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South Area



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1 GENERAL VIEW

Last season, the excavation on the saddle floor and the north slope of the valley located in the southwest part of Akoris was limited to revealing the tops of mud brick walls so as to be able to grasp the outline of a settlement as much as possible during this summer season. However, as to the tombs in the excavated area, all were completely investigated as a precaution against illegal activity after our summer work. As the result of the work done, the transition of construction and tombs has been clarified to a greater extent, that is to say, at first, houses and streets were arranged according to a plan, and thereafter they were partially destroyed or damaged by the increase of silos, and then tombs which became predominant by degrees. The house and street construction dates back to the end of the New Kingdom, and the evidence of residence almost completely ended in the Third Intermediate Period (TIP) or the beginning of the Late Period.

Based on the various materials gained in the valley area since 2002, the economic activity waged by the inhabitants is attested to have been agriculture, stock-breeding, fishing, manufacture and commerce. The manufacturing, which consists of various kinds, can be categorized into two groups. One group is formed by the products of agriculture and stock-breeding as shown by textile work of linen and wool, and leather work of goat skin. The other group is established by



Fig. 1 Map of Egypt.

pyrotechnology as exemplified by glasswork, ceramics and copper refining. Each manufacture is of small-scale, except for the leather work which appears to have been rather large. Last season, a pottery mold for casting the faience figurine of the goddess of *Sekhmet* or *Bastet* was uncovered. This discovery is significant in testifying faience work.

Masonry work is different from the abovementioned categories in its scale and base of manufacture. A huge unfinished, monolithic column, found in the Ptolemaic masonry workshop excavated at the north end of the city area in the 1997 work (*Preliminary Report* 1997), was carefully investigated and re-measured by laser scanning so as to reconstruct the operations through to completion.

Through the architectural and epigraphic survey, two Ptolemaic quarries were confirmed near Akoris. One lies at Zāwiyat al-Sulṭān (New Minya) which is situated southward at a distance of 15km from Akoris, and the other is the south neighborhood of the excavated area. Considering the distance from the workshop, the crude limestone of the unfinished monolithic column must have been transported from the latter. As suggested by Dr. L. Habachi (*JARCE* 11, 1974) the beginning of quarrying near Akoris is supposed to date back to the Ramses III Period. Although this is quite possible, the evidence of quarrying has already been lost. (KAWANISHI)

2 ARCHAEOLOGICAL INVESTIGATION

South Area (Cover, Figs. 2–5, Tab. 1) A settlement dating mainly from the TIP extends in the lowland between a gigantic north crag and the next crag to the south in which the Greek-Roman rock-cut tomb chapels are located in rows half way up. The west end of the settlement where we found five houses (House I-V) built in density is divided by the east-west main street at the skirt of the north crag and the north-south main street diverging southward in a T intersection. In this season, we extended the excavation to the east of the north-south main street in the lowland and up to the slope of the south crag. The triangular area formed, Area L, measures 47m north-south and 21m east-west at the south end, and Area M on the slope measures 31m north-south × 5m east-west.

To know the arrangement of houses in an area as large as possible, only the surface soil was removed, except for tombs in the upper layer, but not excavated completely. As a result, the tops of



Fig. 2 Map of Akoris.

many mud brick walls were revealed in Area L and they were supposed to compose some densely built houses similar to those found in the west area of the north-south main street. Because the foot of the south crag curves to the south in Area L, the east area of settlement extends more to the south compared to the west area. An eastwest alley extends to the east opposite the south end of the west side area.

On the east side of the main street, two walls having different angles and of different thickness were found. A thick wall extends in the north and makes contact with the thin wall in mid way. The thick wall stretches 6m to the south from that point and disappears. The other wall that angles about 10 degrees to the west stretches to the south, however it does not reach the east-west alley in Area L. The difference between these walls corresponds to the two walls formed on the west side of the main street.

