

Salvage Excavations at Alexandria: Topographical Notes

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The purpose of this topic is to present a selection of the archaeological material obtained during many years of foundation digging control. The material in question represents the remainder of elements from various sites in the modern city of Alexandria, which provide some hints to the topographical study of the ancient city and suburbs¹.

The presented data starts from west of Alexandria eastward as follows:

1. *Eunostos Harbour, Kibotos*: Kom El Nadoura
2. *Western Necropolis*: Kom El Shogafa
3. The Royal Quarter
4. Area of the *Via Canopica*: Faculty of Science, Shatby.
5. Shatby Cemetery II
6. *Nicopolis*: Mostafa Kamel Aqueduct
7. *Nicopolis*: Roushdy Tram Station
8. The Outskirts of *Nicopolis*: Glaymonopoulo
9. *Taposiris Parva*: The Miami Cachet

1. *Eunostos Harbour, Kibotos*: Kom El Nadoura

While digging a trench in the middle of El-Gazayer (Algeria) Street, at about 5.30 m to the east of kom El Nadoura mound (Fig. 1), an outstanding little column was found in situ (Fig 2: A&B). The column (L. 2.50 cm, W. 70 cm) is carved in red granite, and rests on a small irregular marble base. The monument is erected on top of a stylobate built of limestone blocks; the width of the stylobate is 35 cm, the apparent portion of it is 75 cm in length. The stylobate was covered by two layers of hydraulic mortar; the outer layer is grey in colour and is about ½ cm. in thickness. The inner one is in red and is about 1 cm in thickness.

1 I would like to express my gratitude and thanks to: Mr. Nagati Antakia for preparing the technical engineering description of the monuments, Mrs. Martha Gabra, St. Mark's computer Centre, El-Morkosseya Cathedral, for her efforts in typing the article, Mrs. Amira Fawzi Ahmed for her assistance in the technical setup of the private part of Shatby II.

The column was found among the remains of a building built with limestone blocks with traces of red mortar. The apparent dimensions of it are: L. 2.50 cm, W. 70 cm.

To the south west of the column at about 70 cm below the street level, the remains of an arch has been found. Another arch to the north-west of the column has also been found, covered with rubbish mostly consisting of stone debris, potsherds of Egyptian jars of rough work and a small marble capital attached to a block of limestone (of an arch?) was found in the rubbish near the column. The capital is carved of grey-veined marble (H. 16 cm, L. 35 cm). Traces of red mortar are noticeable on it. Thus, it becomes clear that the above mentioned archaeological material represents the relics of a demolished Byzantine cistern.

Considering the modern traffic character of the site, it was not possible to carry out any extensive excavations, or even to have the chance to prepare suitable photos or drawings for the revealed archaeological elements.

The monument is situated in the proximity of Kom El Nadoura mound, which is designated on the plan of El Falaky under the title of "fort". It is to be noticed that Kom El Nadoura mound or the fort is overlooking the *Kibotos* harbour on El Falaky Plan.

Saint-Genis observed a mass of construction material which belongs to the wall built by the Arabs in the area where the *Kibotos* harbour was situated in his view. In regards to the *Kibotos*, Saint-Genis mentions: "when the sea is calm, some remains of a mole of the wall of *Kibotos*, could be seen, because of the presence of a huge pier at the base of a grand tower which presents some feature of an ancient jetty².

In consideration of El Falaky plan, and the observations of Saint-Genis, I suggest that the Kom-El Nadoura cistern represents the area bordering the district of the harbour *Kibotos*, and presumably has been demolished before building the Arab wall.

2. Western Necropolis: Kom El Shogafa

During the course of excavating the courtyard of Kom El Shogafa Preparatory school, at about 100 meters to the north east of the

2 Saint-Genis, 1826: 211-213.

Catacomb, a mass of a ruined Roman monument has been revealed (Fig. 3).

The ruins were buried in a big trench, full of rubbish of stones and potsherds, at a depth of about 1.5 m below the level of the courtyard. It seems that a Roman building has been severely damaged in the past, to the extent that a very few remains can be identified as follows:

A- Part of a wall built of limestone blocks, consisting of eight Ashlar rows, was found in the north eastern side of the trench.

