematic study of Gawasis stone anchors has been underway since 2003, with the goal of examining the detail of the anchors and their manufacture in order to obtain information on the organization of seafaring activities and the technical aspects of navigation. A range of dimensions, as well as disparate standardised features, construction techniques, and solutions adopted to make anchors suitable for the bottom of the Red Sea have been identified so far. The other aim is to investigate anchors in their archaeological context in order to more closely examine their function and the ancient Egyptian perception of their symbolic use.

Gawasis Stone Anchors

All of the identified Gawasis stone anchors have been described, photographed, and drawn to scale, recorded in terms of shape, dimensions, material, and (where possible) weight, along with the context in which they were found. At present, each anchor is catalogued and numbered from AI to A28, continuing the inventory of the Gawasis general catalogue of anchors that has already been published.¹³ The present catalogue includes nine complete and nineteen fragmentary stone anchors. A group of fragmentary pieces of limestone has been recorded and considered separately, as these could also be fragments of stelae. The six complete anchors found by Sayed have also been considered separately. Some pierced stones, dubiously interpreted as anchors, have been inventoried in a different catalogue. These are made of local conglomerate stone; they have an irregular rectangular or oval shape with a circular or a square piercing carved in the centre or at one extremity [fig. 1]. These pierced stones do not have any of the typical characteristics of Egyptian stone anchors, and the interpretation of their use is problematic.

^{9.} Zazzaro, Abd el-Maguid 2006; Zazzaro, Abd el-Maguid 2007; Zazzaro 2007, p. 157-163; Zazzaro 2009b.

^{10.} ABD EL-RAZIQ, CASTEL, TALLET, 2006, p. 4, fig. 2; 5-6

^{11.} SAYED 1980, p. 154-156.

^{12.} See NIBBI 1993, p. 11-13. For the discussion about stone anchor typology based on shape and attribute, see the conclusions.

^{13.} ZAZZARO in WARD, ZAZZARO 2007, p. 161-163, table 5

Most of the Gawasis anchors were cut in fine limestone, with the exception of two anchors respectively made of granite and local conglomerate. Limestone anchors found in the sandy strata are usually well preserved, while those found on the surface, on the top of the terrace, were damaged by the sun and wind. Other Egyptian anchors are also made of limestone, including the two possibly Egyptian anchors from Byblos and Ugarit¹⁴ and another two possibly Egyptian anchors from Megadim, described as "hammered-dressed slabs of buff-coloured limestone", 15 while three anchors from Mirgissa are made of sandstone. 16

Gawasis stone anchors are distinctive for their triangular shape, in some cases asymmetric, and for their rounded top, characterized by an upper hole with a groove running from the top of the hole to the apex, usually on both sides of the anchor. Some Gawasis stone anchors have an additional L-shaped lower piercing at one of the bottom corners [fig. 2a, 3]. One recently discovered complete stone anchor from Mersa Gawasis is small in size (A23) and roughly rectangular in shape [fig. 4].¹⁷ One of the two anchors found at Ayn Soukhna also shows an unusual rectangular shape.18

Gawasis anchors vary in size: four different categories of anchors have been identified according to dimensions. The largest anchor is 105 cm long, 62 cm wide, and with a thickness of 16-25 cm; the smallest is 21 cm long, 15 cm wide, and with a thickness of 7 cm. One anchor found by Sayed is 40-45 cm long and 20-25 cm wide, 19 based on his illustration. A group of anchors measuring 82-84 cm in length, 52-52 cm++ in width and 24-26 cm in thickness constitutes an intermediate group. Length and width, as well as attributes and features, are usually proportional in Egyptian stone anchors; these standardised proportions provide the possibility of estimating the original dimensions of anchors that are fragmented or incomplete.

Due to the difficulty of weighing large stone anchors, weight has been calculated on the basis of the dimensions and specific gravity of the limestone. The specific gravity of the limestone was calculated on the basis of a roughly rectangular stela found on the site and cut in the same kind of limestone as the anchors. The respective estimated weights of the anchors in this intermediate group are 195 kg, 216 kg and 224 kg. The estimated weight of anchors found by Sayed is 250 kg.²⁰ The two complete small anchors respectively weigh 5.8 kg and 3.5 kg.