Inner and outer walls of houses are also divided into two groups by their directions, that is, parallel/ perpendicular or not to the two sidewalls of different thickness along the main street. Walls in the north part



Fig. 3 South Area. 1,6: From north; 2: From south; 3–5: From west; 7: From east; 8: From southeast.





Fig. 5 South Area. No. 1: General view; No. 2: Tomb 7; No. 3: Tomb 13; No. 4: Tomb 15; No. 5: Tomb 14; No. 6: Tomb 16.

of the area and the part to the south of the east-west alley belong to the thick sidewall group. And walls in the middle part of the area belong to the thin sidewall group. If the thin sidewall were built earlier than the thick sidewall, there is no reason why only walls in the south part were arranged in a different direction from the middle part. A house in the middle part was possibly rebuilt with House V or almost simultaneously, but the conclusion should await the results of the complete excavations. In any case, it is noteworthy that the coincidence of directions between the north and the south parts means some intentional town-planning was carried out.

Silos lined up across the main street from the west area along the foot of the south crag were built over walls in the west half of the south house in Area L. Observing their details, two types

Tomb No.	Area	Burial means	Size of coffin (cm)	The dead	Direction of the head	Funeral objects
1	L	Wooden coffin	pit (232 × 58)	Adult (Female?)	West	
2	L	Wooden coffin	147×43	Adult	West	
3	L	?	160×44	Male	West	
4	L	Wooden coffin	100×30	Infant	?	
5	L	Wooden coffin	188×50	Female, Adult	West	A leather sandal
6	L	pottery coffin		suckling		
7	L	Wooden coffin	192×46	Female, Adult	West	
		(pit with a clay roof)	pit (200 \times 74)	Male, Juvenile		
				Male, Adult		
8	L	Wooden coffin	$(45 +) \times 36$	Female, Adult	?	
9	L	Wooden coffin	78×24	Infant	West	
10	L	?				
11	М	pottery coffin		suckling		
12	М	pottery coffin		suckling		
13	М	pottery coffin		suckling		
14	М	Wooden coffin	95×28	Infant	West	A bronze pin with beads, amulets
15	L	Wooden coffin	127×27	Infant	West	
16	М	Mat wrapping	73×25	suckling		
17	М	pottery coffin		suckling		
18	L	?		Adult		

Table 1List of the excavated tombs.

could be ascertained. One type is comparatively large and has a thick wall, and another is small and has a thin wall. The large-sized silo was for storing cereals, while the small-sized silos were for fodder. Considering much fodder and dung were accumulated, Area M seems to have been utilized for grazing.

Twelve tombs lying in Area L were also built after houses were abandoned. Among them Tombs 10 and 18 contained no traces of coffins. As human bones were scattered in a silo we consider it as Tomb 18 for the present, and Tomb 10 in which human bones are limited to a small quantity might actually just be a hole left by illegal digging. Opposite Area L where eight wooden coffins and one pottery coffin were found, four tombs in Area M contained pottery coffins. All sucklings under one year old excepting those in Tomb 16 covered with a mat were placed in storage jars, infants older than sucklings and adults were lying in wooden coffins. Because an infant was lying in the only wooden coffin of Area M, the dead buried in Area M are limited to sucklings and infants.

According to the chronology of Egyptian storage jars, these jars date from the 8th or 7th century B.C. Usually, a storage jar containing a suckling wrapped in cloth was put into a pit as it was, but a storage jar in Tomb 6 is wrapped in a mat, and in Tomb 13 which is surrounded by bricks breaking a part of the wall of a silo, a bowl was put over the mouth of a storage jar like a lid. Tomb 1 containing a wooden coffin for an adult is also protected by rows of bricks on either side of the tomb.

Though a tomb is for one body basically and sizes of wooden coffins are fitted to each, Tomb 7 contained human bones of three persons. Because this tomb measuring 200cm long \times 74cm wide \times 80cm in depth, is large compared to other tombs, it was probably planned to bury plural dead there at the time the pit was dug. A wooden coffin in which a female adult is lying was put on the bottom of the pit. Bones of two males without coffins unearthed from the upper layer don't keep their original position. The pit was covered with a slightly rounded roof of 13cm thick solid mud.