B- Part of a floor paved with limestone blocks and tiles, the presence of tiles may indicate an ancient restoration work.

C- Shafts of three red granite columns and a portion of a fourth, one of the shafts is badly preserved³.

Unfortunately, no objects were found among these remains to indicate the character of the building. According to the location in the area between the *Serapeum* and the Catacombs of Kom El Shogafa and the size of the column shafts, the building presumably represented one of the civic monuments serving the district of *Rhakotis* in the way leading to the Catacombs.

However, this is not the first ruinous civic monument to be found in the area between the Catacombs and the *Serapeum*, another one of red granite as well has been identified by Botti, who presumed it to have been related to the stadium⁴.

It is noteworthy that in 1984 during leveling the sandy hillock adjacent to the modern south wall of the Catacombs, a variety of sumptuous architectural elements of an ancient complex were found, among which two extraordinary Corinthian capitals adorned with the head of *Medusa* amid branched flora sculpted in high relief, double-decker bases⁵, and granite

3 The columns are currently displayed in the upper esplanade of the Catacombs of Kom El Shogafa. Dimensions are: shaft no. 5: L. 2.85 m, lower D. 0,64 m, upper D. 0.60 m; shaft no. 45: L. 2.13 m, lower D. 0, 63 m, upper D. 0,60 m.; part of shaft no. 46: L. 0,70 m, upper D. 0, 37 m; shaft badly preserved: L. 2,61 m, lower D. 0,74 m, upper D. 0,71 m.

4 Botti, G., 1908: 4.

5 Pensabene, Patrizio, 1993: 382, 383, tav 40.

columns. If we consider the above mentioned elements as contemporary with the Catacombs, then, the Kom El Shogafa School monument could be, in my view, of an earlier date according to its columns' dimensions.

3. The Royal Quarter

While digging foundation of block N° 2, known as Borg El Pharos, Rue Abassides, walls of dressed limestone blocks of a well were revealed in the bottom of the foundation shaft at a depth of 6-7 m below the ground level. A fine Corinthian capital of Proconnessian marble (Fig. 4) was found inside the well and some stamped Amphora handles. Owing to the depth and the restricted area of the digging, it was not possible to reach the ground level of the walls.

The site of discovery is of great interest as it is situated in the middle of the area of Champollion Street, Government hospital, Menacha property, and the *Canopic* Street, where important discoveries have been done there and proved the existence of high standard ancient architecture in this area.

The Capital could be a useful material for the clarification of Alexandrian style of Capitals and the discovery, although uncompleted, could add to the topography of the Royal Quarter.

4. Area of the *Via Canopica*: Faculty of Science, Shatby

During digging foundations for a new building for chemical studies in the Faculty of Science, in the northern side of Gamal Abd El Nasser Street, and a little to the south of the English Girls' College, a series of ancient aqueducts deeply cut in the solid sandy rock have been revealed, parts of Doric semi-columns were also found (Fig. 5) and nothing more was found in the site. The columns were plastered with white mortar, which is now changed into a grey patina. The architectural elements are clearly of Ptolemaic style ⁶.

The rock-cut aqueducts are of the same style as those found in the Latin Cemetery site⁷. The site of the find intermediates the Latin

6 They are 7 pieces. Dimensions are: No. 1: L. 29 cm, D. 30 cm, Th. 17 cm; No. 2: L. 18 cm, D. 30 cm, Th. 18 cm; No. 3: L. 48 cm, D. 30 cm, Th. 14 cm; No. 4: L. 17 cm, D. 30 cm, Th. 17 cm; No. 5: L. 22 cm, D. 17 cm, Th. 16 cm; No. 6: L. 13 cm, D. 30 cm, Th. 16 cm; No. 7: L. 48 cm, D. 30 cm, Th. 16 cm.

