1994

- The LMIA Kiln Dump (A. VAN DE MOORTEL)
- The Iron Age Pottery (A. JOHNSTON)
- Murex and Other Shells from Trench 9 ½ (D. RUSCILLO)
CONTEXTS

To the north, east and west of the LM IA(2) kiln that was discovered in 1993, the excavators found a large pottery deposit, which because of the repetitiveness of fabrics, shapes and decoration, as well as the presence of many wasters, was identified as the waste dump of the kiln operation. This kiln dump has been excavated completely in 1993 and 1994 (trenches 87B, 90C, 91B, 95A, 95B, and 95C, and perhaps 84A). It covered a large part of the south stoa of Building T, in which the kiln had been built, and even continued a short distance over the pebbled court to the north. The present report will discuss the various contexts in which kiln dump pottery has been found, and provide an overview of the vessel shapes that have been inventoried up to now. Occurrences of wasters and possible hat fragments will be listed. Also, part of the pottery has been washed with water only, without acid, so that we would have reliable samples for chemical analysis. A list of non-acid-washed pails will be given in an appendix.

Josée Sabourin (87B trench report, pp. 5-15) proposed, in the part of the kiln dump which she excavated, the existence of four deposits separated by surfaces. However, under closer scrutiny these surfaces appeared to be incomplete; they rather may be areas of the kiln dump that were walked on frequently. In
addition, joins occur between sherds of the four deposits, indicating that they are part of the same dump.

More valid divisions within the kiln dump can be made on the basis of soil types. One can distinguish three parts: 1. a large area of red clay and earth extending east, north, and west from the kiln; 2. small patches of brown earth on top of this red area, situated to the west, north, and east of the kiln; 3. a large layer of relatively soft brown earth situated below the red area, and extending further to the north, west and northeast. These three soil types seem to reflect different modes of deposition. The soft brown earth layer in all likelihood contained the actual kiln dump. Gordon Nixon (95A trench report, p. 30) remarks that in his trench it was more densely packed with pottery than the red area on top, and it seems that walking surfaces had formed on it (v. supra, infra). The red area, which also extended over the kiln and in the flues, to all appearances represents the remains of the kiln superstructure, which would have been made out of mud, reed, and small stones (95A trench report, p. 28). In one location (87B:1052), it seems to have been found below wall fall from the kiln (87B section 1.40 m from west baulk). Almost nothing of this superstructure has been found on top of the kiln itself. Since the red layer was sitting on top of the brown layer and was not intermingled with it, it seems most likely to me that this layer was formed after the kiln went out of use, rather than being the result of occasional dismantlings of the superstructure. It may be in part the result of the
collapse and washing down of the superstructure, but at least part of it must have been spread by human hand during levelling operations (cf. infra). The brown patches on top of the red layer seem to represent merely a different type of collapsed material. Those to the east and west of the kiln may be fallen wall debris. A further study of pottery joins within and between the various contexts is needed to test the validity of these interpretations.

There is some evidence that the kiln dump pottery in the brown earth layer has been moved around when the kiln was still in use. Some vessels have joins in pails that were not contiguous and sometimes were situated far apart in area and depth. Most spectacular is the distribution of fragments of dark-on-light decorated, imported bridge-spouted jar C.3477, over no less than 7 pails (87B.111C. 112D, 115. 115A, 116. 118. 118A). The fact that small amounts of unrestorable, imported 2M IA pottery were found throughout the brown layer indicates that the kiln dump had been used for other types of dumping as well.

The kiln flues and firing chamber contained some fresh-looking pottery which is similar to that of the kiln dump. The kiln interior will be treated as a fourth find context. In the future, we will look also for joins between this and the other three contexts.