Funeral objects were found in Tomb 5 and Tomb 14. Tomb 5 has a wooden coffin in which a female adult is lying. Although her body is badly damaged, her legs keep their original position. A leather sandal was found under her right knee. This example is the second one found in wooden coffin. The first was found in a coffin in Tomb 2 excavated in 2007. Including a leather sandal for child found in disturbed soil in Area M, footwear made of leather is supposed to have been widespread as it was not so expensive at the end of the TIP. Tomb 14 has a wooden coffin in which an infant estimated to be 3 to 4 years old wrapped firmly with cloth is lying face up. A bronze pin with beads, a large-sized *Udjat*-eye and a cartouche-shaped amulet were put on his/her chest.

Thus the manner of burial for infants is not so different from those of adults in Areas L and M. A matter of special importance as a burial manner is the direction of the head. That is, not only adults but also infants were lying in wooden coffin with their heads to the west.

Considerable finds besides funeral objects include some fragments of papyri with hieratic letters, and a mold for a faience figure of the goddess *Sekhmet*. These finds were unearthed from disturbed surface soil in the middle part of Area L. (TSUJIMURA)

Finds from the South Area (Fig. 6) No. 1: Glazed stone (steatite?) scarab, with engraved hieroglyph signs; h and other unreadable signs, Area 10M, l. 1.60 × w. 1.14 × h. 0.65cm. No. 2: Faience scarab, with engraved hieroglyph sings; sun-disc, scarab and two uraeus, Area 10L, $1.2.52 \times w.1.87 \times h.1.12$ cm. No. 3: Faience ring, with some unreadable engraved signs, Area 10M, fragment, l. 1.96 × h. 1.46 × bezel w. 0.71cm. No. 4: Faience ring, with engraved hieroglyph sings on the cartouche shaped bezel; hk' and w's scepters and others, Area 10M tomb 14, fragment, l. 2.58 × h. 1.74 × bezel w. 1.58. No. 5: Faience amulet, Udjat-eye, Area 10M tomb 14, on mummified remains, l. $3.21 \times h. 2.60 \times t. 1.21$ cm. No. 6: Beads, one black and two dark blue glass ball-beads, shaped by winding molten glass rod, diameter 0.68–1.01cm: one greenish light blue faience tubular-bead, l. 1.03 × d. 0.33cm, Area 10M tomb 14, on the mummified remains, black ball bead attached to the tip of No. 7 bronze tool. No. 7: Bronze pin or tool (?), slab-shaped, found with No. 6 black glass bead fixed at the tip on the mummified remains, Area 10M tomb 14, fragment, $1.5.41 \times w.0.34 \times t.0.12$ cm. No. 8: Bronze fish hook, with rectangular stem section, Area 10L, $1.3.08 \times w. 1.58$ cm. No. 9: Clay weight with a hole, fired, Area 10L, $1.3.73 \times w. 1.86$ cm. No. 10: Clay weight with a hole, fired, Area 10D (leather workshop), $l. 2.32 \times w. 2.08$ cm. No. 11: Clay object, gaming piece (?), unfired, black polished, Area 10L, h. 1.59 × diam. 2.01cm. No. 12: Clay open mold, fired, for faience Sekhmet figure/amulet, rectangular shaped, a bit of yellowish-white powdery substance lines inner surface, Area 10L, fragment, l. 6.3 × w. 4.4 × t. 3.2cm. The size of Sekhmet figure is l. 5.9 × w. 1.7 × t. 2.5cm. No. 13: Clay lid (?), unfired, with two impressions of oval shaped stamps, Area 10M, fragment, $1.9.91 \times w.6.40 \times h.4.09$ cm. The size of impressions is