7 Adriani, Achille, 1935-1939: 194, Pl. 9.15-16.

cemetery to the west, and Hadara Cemetery to the east. In El Falaky plan and street network, the site is included in the insula 1.2.-1.3 R 3bis - R 4bis, already beyond presumed Ptolemaic walls, but within the circuit reconstructed by Mahmud bay. In 1935, during digging foundations of the English Girls' College to the north of the aqueducts' site, a mosaic floor has been revealed. The floor is decorated with an emblema depicting sea fishes and a fish pond, in spite of the Greek inscription, the emblema is of Roman design and execution. At the same site, part of a Roman street and a simple Ptolemaic burial place were uncovered.

In the light of the archaeological work carried out during the year 1935 in the neighboring English Girls' College, it seems that the newly discovered columns in the site of the Faculty of Science are the remains of a funerary Chapel, or a sanctuary, situated at the northern edge of street L1, *Via Canopica*, in an area that was already beyond the walls of the city during the early period of the Ptolemaic era.

Presumably the site of the discovery had been destroyed during the Roman era as a result of the great topographical development carried out by the Romans at the beginning of their rule of Egypt ⁸.

5. Shatby Cemetery II

The area of the present Shatby Cemetery has always been considered one of the sites of the Eastern *Necropolis*. In 1981, during digging the foundations for the building of the Alexandria Sanitary Drainage Company, another part of the Eastern *Necropolis* has been revealed. The site of the discovery lies at a distance of about 50 m to the east of Shatby cemetery, adjacent to the streets of Tanis to the north, Shafik Ghorbal to the east, and Syndicate of the Engineers House to the south. According to El-Falaki map, the site lies to the east of R 3bis and to the north of L2 Streets. In consideration of both the topographical and geographical nature of the site of the new discovery, it is suggested that it marks the beginning of a newer phase of using and elongating the eastern *Necropolis* towards the east. Accordingly, I prefer to designate it as Shatby cemetery II.

⁸ Tkaczow, Barbara, 1993: 170.

The site is a rectangular plot extending from east to west. At a depth of 4-8 m below Shafik Ghorbal Street, a public cemetery was revealed. Most of the tombs of the cemetery had already been destroyed by modern concrete constructions, especially the tombs of the north-eastern group. Most of the tombs had already been robbed in the past. Accordingly, no systematic excavations could be undertaken and the site was briefly surveyed.

The entrance to the cemetery begins on the south-eastern angle of the plot where a flight of stone steps is constructed (Fig. 6). Fragments of a wall decorated with stucco reliefs of Meander and floral motives (Fig. 7) show the type of decorations which had once existed behind the entrance.

The cemetery consists of two groups of rock cut tombs located in two areas, in the south of the site, and in the north eastern corner of it (Fig. 8). The loculi are arranged in rows along a narrow gallery extending from the north-east to the south-west in an arrangement that looks similar to that of the Hadra cemetery. The ceiling of the loculi is flat.

The loculi of the southern group were of more than one tier. Some are chamber-like loculi consisting of two axial chambers (Fig. 9). Some loculi slabs are plastered and decorated with coloured paintings representing fine false doors (Fig. 10), ornamented with some floral designs which betray an early Coptic style (Fig. 11 A & B). This part of the cemetery shows traces of reuse in antiquity.

The northern group of tombs consists of one row of loculi opening onto the principal gallery. The closing slabs were plastered and decorated with coloured motives, some of them include enigmatic symbols (Fig. 12)⁹ or illegible writings (Fig. 13). One of the closing slabs of this group is to be considered as the most important monument found in the entire cemetery. It provides us with the first example of an Alexandrian scene of true landscape and a representation of the underworld which include some mythical and epic figures (Fig. 14)¹⁰.

9 Copyright of Figures 12, 13, 14, 15, 16, 19, 20, goes to the Polish Centre of Archaeology in Cairo, photo Zbigniew Doliński.