Attributes and Features

Six Gawasis anchors contain an L-shaped rectangular hole opening to the side [fig. 2a, 3]. In two anchors of the 'Ankhu monument, the hole is square in shape, and in one anchor, it is blind. The other two anchors of the same monument have holes that are circular in shape, one

- 14. Frost 1969a, p. 241, 245; Frost 1969b, p. 430-431.
- 15. STIEGLITZ 1972-1975, p. 42.
- 16. NIBBI 1992, p. 265.
- 17. ZAZZARO, ABD EL-MAGUID 2007.
- 18. ABD EL-RAZIQ, CASTEL, TALLET, 2006, p. 4, fig. 2; p. 5-6.
- 19. SAYED 1980, pl. 12,3.
- 20. FROST 1979, p. 154.

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of which is open to the base of the anchor. It has been suggested that the L-shaped hole was cut to receive another rope in order to free the anchors from a rocky bottom or from reefs in the case that the main cable got caught.

Generally speaking, all Egyptian anchors, with the exception of the two anchors from Ayn Soukhna,²¹ display a groove running from the hole to the top, which was used to keep the rope in its place and reduce chafing [Fig. 2, 3, 4].

Some Gawasis anchors also feature a dovetail cut in their side; this is potentially related to the second use of the anchors as construction components on land [fig. 2b, c, d].

Tool Marks and Manufacture

Some of the Gawasis stone anchors have clear tool marks on the surface faces, while others are smooth. Angles between faces and sides are usually smooth. The direction of the marks, 1-2 cm wide, is generally diagonal, and the instrument most likely used was a flat chisel. The dovetail cuts were also made by chisel, as marks are still visible in the cavity.

The apical holes in the Gawasis anchors were pierced with a pointed tool or chisel boring diagonally, usually from right to left. The section of the hole can be either simply tubular or bi-conical: bi-conical apical holes show diagonal tool marks indicating that the holes were carved with a chisel or some other tool boring diagonally, starting on one face and continuing on the other [fig. 5]; tubular upper holes also show diagonal tool marks from right to left that start on one face and continue on that same face in one direction only.

The petrographic analysis of fourteen stone samples taken from the Gawasis anchors revealed that most of them were made with limestone composed almost entirely of calcium carbonate grains of a micrite/microsparite-sparite matrix. The nearest source for this type of limestone is Jebel Muhammad Rabah, located approximately 25 km to the west of the site. One anchor (A11) and one pierced stone (P/S3) are of a calcareous sandstone composition. The nearest source for the extraction of this stone is Bir Umm al-Huwaytat, located approximately 12 km to the west of the site. Only one anchor (A1) is made of granite. The nearest source for this monzogranite composition stone is Jebel Umm al-Huwaytat, located approximately 15 km to the west of the site.²² The granite anchor (A1) is made with a type of granite that can be found in the Eastern Desert region, within a 25 km range of the site [fig. 6]. The conglomerate stone in which one of the anchors is carved was available on the site itself. The aim of this analysis was to provide a better understanding of the production process of Gawasis stone anchors and consequently, to investigate an important aspect of the organization and provisioning of seafaring expeditions.

The two unfinished stone anchors located on the sand heap of the south-eastern slope confirm the local provenance of the anchors and provide evidence that some anchors at least were prepared on site.

^{21.} Abd el-Raziq, Castel, Tallet, 2006, p. 4, fig. 2, p. 5-6.

^{22.} Mohamed Badr of the Egyptian Geological Survey and Mining Authority (EGSMA) conducted the analysis.

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Some Gawasis anchors show mistakes and modifications that may have occurred during manufacture. One complete stone anchor (A2), for example, shows part of the characteristic apical hole carved at its base [fig. 7] – an unusual position for the hole that seems to prove that this anchor was reshaped from a previous anchor that may have been damaged during the fabrication process. Two unfinished square holes on another recently found anchor (A27), and one such hole on the anchor found in the workshop area (A9), also suggest a similar interpretation.²³ This evidence testifies to the extensive manufacture and modification activity carried out at the site, not only on ship timbers,24 but also on ship equipment.