1. Layer of Red Clay and Earth

A large area of red clay and earth, mixed with some small stones, was found in trenches 87B and 95A. It spread out from the
kiln to the east, north and west, but was absent from the northeast part of the dump (pails 87B/105, 114). Its maximum dimensions were 5 m north-south, and 12 m east-west. To the north, it ran over the first and second column bases from the east, continuing for about 1 m over the court. Further to the west, it was contained within the stoa. To the east, the red layer extended about 2 m away from the kiln, and to the west about 5 m. On either side of the kiln, it stopped abruptly at the south wall of Building T, undoubtedly held by its surviving superstructure. The red layer was about 20 to 40 cm thick in most places, petering out to the north. Its highest point was situated east of the kiln at +3.66 masl, or about 25 cm below the top of the kiln wall (+3.92 masl). It sloped down to the northwest to an elevation of about +3.20 m between the first and second columns of the stoa and +3.06 m between the third and fourth columns. Between the third column and the kiln, it reached a level of +3.09 m. Just west of the fire pit entrance, it had an elevation of +3.17 m. Toward its western edge, the red layer sloped up again to +3.40 m, undoubtedly as a result of human activity. Its bottom level, near the south wall of T east of the kiln, was at about +3.45 m, sloping down to the north and west. It seems to have reached below the level of the kiln wall and associated wall fall in pail 87B/105B (87B section 1.40 m from west baulk. To the north, the red layer sloped down to +3.17 m between the first and second columns, +2.92 m between the third and fourth columns as well as between the third column and the kiln, going further down
to +2.84 m south of the fire pit entrance, but rising to +2.99 at its western edge. The bottom of the red layer is marked by some fire-black patches west of the fire pit and to the south wall of T. in pails 95A/157, 157A, 158. Below pails 95A/187 and 188, tiny, discreet patches of pebbled surface were found adjacent to the third and fourth column bases, at +2.82 and +2.63 m asl, respectively (95A trench report, pp. 38-39, res. surfaces 3 and 4).

The red layer was excavated with the following pails: 87B/21, 93A, 96, 105A, 105B, 106, 106A, 106B, 106C, 106D, 106E, 107, 107A, 107B, 107C, 113; and 95A/68, 76, 78, 92, 94, 95, 103, 110, 115, 116, 117, 118, 119, 136, 138, 139, 140, 144, 147, 150, 151, 152, 153, 156, 157, 157A, 158, 160, 176, 183, 189, 191, 195. Nearly all, except for pail 116 which was dug partially outside of the red patch, have almost pure LM IA(2) pottery in a quite good condition and recognizable as kiln dump material. Several of the top pails have a sprinkling of later sherds (LM IB, LM II, LM IIIA1, LM IIIA2, LM IIIB), which represent either contamination or the result of moving activities in these later periods. Throughout the red layer also a number of earlier sherds have been found [MM IB/II, MM III, LM IA(1)]. They probably had been used as a temper in the kiln superstructure. Even allowing for the fact that the red layer may have penetrated somewhat the pre-existing kiln dump that was embedded in the brown earth, it seems likely that most or all of the LM IA(2) pottery contained by the red layer is the product of the last firing of the kiln. For this
reason it will be studied as a separate unit.

Most of the LM IA(2) pottery is in fresh condition, except for that of pails 95A/139 and 144, situated in the northwest of the red area and near the firing chamber. In most pails, however, a few vessels—mostly unpainted conical cups and medium-coarse vessels—have suffered considerable water damage. These vessels may be tested to see whether they had been fired insufficiently. Many sherds in trench 95A are coated with a limey encrustation (95A/94, 109, 110, 115, 117, 119, 138, 143, 144, 156). This feature has not been noted for trench 87B, but it is possible that acid-washing in 1993 removed all traces of it. Lime was found also on pottery from the kiln flues and firing chamber, but it is virtually non-existent in the brown earth layer, occurring only in pail 95B/175 which was lying out on the court near plaster debris. Perhaps the lime in the red layer comes from the fallen superstructure which may have been lime-coated on the exterior much like traditional Cretan bread ovens are today.