10 Daszewski, Viktor A., & Ahmed Abdel Fattah, 441-442.

Few objects have been discovered and some unstratified artifacts have been picked out of the debris from outside the tombs, examples of such objects are:

- Hellenistic pottery shards of table ware (Fig. 15)
- Bowl of Egyptian pottery (Fig. 16)
- Amphora jars found in the south-eastern corner of the site of Dressel 2/4 type of early Roman or 1st century AD. (Fig. 17)¹¹.
- A coloured head of a *Tanagra* figurine (Fig. 18 A) of fine workmanship. The hair is divided into longitudinal locks (Fig. 18 B) and bound in the form of a knot at the back of the head (Fig. 18 C), in the Ptolemaic hairstyle known as the melon coiffure, similar to the Tanagra heads previously found in Shatby Cemetery¹², but our head is more finely executed especially in its facial features.
- Hellenistic and Coptic oil lamps (Fig. 19).
- A jug and three balsamarea found in front of one of the loculi, most probably as votive for the dead according to the ancient Alexandrian funerary beliefs (Fig. 20).
- Three stamped Rhodian shaped amphora handles (Fig. 21). The stamps inscriptions are very indicative in respect of the dating of the tombs¹³. One of these inscriptions refers to a Rhodian producer ARISTION dated to c. 198-161 BC. Inscription: Ἀρισ[τι]ωνος. The second inscription refers to a Rhodian eponym XENOPHON dated to c. 164-162 BC with month name: AGRIANIOS. Inscription is:

Ἐπι Ξένο-
Φωντος
Ἀγριανίου

The third inscription has another Rhodian eponym XENOPHANES dated to c. 189 BC. Month name is DALIOS. Inscription is:

Ἐπι Ξενοφάωυς
Δαλίου

11 I'm indebted to Jean-Yves Empereur for the identification of the type and the dating of this jar.

12 Breccia, Ev., 1912: 133-134; tav. LXX, nos. 415-416.

13 Other fragments of inscribed pieces were found in the site.

6. *Nicopolis*: Mostafa Kamel Aqueduct

In the course of leveling a sandy hillock in the site of block N° 97 in Mostafa Kamel (previous camp), part of an aqueduct appeared at a depth of about 5 meters below the top of the hillock (Fig. 22). The aqueduct consists of a large channel built of red bricks, lined with plaster, and protected by a line of irregular slabs on each side (Fig. 23). The upper part is pyramidal in form, built of irregular slabs of limestone (Fig. 24). No more excavations were possible, for the safety of the workers. From inside the aqueduct, a broken cooking pot (D. 9 cm) with two handles made of Nilotic clay was found. However, a collection of domestic vessels of Greek and Roman types were picked up from around the aqueduct, the collection consists of the following:

- A painted jug (H. 13 cm) made of Nilotic clay.
- Some potsherds decorated with floral elements in Geometrical style.
- A broken brown cover of a pot (L. from 4.8 - 9 cm).
- A Ptolemaic oil lamp (D. 6.8 cm) coloured in faded black.
- A Roman lamp (D. 7cm, H. 2.5 cm), brown in colour, with traces of smoke on the nozzle.
- Fragment of a limestone column (L. 18.5 cm).
- Fragments of a plaster panel decorated with geometrical elements painted in red and black.
- A piece of white gray veined marble.

This monument is of special interest owing to its architectural style as a hydraulic element in the ancient *Nicopolis*¹⁴.

7. *Nicopolis*: Roushdy Tram Station

In the course of digging foundations of the block No 160 situated in Ahmed Shawky Street, to the north of Roushdy tram station, a cistern was revealed in the north-western corner of the site.

The cistern was found in a ruinous case. The north and west sides of it were lying under the neighbouring properties (Fig. 25). In spite of the poor case of preservation of the monument, some features could be identified.

14 Adriani, Achille, 1935-1939: 149-159.

The cistern is rectangular in shape, it consists of a single storey with two rooms. It is built of limestone blocks and red bricks, the walls are covered with red plaster. The mortar used in the entire monument consists of a mix of crushed shells, lime, and ash.

The building is oriented north - south and the two rooms are on the same axis, connected together by means of a tunnel which has been blocked in a later period (Fig. 26).