The Archaeological Context

Ancient stone anchors found in an underwater context were clearly used for mooring, while anchors found in a land context may suggest different and multiple interpretations concerning their use or reuse. The interpretation of the archaeological context in which the Gawasis stone anchors have been found can explain some aspects of the organization of maritime activities at the site as well as some cognitive aspects of the ancient Egyptian perception of the sea, when associated with celebratory features and symbolic meaning. The different contexts in which the Gawasis anchors were found testify to the array in terms of function, use and value of ancient Egyptian anchors.

The Use of Stone Anchors in Celebratory Contexts

In her studies on the anchors, Frost primarily highlights the symbolic meaning of these objects in ancient times, where they were commonly recognized as symbols of hope and safety.²⁵ Pierced stones or stone anchors were frequently found in ceremonial and funerary structures, as is the case for the Early Bronze Age shiftfonim found on sites around the Sea of Galilee, 26 or for the Egyptian stone anchors found in the temple of Baal at Ugarit and at Byblos,²⁷ in a 12th dynasty chapel belonging to the temple of the Obelisks.²⁸ In Egypt, the most ancient pierced stones or anchors, dating to the Old Kingdom, are found in a funerary context: they come from the mastaba of Kahotep at Abusir, from those of Mereruka and Ptahhotep and from the funerary temple of Userkaf.29

- 23. ZAZZARO 2009b.
- 24. WARD, ZAZZARO 2010.
- 25. FROST 1997, p. 101.
- 26. Wachsmann 1997, p. 262-265.
- 27. FROST 1996, p. 874 et fig. 2b, no. 17.
- 28. Frost 1969b, p. 425-429.
- 29. FROST 1979, p. 141-143.

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The Ankhu monument provides the first attestation of anchors used or reused in a celebratory structure at Mersa Gawasis. The shrine consists of seven anchors, four of which formed the pedestal and three of which were reshaped and used as stelae to commemorate the safe return from sea travel.30

After her visit to Mersa Gawasis, Frost emphasized the symbolic importance of the anchors in this context.³¹ On the basis of subsequent discoveries, the UNO/BU excavation later confirmed her opinions.

A group of Gawasis stone anchors associated with celebratory structures made of conglomerate and granite slabs enclosed by a mound of gravel has been found on the top of the northern terrace of the wadi, close to the sea. The structures were interpreted as having a celebratory function because some of them originally bore inscriptions or resembled a shrine, whilst remains of hearths and bowl fragments most likely related to the performance of some kind of ritual were found around the enclosure.³² Taking into account their position on the terrace, facing the sea, it has also been suggested that these structures might also have been used as landmarks for ships approaching the bay of Mersa Gawasis. 33

Most likely, each structure originally had one or several anchors placed either horizontally at the entrance, within the structure itself, or in its foundation. At present, one complete and eleven fragmentary anchors have been found in this context. The complete anchor (A2) was found at the entrance of one of the structures, at ground level [fig. 8]. This anchor reveals an additional square hole, uncommon in that it was pierced more or less in the centre of the anchor, as opposed to the lower holes that had a functional use in the seagoing context. The square pierced hole is most probably connected to the reuse of the anchor on land: it could have been used to receive a flagpole, given that Frost suggests that these coastal structures, employed as landmarks, were likely improved by erecting flagpoles on them.³⁴ The square hole on anchor A2 may also have been intended for other functional purposes, such as a door socket, for example.

Fragments of anchors were found within the gravel mounds of the structures; in this case it is suggested that broken anchors were reused as construction material to build up the mound behind the chamber [fig. 9]. It can be surmised that some measure of symbolic meaning was attached to the use or reuse of the anchors in a celebratory structure.

In one of the structures, hundreds of limestone fragments were found gathered in a circle beneath the mound of gravel, close to the main structure. The hypothesis is that an anchor was intentionally crumbled during the foundation ritual of the structure [fig. 10].35 A fragment of the body and the base of another anchor were found in the foundation deposit of the same structure, along with mother-of-pearl shell and fragments of construction material [Fig. 11].³⁶ In

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30. SAYED 1977.
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^{31.} Frost 1996, p. 874, 882.