2. Patches of Brown Earth on Top of the Red Area

To the west of the firing chamber entrance was a patch of light brown earth lying on top of the red layer, and below fallen wall debris. It seems to represent wall fall that occurred after the kiln went out of use. This debris continues inside the firing chamber (pail 103; see section D0-D1). The pottery from this light brown earth (95A/104, 107) is indistinguishable from that of the red area. No vessels from it have been inventoried yet.
Also to the east of the kiln, there was a small area of brown earth lying on top of the red layer (pails 87B/80, 82, 83, 84, 93, and 90C/85, 90, 94). Its top surface at +3.99 masl was slightly higher than the kiln wall (+3.92 masl). It is possible that pail 90C/100, which extends at a lower level over the south wall of Building T but is otherwise similar in composition to higher area, is merely material fallen from above when the south wall of T lost its remaining superstructure. The pottery of all these pails resembles kiln dump material. Nothing was inventoried.

To the north of the kiln, near the second column base from the east, a substantial patch of brown earth overlay the red layer (pails 87B/102, 103, 104). At places it reached a thickness of 20 cm. The pottery contained in it looks like the kiln dump material. Again nothing was inventoried. Since pails 103 and 104 include a lot of later sherds (LM IB, LM IIIA2'B), it is likely that this brown patch is a part of the kiln dump that was moved on top of the red layer during later activity in the area.

3. Layer of Soft Brown Earth

The brown earth layer mixed with stones and dense with pottery was situated below the red area and extended beyond it. This layer reached a maximum elevation and a maximum thickness of about 60 cm to the east of the kiln (v. supra, bottom elevations of red layer). It sloped down to the north and west, becoming gradually thinner. To the north, it covered the first two column
bases of the stoa. There it was lying about 15 cm thick over the upper LM IA court, at +2.93/2.98 m (pails 87B/112C, 112D, 114, 1177). Material situated even further to the north, with a top elevation of +3.30 m (pails 91B/45, 47), was not in its original position, since it was lying on top of LM III and historical material (pails 91B/49, 50). To the northwest, the brown layer was lying about 15 cm to 30 cm thick over the upper LM IA court, its top surface rising to +3.22 m (pails 95A/134, 137, 143, 145, 146, 165, 166, 167, 169, 205, 207; 95B/121, 173, 175; 95A sections F0-F1, I0-I1; 95A trench report, p. 38, surface 2). This pebble and plaster surface extended 0.60 m south into the stoa between fourth and fifth column bases (52266 and 52267). Nixon suggests this might have been the original LM IA stoa floor which had been removed for the construction of the kiln (95A trench report, p. 38). There appear to have been empty spots in the brown layer near the third and fourth column bases, since the red layer is reported to have made contact with pebble surfaces at these locations (v. supra, pails 95A/187, 188). To the west inside the stoa, the soft brown layer rose again slightly to +3.08 m, lying up to 35 cm thick over a lower pebble surface (95A trench report, pp. 40-41, surface 5). It seems to have continued into trench 95C, reaching almost to the 6th column base. Just north of the kiln wall (95A/180, 162, 164), the soft brown layer was lying about 20 cm thick on a lightly pebbled surface (+2.72/2.75 masl) as well as on a dark earthen surface situated on top of this pebbled surface, which sloped up from +2.84 m in
this location to +3.54 m in the east of the kiln (95A trench report, p. 42, surface 7: 95A section I0-I1). I agree with Nixon that the dark earthen surface may represent rubble that was either lying there after the destruction of the stoa, or had been purposefully placed on the lower pebbled surface. On top of this rubble surface the kiln wall had been built. This surface was only partially recognized to the east in trench 87B (pails 109, 110). Since in this trench, the kiln dump continued below the level of this surface, and came very close to the kiln, even in its lowest pails, it seems to me that the kiln must have been built on a narrow rubble platform rather than on a large, mound-shaped pile of debris. This platform has been firmly dated to LM IA(2) by the find of a dark-on-light decorated in-and-out bowl (C.9908) in its pail 87B/91. The lower pebble surface is likely to be the same as the one found at +2.74 masl by Josee Sabourin in her sounding just north of the kiln (pail 87B/123).