The northern room is almost square in shape and part of its ceiling is still preserved (Fig. 27). In the north-eastern corner, there is a circular well with five foot holes on both northern and southern sides.

An arched door in the southern wall of the northern room leads to the southern one which is almost square in shape and has two opposite openings on both eastern and western walls.

Nothing was found in the site of the monument except some fragments of pure white and grey veined marble, also potsherds of Egyptian Amphora, vessels of silt ware and rough work were found.

It seems that the cistern is similar to other cisterns surveyed by Adriani to the east of the site¹⁵. The monument seems to have been supplied by rain water, and indicates the presence of an ancient habitation quarter in this spot of ancient *Nicopolis*.

8. The Outskirts of *Nicopolis*: Glaymonopoulo

In the course of digging the foundations of the mosque of the Faculty of Fine Arts in Glymonopoulo in Ramleh district, a simple rock-cut tomb was found. The tomb is in the form of a cavity, 1 m in length and contained few remains of human bones. Four amphora jars were found inside the tombs, most probably representing the funerary furniture (Fig. 28). The Amphora jars are Egyptian Amphora of AE3 type, dated to the 2nd – 3rd centuries A.D.

9. Taposiris Parva: The Miami Cachet

On Sunday 24 February 1985, I was notified by the police of antiquities that a statue of a Pharaoh came to light in the course of digging the foundations of a residential building in Maiami district.

15 Adriani, Achille, 1935-1939: 66.

The site of the find is at the cross road of Malak Hefny Nasef St., parallel to the railway line Alex-Abu-Qir and Iskander Ibrahim St.

Inspecting the site of digging, it was an enormous square trench of yellow wind-blown sand which characterizes the coastal strip that extends from the east of Alexandria to Abu-Qir.

The statue was found in the middle of the trench; digging was stopped and resumed under archaeological control, and yielded six tableware vessels (Fig. 29). The types of the vessels indicate their Ptolemaic date¹⁶.

No other archaeological items which could shed light on this statue or on the site in antiquity were revealed, it is noteworthy that both the statue and the tableware have not been found in an archaeological stratum, so it is obligatory to depend on the object itself and the site to identify the archaeological character and the topographical value of the site.

The statue is published by Stanwick¹⁷. It is an upper part of a life size statue of black Basalt (Fig. 30), probably standing, of an Egyptian style with Greek forehead hair (H. 65 cm, head's H. 27.3 cm). Headdress, ears, and lips are relatively damaged, the *uraeus*, nose, and portions of both arms are missing. The back pillar is broken, and the surface of the statue is weathered. Right arm broken off at biceps and left arm at shoulders, back pillar is inscribed.

The king is wearing the conventional plain *Nemes* headdress, with the *uraeus* serpent on top of the front, there is two rows of stylized

16 According to the West/Delta registry, the vessels are of various types as follows:
 No. 416: bowl, low foot ring, curved in rim. Dimensions: outer D. 14 cm, inner D. 12 cm, H. 5 cm. No. 417: amphora like vessel ring foot, incised body, curved-out rim, brown Nilotic clay. Dimensions: H.12 cm, D. 10.5 cm. No. 418: jug, ring foot, conical body, distinguishable shoulders, one side handle, small curved in rim, reddish brown Nilotic clay. No. 419: jug oval body, one side handle, low ring foot, narrow short neck curved out rim, brown Nilotic clay. Dimensions: H. 17 cm, D. 12 cm. No. 420: jug, globular body, short neck, curved-out rim, light brown Nilotic clay, handle broken, a crash on the body. Dimensions: H. 13 cm, D. 10 cm. No. 421: fusiform vessel, one side handle, light brown clay. H. 15.2 cm.

17 Stanwick, P.E., 2002: 121.

curls under the edge of the headdress, and sideburns formed in small globular curls of hair. The face is round with closely set eyes and straight small mouth with firm chin, the bridge of the nose suggests that it was large, the king has frowning expression. The shoulders are broad and muscular, the pectorals are full, the rib cage surface is somewhat swelling. The monument is of a good quality.