approximately $1.4.3 \times w.2.5$ cm. No. 14: Clay lid, unfired, with five impressions of rectangular stamps, Area 10L, outer diam. $6.82 \times 6.22 \times h$. 2.80cm, the caliber size of pottery is about 4.8cm. The size of impressions is approximately $1.1.6 \times w. 1.2 \times 0.4$ cm depth. No. 15: Clay cobra figure, fired, with three red vertical lines on the body, no ornamentation on the head and foot base, Area 10L, fragment, l. $9.58 \times w. 5.90 \times t. 3.46$ cm. Thirteen cobra figurines were found in this season. No. 16: Wooden yoke (?), to be used over the necks of two animals and attached to a plow, with one oval shaped hole at the center and five rectangular mortises, Area 10M tomb 4, fragment, No. 17: Wooden spindle whorl with shaft, Area 10M, whorl; l. $101.4 \times w. 27.2$ cm. diam. 4.90 × t. 1.64, fragment of shaft; l. 2.48cm. No. 18: Wooden spindle whorl, Area 10M, diam. 4.11 × t. 2.03cm. No. 19: Wooden object, farming implement (?), wedge-like rectangular flat body, Area 10L, l. 19.53 × w. 7.09 × t. 2.37cm. No. 20: Pottery fragment, pointed base of jar or amphora (?), imported (?), very fine clay and well-treated surface, Area 10L, fragment, $1.10.33 \times d.4.26$. Three other fragments were found from Area 10M in this season. No. 21: Flint sickle blade, dark brown flint, formed in a trapezoidal shape, with the remains of dark gray adhesive over yellowish-white lime plaster, sickle gloss on the limb, Area 10M, l. $7.02 \times w. 2.85 \times t. 1.84$ cm. No. 22: Leather sandal, a part of the right toe folded up, single sole with leather clog thong, stitched on the edge by vegetable thread, Area 10L tomb 5, under the right knees of a mummified remains, fragment, l. $12.3 \times w. 12.0$ cm, estimate of sole size is about l. $21.0 \times w. 9.0$ cm. (HANASAKA)

Hieratic Papyri (Cover, Fig. 7) There are more than ten papyrus fragments unearthed, most of which are inscribed with hieratic. Some of them retain somewhat significant, although brief, texts.

Papyrus No. 1 (Cover, Fig. 7 Left) Area 10L, 6.5×6.8 cm. This papyrus bears a part of seven lines of a magical text, two of which are written in red ¹). There is blank space at the right end, indicating the remaining part to be the beginning of a column in the original text. The date of this papyrus is uncertain, although it probably dates from the Ramesside Period or the TIP ²).

Translation:

- x + 1 ... /// true ////// ...
- $x + 2 \dots$ chewing by the god³⁾, salt /// ...
- x + 3 ... Isis. My brother Seth did ...
- $x + 4 \dots$ My brother Seth created ////// $^{4)} \dots$
- $x + 5 \dots$ these people (?) ...
- $x + 6 \dots$ chewing by (?) the god, salt of \dots
- x + 7 ... Seth ///// ...

Notes

- 1) The lines in red are indicated by italic in the translation.
- 2) The spelling of the 'brother' (Gardiner T 22) of the line x + 4 is peculiar to the Ramesside and the Third Intermediate Periods (G. Möller, *Hieratische Paläographie*, Leipzig 1927–1936, II, S.53, 596; III, S.57, 596). Although the spelling of the first letter (Gardiner M (22)) of the line x + 5 is a Graeco-Roman feature according to Möller (*ibid.* III, S.27, 288), it is attested in the late Ramesside period (e.g. A. H. Gardiner, 'A Protest against Unjustified Tax-demands', *Revue d'Égyptologie* 6 (1951), pp. 132–133, l. 11).
- 3) The parallel phrase 'chewing by Seth' (wg in Sth) is attested as a part of a spell in the Papyrus Ramesseum III, a magical papyrus dated to the early Second Intermediate Period. See J. W. B. Barns, *Five Ramesseum Papyri*, Oxford, 1956, p. 21, pl. 12, 11.
- 4) The preserved signs at the end of the line x + 4 (Gardiner P 8 and possibly Z 7) could be a part of the word 'voice' (*hrw*) or 'rebellion' (*hrwyw*).