In two instances kiln dump pottery was found lying on top of LM IA(1) and earlier debris which was heavily worn, and possibly represents stoa material. This earlier pottery was found in the rubble platform on which the kiln was built (pail 95A/185 below pail 95A/184) as well as on the court in the east part of trench 95B (pail 204 below pail 121) in association with possible stoa debris, including plaster fragments. Elsewhere it proved difficult to isolate earlier debris below the kiln dump; it is possible that the stoa was largely cleared out before the kiln was built.
The brown layer was excavated with pails 87B/105, 109, 110, 111, 111A, 111B, 112C, 111D, 112, 112A, 112B, 112C, 112D, 114, 115, 115A, 116, 116A, 116B, 116C, 116D, 117, 118, 118A: 90C/100; 91B/45, 47; 95A/116. 120, 134, 137, 143, 145, 146, 148, 161, 163, 164, 165, 166, 166B, 167, 169, 178, 178, 180, 181, 182, 184, 187, 193, 194, 197, 198, 199, 200, 201, 202, 205, 207, 216, 95B/121, 173, 175 (see section CC-C1); and perhaps 95C/203, 205, 208, 209, 210, 211, 214, 215 and 84A/34.49. Its pottery is in quite fresh condition in many pails, but is remarkably worn in areas to the west (top pails 95A/120, 198, 199 and all pails in trench 95C), northeast (top pails 95A/143, 187), and just north of the kiln wall (pails 95A/130, 182, 184), as well as in several pails on the court (95A/137, 143, 145). The distribution of worn kiln dump material supports the excavator’s opinion that it indicates temporary walking surfaces or tracks that ran over the kiln dump (95A trench report, p. 30). No such areas have been identified in the red layer.

4. Kiln

Pottery similar to the kiln dump material was found in all four flues, as well as in the firing chamber. Some such pottery was found on top of the flues (pail 87B/61) but mixed with IIIA2/B debris. The flues were excavated with pails 87B/90, 90A; 95A/135 (flue 1 = northernmost flue); 95A/101, 142, 172 (flue 2); 95A/100, 174 (flue 3, only top part excavated); 95A/131, 132, 133. They were filled with reddish earth and clay, small stones,
and pottery. The vessels are in fresh condition, apart from some water-damage and lime-coating, which also has been noted for the pottery of the red layer outside the kiln (v. supra). Apart from a medium-coarse side-spouted cup, all restorable shapes from the flues are conical cups (22 ex.). The fact that only small, simple shapes were found may indicate that the larger vessels were rescued from under the debris when the kiln had collapsed, and that small pottery was allowed to fall in the flues. The smaller sherd material from the flues includes many of the shapes found in the dump outside the kiln. The first flue contained a washer, and a large "bat" fragment (C.10052) was lying in the third flue. This fragment as well as a large pithos base (C.10168) found in the lowest part of the second flue may originally have bridged the open flues and supported the pottery to be fired. Some earlier sherds [MM IB:II, MM III, LM IA(1)], found mostly in the top pails of the flues, must derive from the kiln superstructure. They often are accompanied by flat clay pieces with reed impressions, which presumably are remains of the collapsed superstructure.

The upper part of the firing chamber contained LM IA(2) as well as LN IIIA and B debris. Undisturbed kiln material was uncovered from +2.96/2.83 masl down, or about level with the entrance (see section D0-D1). It was excavated with pails 95A/111, 114, 127, 130. The soil in the top pail 95A/111 consists of rather dark brown earth and clay mixed with rubble. The other pails have blackened earth, and pail 95A/127 may contain ash. The
pottery is in quite fresh condition except for damage done by water or fire. The top pail (95A/111) has some lime-coated sherds and clay pieces with reed impressions, possibly from the collapsed superstructure. To this may also belong some MM IB,II and MM III fragments in pails 95A/111 and 130, as well as a flat, curved piece of limestone (95A/111) and clay pieces coated with lime (95A/127). Top pail 95A/111 also contains a waster as well as a bat fragment (C.10073) joining with pail 95A/114 in the firing pit entrance as well as with pail 95A/110 just to the north of the entrance. Their distribution may be the result of cleaning activity. Heavy burning is seen on material in pails from the lowest part of the pit and from the entrance (95A/114, 127, 130). Since this pottery had not turned into wasters, we may conclude that it must have fallen into the ashes when these were still hot, but after the firing had stopped.