^{32.} Bard, Fattovich 2007, p. 244-245.

^{33.} Frost 1996, p. 876; Bard, Fattovich 2007, p. 244.

^{34.} Frost 1996, p. 876.

^{35.} Fattovich, Manzo, Zazzaro 2009.

^{36.} FATTOVICH, MANZO, ZAZZARO 2009b.

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another structure (WG23), parts of anchors were found in the foundation of a chamber alongside other materials also used to build the structure, as is common in foundation deposits [fig. 12].³⁷

The anchors found in the enclosure of these celebratory structures probably symbolised the wish for a safe journey or the commemoration of a safe return in the minds of ancient Egyptians.

Structural Use

The six anchors from the Middle Kingdom fortress in Mirgissa on the Second Cataract were found in a non-celebratory context. According to Nibbi, these anchors lay in storage within a supplies room, 38 but the excavators agree with Basch's opinion that they were used to shape animal hides into shields ().39 The three possible anchors from the Delta port of Tell Basta (Bubastis), dated to the New Kingdom, were also found in a non-celebratory context, in a level of stone blocks.40

At Gawasis, a group of stone anchors was found alongside handmade caves cut in the fossil coral terrace, which incorporated working spaces, food processing areas and an area for the storage of ship equipment. 41 According to Zazzaro, six limestone anchors were incorporated into the wall structure to mark the entrance of Cave 2, while a well-preserved granite anchor was found at the entrance of Cave 3. The stone anchors in the wall were used or reused as construction material together with stone blocks and mud bricks; they were held together with mortar.⁴² Three anchors from the wall structure of Cave 2 show double lateral dovetail cavities associated with dovetail joints, which are widely attested in ancient Egyptian stone construction. In one case, the wood remains (Acacia nilotica, according to Rainer Gerisch) of the joint originally used to fix the anchor were still preserved in one of the dovetail cavities. The dovetail recesses on this group of anchors seem to be related to the anchors' previous use in other structures rather than to their use in the Cave 2 wall [fig. 2 b, c, d]. Two anchors from the same cave were cut off, as in the case of the upper part of the Ankhu monument, probably in order to embed the anchors into the wall more firmly.

It seems most likely that the Gawasis anchors were used at sea and reused on land when Egyptians returned from journeys south of the Red Sea. The reuse of well-finished stone anchors as construction stone, to build structures and to carve inscriptions at Gawasis, is due to the absence of construction stones and well-shaped slabs on the site itself. The anchors provided an immediate source of construction material to build celebratory monuments upon return from seafaring voyages, and to reinforce and preserve existing structures for expeditions to come.

- 37. FATTOVICH, BARD 2004.
- 38. Nibbi 1992, p. 260.
- 39. Basch 1994, p. 226.
- 40. BAKR, NIBBI 1991, p. 3.
- 41. WARD, ZAZZARO 2010, p. 4-5.
- 42. BARD, FATTOVICH 2007, p. 63-64.

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Stone Anchors and the Landing Area

Two anchors have been found in trenches opened in the wadi, where the bed of the wadi now lies, which, according to recent geological investigation, corresponds to the ancient shore and lagoon⁴³ and possibly to the site where ancient Egyptian ships landed. The two anchors respectively measure 86 cm in length, 61 cm in width and 9 cm in thickness, and 21 cm in length, 15 cm in width and 7 cm in thickness, and are characterized by an irregular surface with signs of breaches and attached sediments, evidence of their long use at sea [fig. 13]. These findings demonstrate that ships approached the lagoon with anchors of different dimensions. The small anchors may have been used by small boats, able to easily enter the lagoon; they may also have been linked and used together.

Stone Anchors Within the Workshop Area

Two unfinished stone anchors were found on the slope. One of the anchors reveals an uncompleted hole and evidence of a deep chisel mark, while the top is missing from the other, probably broken during the piercing of the hole [fig. 14]. According to the UNO/BU excavations, the slope areas and cave entrances at Mersa Gawasis were used for working activities, and it is not out of the question that these anchors indicate the presence of a workshop area for anchors at the site.