Scholars differ as for the real date of the statue as if it represents a Ptolemaic king or a Roman emperor, but according to Stanwick, the statue dates back to the age of Ptolemy X Alexandr I¹⁸ while Ashton interprets the statue as representing either Ptolemy IX or X¹⁹.

Anyhow, the presence of the tableware with the statue enhances the opinion that it belongs to a Ptolemaic King and not a Roman emperor.

In addition to the historical and archaeological value of the find, it has a topographical significance, as it lies at about 1630 metres to the east of the Roman sanctuary of Ras El Soda discovered by Adriani²⁰. The site of the find is situated at some hundred metres to the north-west of another Ras-El Soda discovery of a cachet which has been uncovered in 1940 and is dated to the Ptolemaic era²¹. In addition to the significance of the discovery of our site, it seems that it was an area of late Ptolemaic and early Roman activities as it lies at about 1200 meters away from El-Asafra area where a bath, most probably Ptolemaic in date, was discovered some years ago²². Finally, the site lies at about one kilometer to the east of El-Mohamara district in Sidi-Bishr where another cachet of Roman marble sculptures have been discovered in 1973²³.

No Ptolemaic royal statue of this genre had been found inside the city of Alexandria to date, but in Canopus which is nearer to the site

18 Stanwick, P.E., 1992: 131-41.

19 Sally-Ann Ashton, 2001: 35.

20 Adriani, Achille, 1940: 136-148. Currently displayed in the garden of the Museum of Mosaics in Gamal Abd El Nasser Street in the District of Bab Sharqi.

21 Adriani, Achille, 1952: 26-46.

22 Riad, Henry, 1975: 114-122.

23 Gassowska, B., 1977: 99-138.

of the find more than the ancient capital. It is noteworthy that Canopus yielded a red Granite colossal head of Ptolemy X? (107- 87 BC)²⁴.

Considering the enigmatic archaeological circumstances of the find and the above mentioned archaeological neighboring sites, the site of the find suggests a cachet of an ancient public building, a temple or a palace?, which has been shifted in the late Ptolemaic era from the Ptolemaic town to the site of the find? Future excavations will give us the correct answer.

24 Sally-Ann Ashton, 2001: 94, no. 27.

References

- Adriani, Achille, 1935-1939: Tombau en Albâtre du Cimetière Latin, in: *Annuaire du Musée Gréco-romain d'Alexandrie, 1933-1950, Société de Publications Égyptiennes*.
- Adriani, Achille, 1940: Sanctuaire de L'époque Romaine à Ras el-Sod, in: *Annuaire du Musée Gréco-romain d'Alexandrie, 1933-1939, Société de Publications Égyptiennes*.
- Adriani, Achille, 1952: Trouvaille à Ras El Soda, in: *Annuaire du Musée Gréco-romain d'Alexandrie, 1940-1950, Société de Publications Égyptiennes*, 26-46.
- Ashton, Sally-Ann, 2001: *Ptolemaic Royal Sculpture from Egypt: the Interaction between Greek and Egyptian Tradition*, Archeo Press, Oxford.
- Botti, G., 1908: Rapport Sur la marche du musée Gréco-romain d'Alexandrie pendant l'année 1908, Alexandrie, 4.
- Breccia, Ev., 1912: *La Necropoli di Sciatbi*, Catalogue Generals des antiquités égyptiennes, Musée d'Alexandrie, 2 Vols., Cairo, 133-134; tav. LXX, nos. 415-416.
- Daszewski, Viktor A., & Ahmed Abdel Fattah, 1988: A Hellenistic Painting from Alexandria with Landscape Elements, *Akten des Int. Kong. Fur Klassische Archaologie*, Berlin, 441-442.
- Gassowska, B., 1977: Depozytrzebzb. Sidi Bishr W Aleksandrii, *Starozytra Aleksandriaw badaniach Polskich. Materialy Sesjinaukowej Zorganizowanej PrezelInstytut Archeologii Uniwersytetu Jaagiellonskiego, Krakow*, 8-9 K wietnia 1975, Varsovie, 99-138.
- Pensabene, Patrizio, 1993: Elementi architettonici di Alessandria e di altri siti egiziani, *Reportorio d'arte dell'Egitto greco-romano, Serie C, vol. III*, L'Erma di Bretschneider, Roma.
- Riad, Henry, 1975: Anciens Bains d'Alexandrie, *BSAA* 43, 114-122.
- Saint-Genis, 1826: Description des Antquités d'Alexandrie et des ses environs, dans *Le Description de l'Égypte, V*, Second edition, Pankoucke, Paris.
- Stanwick, P.E., 1992: A Royal Ptolemaic Bust in Alexandria, *JARCE* 29, 131-41.
- Stanwick, P.E., 2002: *Portraits of the Ptolemies: Greek King as Egyptian Pharaohs*, Austin.
- Tkaczow, Barbara, 1993: *The Topography of Ancient Alexandria: An Archaeological Map*, Travaux du Centre d'archéologie méditerranéenne de l'Academie polonaise de sciences 32, Varsovie.