Papyrus No. 2 (Cover, Fig. 7 Center) Area 10L, 7.4×5.5 cm. This fragment bears a part of a text related to transport and trade, which is dated to the New Kingdom, probably the Ramesside Period.

Translation:

- x + 1 ... transport boat which was sent before...
- $x + 2 \dots$ merchant ¹⁾, grain of [harvest tax] ²⁾...
- $x + 3 \dots$ [the last day (of a month)] ³⁾, the beginning of a season...

Notes

 For the *šwyty* translated as 'merchant', 'trader', or 'commercial agent', see S. Bickel, 'Commerçants et bateliers au Nouvel Empire: Mode de vie et statut d'un groupe social', N. Grimal et B. Menu (eds.), *Le Commerce en Égypte ancienne*, Le Caire, 1998, pp. 157–172; R. J. Demarée, *The Bankes*



Fig. 7 Papyri. Left: No. 1; Center: No. 2; Right: No. 3

Late Ramesside Papyri, London, 2006, p. 8.

- 2) For the 'harvest tax' (šmw) and 'grain of harvest tax' (*it šmw*), see A. H. Gardiner, 'Ramesside Texts relating to the Taxation and Transport of Corn', *Journal of Egyptian Archaeology* 27 (1941), pp. 20, 28–29. Also cf. D. A. Warburton, *State and Economy in Ancient Egypt: Fiscal Vocabulary of the New Kingdom*, Göttingen, 1997, pp. 282–286.
- 3) The word 'the last day (of a month)' ('rky) is restored on the grounds of the context and surviving determinatives.

Papyrus No. 3 (Cover, Fig. 7 Right) Area 10L, 2.9×4.4 cm. This papyrus bears a part of four lines of the original text. There is blank space discernible at the right edge, indicating the remaining part to be the beginning of a column. This fragment is a part of an indictment concerning a mayor, dated to the New Kingdom, probably the Ramesside Period¹⁾.

Translation:

- x + 1 Charge concerning ²⁾ the statement of a mayor ...
- $x + 2 \dots$ boat(?), Khonsuwer ³)...
- x + 3 ... report, /////...
- x + 4 ... he recognized ... ///// ...

Notes

- 1) This indictment would have been parallel to the Papyrus Turin 1887 in the form. For this papyrus, see A. H. Gardiner, *Ramesside Administrative Documents*, Oxford, 1948, pp. 73–82.
- 2) This phrase (sh) r) is attested at the beginning of charges in the Papyrus Turin 1887. See A. H. Gardiner, *ibid. passim*; *idem*, 'Ramesside Texts relating to the Taxation and Transport of Corn', *Journal of Egyptian Archaeology* 27 (1941), p. 60, n. 2.
- Probably a personal name, although not included in H. Ranke, *Die Ägyptischen Personennamen*, Glückstadt, 1935. (UCHIDA)

3 EPHIGRAPHIC INVESTIGATION

Ptolemaic Quarry at Zāwiyat al-Sulțān (Figs. 8–9) Further investigations were carried out in the Ptolemaic quarry at Zāwiyat al-Sulțān (New Minya). As in the recent past, our work was concentrated largely in horizontal galleries hewn into the limestone bedrock at various points of the quarry valley. We confirmed and reexamined all the graffiti at Sections E, H, and U, and made additional notes about their spatial configuration on the site.

In the last report we suggested that the graffito Q29 should be read as 'Year 2, the month of Tybi, 7th' (*Preliminary Report AKORIS 2009*, pp. 20–21). However, it now seems certain that the abbreviated sign denoting the month is made up not of letters *tau* and *beta* but of *phi*, *alpha*, and another letter. It most probably reads Pharmouthi, but Phaophi or Phamenoth are not impossible. The peculiarity of Q29 is the lack of a personal name and canonical tripartite numerals which other Greek graffiti normally contain. This suggests that Q29 might have been a correction, or rather an annotation, to the graffito Q30 which is written next to Q29 and which has an earlier date of 'Year 26, the month of Phaophi, 7th'.