Use at Sea

The use of the Gawasis anchors at sea has not been completely ascertained – with the exception of the two anchors found in the wadi area - due to the absence of clear signs of use and wear on the faces of the anchors. This can be explained by the short duration of use, bearing in mind that only one voyage to Punt was made yearly. It is also noteworthy that ships carried extra anchors as ballast, and that not all anchors on a ship were used, as has been evidenced by the Mediterranean shipwreck off Uluburun from the LBA.44

The Gawasis anchors are of the weight-type, used on rocky and sandy sea floors. The lack of flukes, which are frequent in Mediterranean stone anchors, confirms that Gawasis anchors were suitable for rocky floors such as are found in the Red Sea. It is suggested that Gawasis ships carried anchors both with and without the characteristic lower hole, which helps free the anchors from the bottom, for use according to the nature of the sea bottom. This theory can explain the abundance of the former and the rarity of the latter in both the Mediterranean and the Red Sea.

^{43.} Fitzgerald, Hein 2008.

^{44.} PULAK 1998.

Conclusion

The Gawasis anchors confirm a well-established organization of manufacturing work with a highly standardized production of ship equipment. Most of the anchors have the same shape and characteristics and only four different ranges of dimensions are attested. Evidence of production, modification and recycling of stone anchors suggests the presence of specialised craftsmen on the site itself. This supports the suggestion that the site functioned as a sort of shipyard, and also demonstrates the knowledge and skills of ancient Egyptians in conducting seafaring expeditions. The reuse of anchors as construction material at the cave entrance, rather than purposefully made stone slabs, reflects the provisional and seasonal function of the site. The use of anchors in shrines and celebratory structures most likely reflects both a functional and a symbolic purpose.

The study of the Gawasis anchors can help in reconsidering other Egyptian stone anchors or pierced stones, the interpretation of which has been uncertain thus far. Of the seven stone anchors found in the fortress of Mirgissa, Basch had disqualified no. 7. As for anchors nos. 3 and 6 they are somehow different. The remaining four are similar to the Gawasis anchors: their shape and characteristics represent a striking similitude. All of them display grooves and only one has an L-shaped piercing. Based on their size, they are situated in the medium group (70 cm by 90 cm long and 40 cm by 60 cm wide). Both the Byblos and Ugarit stone anchors can be placed in the same group based on their shape, features, size and material; these can also be dated to the same period. The stone anchor I of Kfar Samir no doubt belongs to the same Egyptian group.⁴⁵ Anchors from Megadim "south", and another from Megadim "north" have been reported as Egyptian and the fact is that they are quite similar to the Gawasis anchors.

On the other hand, the recently discovered stone anchors at Mersa Gawasis once again raise some questions about the typology and "nationality" of this type of stone anchor in Antiquity, especially in the second millennium BC. Galili and others have discussed the origin of Egyptian stone anchors and others found on the Syro-Palestinian coast, using numeric methods and concluding that "the previous typological definitions by means of shapes and other observable attributes are outdated". The numeric method therefore suggests that stone anchors previously defined by Frost are a sub-type of the so-called Byblian type anchor.⁴⁶ We believe that this conclusion must be reconsidered in the light of the newly discovered stone anchors at Mersa Gawasis. It is clear that we have a family of stone anchors that includes the so-called Byblian group and the so-called Egyptian group; both of them belong to the weight-type. The difference lies in their use, as ancient sailors noticed that those containing a groove and an additional lower corner piercing were better for use on rocks and reefs.

^{45.} GALILI et al., 1994, p. 95-96.

^{46.} Ibid., p. 103.

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Fig. 1. Pierced stones and stone anchors at the entrance of Cave 2 at Mersa Gawasis.



Fig. 2. Gawasis stone anchors found in the wall entrance of Cave 2.