POTTERY

So far, over 19,000 pottery fragments from the kiln dump have been studied, weighing almost 400 kg. It is estimated that the total amount, including the still unstudied pails (cf. infra) will be about 25,000 fragments, weighing about 500 kg.

The following list contains the vessel shapes that have been inventoried up to now, after a first, summary study. It must be remarked that not all the pails have been studied yet. The unread pails are: 95A/131, 140, 142, 146, 147, 148 (buckets #1 and 3), 150, 151, 152, 153, 156, 158, 166, 166B, 167, 169, 176, 179, 188,
189, 191, 193, 194, 195, 197, 202, 205, 207. These will be studied in 1995.

The frequency distribution of shapes is heavily biased towards small-sized vases, and especially unpainted conical cups. In all, 142 vessels have been inventoried, of which 115 are conical cups. A glance at the remaining sherd material of the kiln dump makes it clear that this is not an accurate reflection of LM IA(2) pottery production in Kommos. Further study of the pails is certain to lead to an increase the proportion of the other shapes. It is projected that in all, about 300 vessels will be restored.

FINE, SMALL: 123
Conical cups - unpainted conical (type C): 80
  C.8926, C.8927, C.8942, C.8943, C.8944, C.8945,
  C.8946, C.8982, C.8983, C.8984, C.9440, C.9441, C.9909, C.9913,
  C.9959, C.9960, C.9961, C.9962, C.9963, C.9964, C.9965, C.9966,
  C.9967, C.9968, C.9970, C.9972, C.9978, C.9987, C.9988, C.9994, C.9999,
  C.10017, C.10044, C.10046, C.10047, C.10056, C.10057, C.10056,
  C.10059, C.10060, C.10061, C.10062, C.10063, C.10071, C.10074,
  C.10089, C.10090, C.10093, C.10094, C.10110, C.10132, C.10132,
  C.10140, C.10141, C.10148, C.10152, C.10153, C.10154, C.10156,
  C.10159, C.10160, C.10161, C.10162, C.10163, C.10170, C.10171,
  C.10172, C.10173, C.10174, C.10175, C.10211, C.10215, C.10271

Conical cups - unpainted tumblers (type D): 2
  C.8928, C.9944

Conical cups - unpainted ovoid or semiglobular (types E and F): 9
  C.8980, C.9442, C.9558, C.9943, C.9945, C.9969,
  C.9977, C.10151, C.10176

Conical cups - dark dipped (types I and J): 1
  C.9989

Conical cups - monochrome ovoid or semiglobular (types P and Q): 18
  C.8934, C.8941, C.9910, C.9914, C.9915, C.9916,
  C.9917, C.9974, C.9971, C.997a, C.997b, C.10053, C.10054,
  C.10055, C.10076, C.10164, C.10165, C.10166
Conical cups - light-on-dark patterned ovoid or semiglobular (types V and W): 3
C.8929, C.9932, C.9988

Conical cups - light-on-dark splashed: 1
C.9932

Conical cups - dark-on-light splashed: 1
C.10048

Teacup - monochrome: 1
C.8937

Vapheio cup - monochrome: 2
C.8972, C.9984

Bell cups - unpainted: 2
C.9947, C.10095

Bell cups - dark dipped: 1
C.9992

Miniature juglet - unpainted: 1
C.10045

FINE, MEDIUM-SIZED: 6
Kalathos - light-on-dark patterned: 1
C.9439

Pitharaki - light-on-dark patterned: 1
C.8956

Bridge-spouted jar - light-on-dark patterned: 1
C.9996

Cylindrical vessel - monochrome: 1
C.9957

Pedestalled vessel with molded foot - unpainted: 1
C.8947

Pedestalled vessel - monochrome: 1
C.10155

MEDIUM-COARSE, MEDIUM-SIZED: 9
Cup, side-spouted - unpainted: 3
C.10072, C.10091, C.10167

Bowl with wide ledge rim - light-on-dark patterned: 1
C.9985
Kalathos - monochrome: 1  
C.9931