If Phaophi is the correct reading of Q29, it is most interesting to find the two graffiti referring to the same month and the same day of two different regnal years. It would be difficult to believe that this is a mere coincidence. Q29 might give a new date for Q30 due to the arrival of the news about the accession of Ptolemy IV in Alexandria. Of course this hypothesis raises the problem of why the regnal year on Q29 is the second, not the first. Our inclination is to say that the scribe made a wrong guess by equating the last year of the previous king correctly with the first year but the current year with the next, i.e. second, year.

In the course of the general survey of the quarry, we found another section with Greek and demotic graffiti in the extensive upper flat area close to the modern town of New Minya (Section C). Despite the heavy damage caused by recent dumping of rubbish, it is still possible to discern there some traces of ancient quarrying activities preserved in relatively good condition (Fig. 9 Left). A Greek graffito shows that this section was exploited in the first or fourth year. The presence of bilingual graffiti written in exactly the same mode as that of the valley below clearly suggests that the upper flat area was also exploited in the third century B.C.

One of our prime concerns in the course of the examination of the graffiti is the identity of workers engaged in the quarry. Obviously an important clue is the onomastics of the personal names shown on the graffiti. But the distribution of attested months also provides illuminating insight into the character of the workers. In the first place, the appearance of months in the graffiti indicates that quarry was in operation throughout the year. In the second, their frequency demonstrates clear seasonal fluctuation of activities in the quarry. Even though the legible graffiti are not distributed evenly in the valley and they may not represent the actual state of works in progress, the distinct seasonal pattern is unmistakable. The quarry was constantly busy during the first half of a financial year, i.e. from Mecheir to Epeiph, while it was less productive during the latter half of the year, i.e. from Mesore to Tybi. The absence of the month Thoth is surely not





Fig. 9 Detail of the South Quarry. Left: General view of the graffiti at Section C; Right: Thick layers of organic material near Section N.

fortuitous. This seasonal pattern shows that stone blocks were actively extracted toward the beginning of inundation in order to export them through the Nile. It also indicates that some of the people named in the graffiti were not full-time professional masons but local peasants who worked in the quarry when the labor in their fields was not so demanding. This is exactly the case for the quarrymen working today in the vicinity of the Minya area.

During the general survey, an interesting observation was made near the exit of the valley to the east of Section N. Several thick layers of organic material appear on the vertical section of accumulated debris in the midst of the valley floor (Fig. 9 Right). It is highly probable that these botanical remains were deliberately brought into the quarry for the purpose of creating a flat bed on which limestone blocks were pulled down toward the Nile. (SUTO and TAKAHASHI)

4 ARCHITECHTURAL INVESTIGATION

Laser Scanning of Quarries (Figs. 10–15) The investigations of ancient quarries have been carried out from 10th to 17th in August, 2010. The investigated area, which has been covered from 2001, consisted of ancient quarries over a long periods of production, partially excavated in the limited places, that yielded a monolithic column left under processing, so wide that its application of up-to-date measuring techniques had to be introduced; laser-scanning. We applied a long-range scanning machine, laser ray from which can reach as far as 700m and more than 2,000 scanning laser beams can be emitted in one second and the object can be described as a cloud of points having three dimensional coordinates. The measuring of three areas of ancient quarries; the south and north quarries from Akoris, Zāwiyat al-Sulṭān has been carried out. Laser scanning in Zāwiyat al-Sulṭān has been completed within three days and the south and north area where the parts of the quarries have been measured. The result coming from laser scanning is still on analysis, and in 2012 the further field survey is expected and will be carried out in order to complete the measuring.