Fig. 1



Fig. 2-A



Fig. 2-B



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

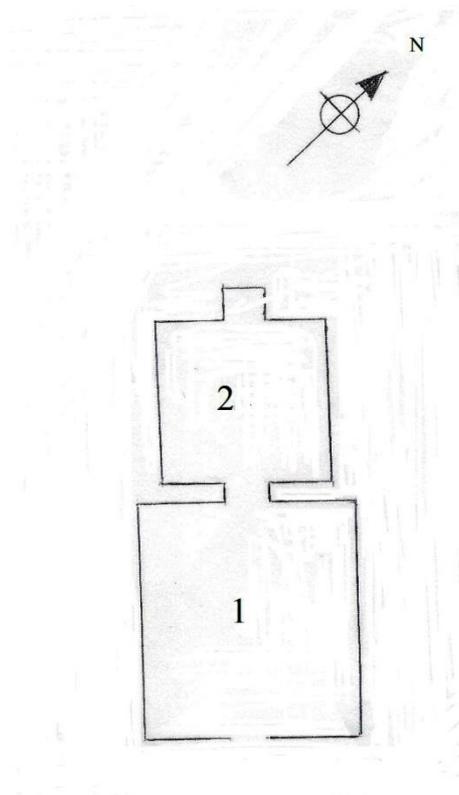


Fig. 9



Fig. 10



Fig. 11-A



Fig. 11-B



Fig. 12



Fig. 13



Fig. 14



Fig. 15



Fig. 16



Fig. 17



Fig. 18-A