Kalathos - light-on-dark patterned: 1  
C.9930

Jugs - unpainted: 2  
C.9934, C.10092

Bridge-spouted jar - light-on-dark patterned: 1  
C.9935

MEDIUM-COARSE, LARGE: 4  
Jug, tall-necked with neck ring: 2  
C.8973, C.10272

Oval-mouthed amphora - dark-on-light patterned: 2  
C.8931, C.8971

DISCUSSION

The Kommos kiln dump gives us the opportunity, unique so far in Minoan Crete, to establish the petrographic and chemical characteristics of pottery that without any doubt was locally produced. This studies will be carried out by Peter Day from Sheffield University and Vasilis Kilikoglou of the Demokritos laboratory in Athens. Also, the preservation of the kiln dump will allow us to study patterns and variations in the pottery production of a single site within a single ceramic phase. In addition, if the layer of red earth and clay that forms the upper part of the kiln dump can be established to contain the pottery from the last firing of the kiln, it will give us a rare chance to study the degree of dimensional standardization among vessel shapes, presuming that these vessels had been made within a very short period of time. This would provide us with invaluable information on the division of labor and the degree of
routinization in the pottery workshop.

The inventoried pottery gives a first impression of the range of shapes that were produced in the LM IA(2) phase at Kommos. Even though we have not yet a reliable picture of their frequencies, a first study of the sherds suggests that some shapes were predominant: unpainted and decorated conical cups, kalathoi, bridge-spouted jars, oval-mouthed amphoras, and elongated jars with a dark-on-light stylized plant motif. Surprising is the rarity of teacups and Vapheio cups. Further characteristics of the locally produced vases are: their thin, washy dark paint with a predominance of red hues; and the small range of decorative motifs limited almost exclusively to thick, retorted spirals and reeds. Minor motifs are light-on-dark splashes, dark-on-light splashes, and light-on-dark festoons on conical cups; and light-on-dark reeds on kalathoi. Unique for Kommos are the conical cups with light-on-dark retorted spirals with branching-off curls. Dark-on-light decorated vessels are always highly fragmentary, and for this reason may be considered as imports (v. infra).

There are some cooking pot and pithos sherds present throughout the dump and even in the kiln (e.g. pithos base C.10168 in the second flue). However, these never can be mended to any extent, so that it seems certain that they have not been produced in this kiln. They may have been built into the kiln superstructure, or have served as fire supports, or else have merely been dumped among the kiln refuse.
The presence of some imported vessel fragments in the soft, brown layer of the kiln dump provide us with opportunities of crossdating. They all can be dated to LM IA:

C.9437 - Fine bridge-spouted jar with a hard, buff fabric and tortoise-shell ripple decoration ripple decoration; North-Central Crete?
C.9982 - Fine closed vessel with a soft, buff fabric and dark-on-light crocus motif; Mesara?
C.9983 - Fine teacup with a soft, buff fabric and dark-on-light tortoise-shell ripple decoration; similar example found in A. Triadha
C.9993 - Fine closed vessel with a soft, buff fabric and tortoise-shell ripple decoration; Mesara?
C.10135 - Medium-coarse closed vessel with an orange fabric, buff slip, and dark-on-light linear decoration; E. Creton?
C.10260 - Medium-coarse closed vessel with a hard brown fabric, buff slip, dark-on-light band, burnished; E. Creton?
C.10270 - Fine jug with red-brown fabric, buff slip, brown tortoise-shell ripple decoration, burnished; E. Creton?

A large number of wasters, 153 in all, have been found throughout the dump, as well as in the flues and firing chamber. In all, 38 out of the 150 kiln dump pails contain wasters. A few (about 10?) are from fine vases (kalathos, jug?), but most belong to medium-coarse shapes (jug? oval-mouthed amphoras, pithos). Some have been inventoried: C.10068 (fine kalathos), C.10069 (fine jug?), C.10176 (medium-coarse jug?). C.10156 (oval-mouthed amphora), C.10176 (medium-coarse jug?). The following pails include wasters: 87B/80, 81, 82, 93, 96, 104, 105, 105B, 106, 106B, 107A, 112, 112A, 112B, 114, 115, 116C, 118; 95A/68, 92, 95, 109, 115, 119, 134, 136, 137, 138, 143, 144, 145, 157, 160, 163, 178, 201; 95B/173; 95C/210, 211. High concentrations of 8 to 23 wasters occur in pails 87B/81, 112A and 95A/137, 138, 160.