There is another advantage in this method. The points cloud with finest accuracy of 3

dimensional coordinates were analyzed in a computer almost exclusively as a substitute for the real-existing column, principally for features which, because of their shape or dimensions, could not at all easily have been measured using old-fashioned techniques. In this report, we would like to deal with the monolithic column that lies down on the working area along the north-east town wall. The evidence of the column under processing confirms the existence of such a working area outside of that town (Fig. 10).

Laser scanning of a monolithic column In order to avoid occlusions, the points clouds collected from 12 stations have been merged into one point cloud consisting of 6 million points (Figs. 11 and 13).

From the result of analysis, the surfaces of the column are less carefully shaped than expected, being brought to a more or less unequal level surface by means of liberal spread of processing, however on the curved face of which are scored pairs of horizontal fine border line between chisel marks running parallel with each other, to represent an absolute line drawn from the small holes on the face of the east end to the other of west. (Figs. 12 and 14). Furthermore those small holes are accurately made in the centre of the column cylinder. On the east end, the divergence between the line from the small holes and the central line of the column cylinder is, of course, caused by the crack running vertically, and we can suppose that the processing of the column had been proceeded with high degree of accuracy of the absolute line from east end to other, until the crack has been opened.

Hypothetic procedure of processing On the curved surface, the effect, in skilled hands, was to create a very shallow trench in a straight line, leaving a tool mark on the processing face resembling that created by a point chisel driven across the flat surfaces. The fact that curved but somewhat irregular lines in one direction appear on the upper part alternate in the direction of work after the rough-processing, on the lower part, very regular, closely set longish and straight lines means that the ends of chisel marks where the mason's chisel had cut so much behind the line of the intended surface that the marks could not be effaced. At the fist stage of its process, those small holes made on the east and west ends may define the central line of the column shaft. Along that central line, three guidelines, which might be provided by ropes fasten on the edges of a crossed arms at right angle, could been used to facilitate the actual processes of curving.

The hypothetic process is below (Fig. 15):

- 1. Make a small hole on the each side of the stone block.
- 2. Set crossed arms at right angle on the small holes. And pull ropes taut providing guidelines between those arms.
- 3. In rough-processing, the curvilinear surface of the column shaft was given to shapes circumscribed polygonal in section.
- 4. Applying a wooden curve vertically on its surfaces, which has the same radius of those of the expected column shaft. This process created the chisel marks that were very regularly and closely set on the surfaces.
- 5. Finally, repeat the same work until the curve would fit to the surface. This stage could be applied to the lower part of the south side of the column shaft.

In this process, on the quarry or working area, there is no need to make the stage to achieve a



Fig. 10 General view of the monolithic column.





Fig. 12 Border line between chisel marks on the south side (Right).



Fig. 13 View of the 3D model of points clouds.



Fig. 14 Comparison of the centre line of column section with the absolute line drawn from the small holes on the both ends.



Fig. 15 Hypothetic procedure of the processing.

more rectangular prism in advance of detailed curving and dressing. That monolithic column block of 14m in length roughly extracted in one of the quarries around Akoris was cracked under the process of finishing. On the supposition that the masons in the late Ptolemaic period quarried a single monolithic column shaft (probably other monolithic columns had been successfully processed and carried away from that work area), it is possible to estimate column length from measured diameter (approx. 2.5m, exclusive of collars); by applying the ratio 1:6 or 1:7 (from Vitruvius), 15m or 17.5m is not anomalous size, but shorter than the ideal length. That block would have been destined to be 14m long, and if the reduction process of the length could not have been continuing, the crack made impossible to produce a single monolithic column. Another possibility remains that the diameter of the column shaft would be reduced to 2.0m, but there is no evidence for further discussion about the final shape of this column shaft. They are still open questions whether any other monolithic columns were produced, how this block was carried from the quarry, and where this block was extracted. The masons saw a sudden, tragic end of processing; though that cracked block could be easily reused for constructing any buildings, still less was it the result of any rational knowledge of quarrying processes involved. The last question why they abandoned this monolithic column is also open to answer. (AJIOKA and HORI)



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