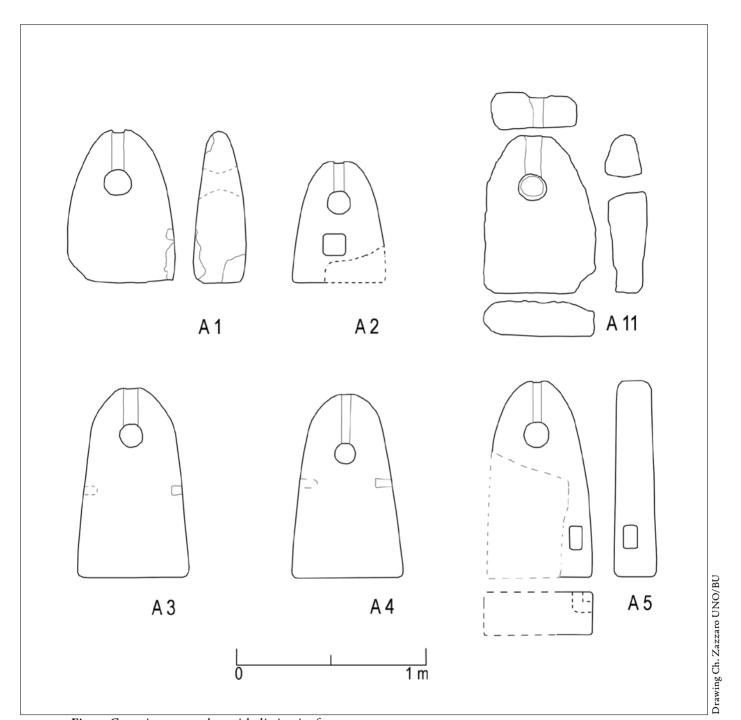


Fig. 3. Gawasis stone anchor with distinctive features.



Fig. 4. Small limestone (A23) anchor and large granite anchor (A1) from Mersa Gawasis.





Fig. 5. Detail of a bi-conical hole from a Gawasis anchor.



Fig. 6. Location of the limestone and granite quarries and of the Mersa/Wadi Gawasis site.



Fig. 7. Anchor featuring part of a hole in an unusual position.





Fig. 9. Pieces of anchors found in the gravel of a celebratory structure.



Fig. 10. Possible anchor intentionally crumbled during the ritual of the foundation of a celebratory structure.



Fig. 11. Pieces of anchors found in a foundation deposit of a celebratory structure.



Fig. 12. Pieces of anchors found in a foundation deposit of a chamber of a celebratory structure.

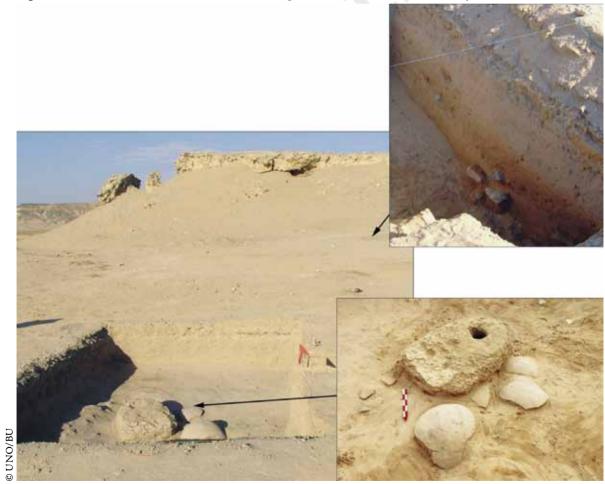


Fig. 13. Anchors found in the ancient landing area.

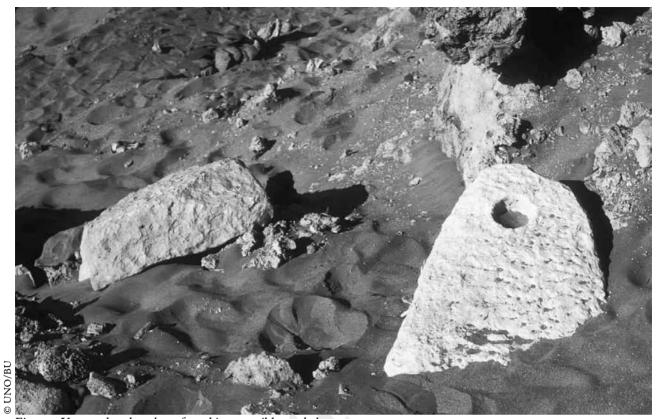


Fig. 14. Uncompleted anchors found in a possible workshop area.