Fig. 18-B



Fig. 18-C



Fig. 19

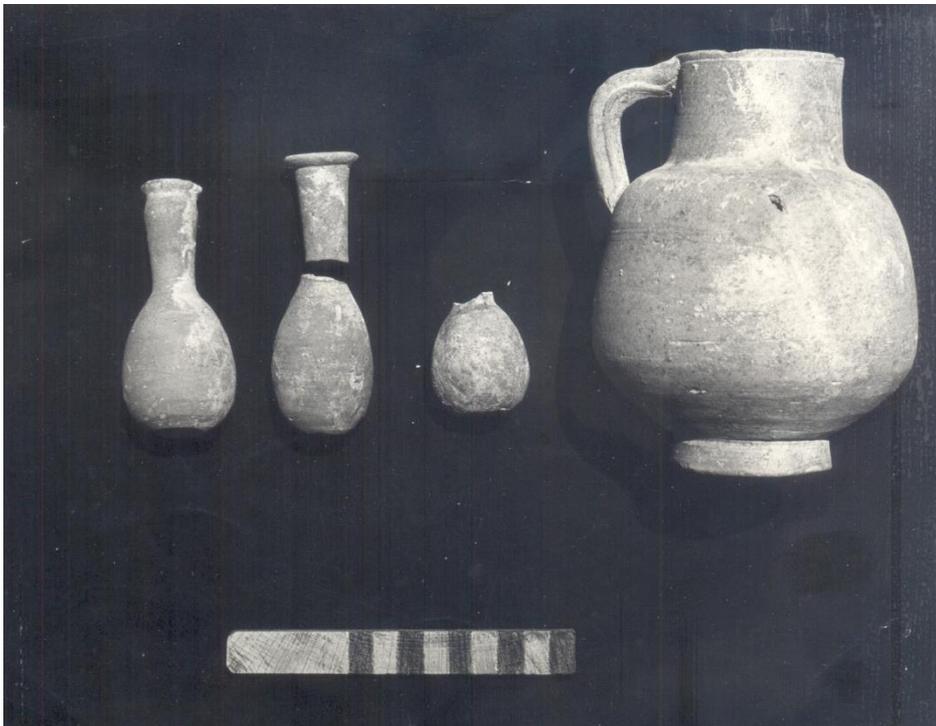


Fig. 20



Fig. 23



Fig. 24



Fig. 25



Fig. 26



Fig. 27



Fig. 28

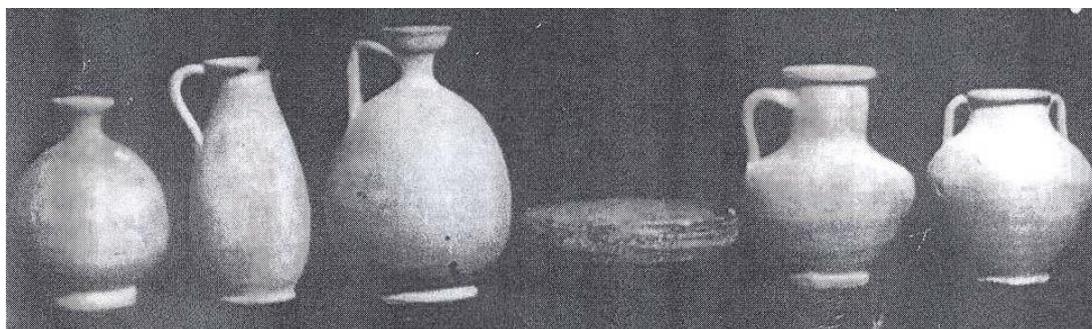


Fig. 29

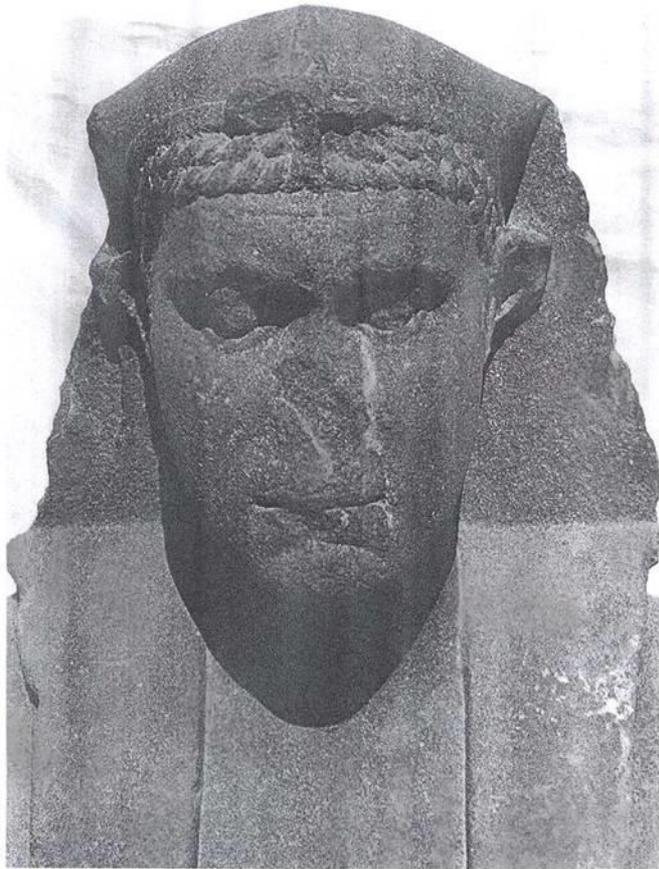


Fig. 30