In the dump and the kiln, also a number of fragmentary, large discs have been found. They have been made in a cooking-pot
fabric, and their upper surfaces have been covered by a fine, buff slip. So far, two have been restored to some extent. Both have a diameter of about 60 cm. In spite of their large size, they may have been used as so-called "bats," or slabs supporting the vessels that were being made on the wheel (D. Evely, dissertation). It is not impossible that they are simply pithos lids, but their distribution pattern over the site, with a much higher frequency in the kiln dump than elsewhere, suggests they rather were bats. Pieces of broken bats may have been used as fire supports. During a visit to Thrapsano this summer, G. Nixon and I have seen broken bats used in this way in a traditional simple updraft kiln. "Bat" fragments have been found in 14 out of the 150 kiln dump pails, with no more than 3 fragments per pail: 87B/116; 95A/76, 94, 110, 111, 114, 136, 139, 157, 160, 165, 176; 95C/203, 210. The total number of fragments so far is 17. Their scarcity in trench 87B may be a result of our inability to identify them during most of the 1993 excavation season. More may be found in future study sessions. A few "bats" have been inventoried: C.8935, C.10052, C.10073, C.10136, C.10147.
APPENDIX: KILN DUMP PAILS THAT HAVE NOT BEEN WASHED WITH ACID

Apart from some pails that have been accidentally washed with acid, and others that have not been identified in the field as containing kiln dump pottery, a large number of kiln dump pails excavated in 1994 have been washed with water only, so as to provide reliable samples for chemical analyses.

The water-washed pails are the following: 95A, B, C, 92, 84, 95, 100, 109, 110, 111, 114, 115, 116, 117, 118, 119, 127, 133, 135, 138, 139, 143, 144, 148, 156, 157, 157A, 160, 172, 175, 180, 181, 182, 184, 204.
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Material from excavations

During the excavations of 1994 a limited amount of Iron Age pottery was recovered, and no structures of the period were found. Trench 93B yielded one pail of mixed material, down to early Hellenistic; similarly, upper pails from 95 contained a variety of post-BA material, including a battered Corinthian pyxis (C9065). The major find in 95, however, was nine kilos of a micaceous pithoid cooking pot (C9228), scraps of which had been found in the surrounding area in previous seasons. Its date remains uncertain, whether LMIIIB-C or EIA; context points, just, to the latter, but a fragment from the Hill-top (4A) in a pail dated to "latest IIIB" gives pause; 95/36 would have fragments of the pot as the only Iron Age material, though a lower pail, 38, may have IA sherds.

Trench 94A, East of Q, produced IA material in all pails, though few in the lowest levels. Sanctuary material of the latest Hellenistic period or after was recovered in relatively deep contexts. It included bull's legs, two ladles in good state of preservation, two lamps found in close association but dating at least three hundred years apart and the only inscription found during the season (I100), a Rhodian amphora stamp of the fabricant Dios, close date to be established. A heavy pithos rim with stamped decoration (C9059) is in the same style as known smaller fragments in 34A/10 and 42A/9; the date should be Classical, pace earlier opinion.

Trench 94B produced sporadic IA material in most pails down to the floor of P. I catalogued the majority of the LMIII pails in this trench to relieve the burden on AvM.

Work on previously excavated material

This fell into several categories concerned with both the discarding and future publication of material.

Building Z

Conservation, photography and drawing of various pots was carried out by members of the team. I re-examined many of the pails with a view to re-assessing the length of use of the building, as well as extracting mendable material, detecting new joins and cataloguing a modicum of new pieces. Particular attention was paid to the range of micaceous pots. A few probably Phoenician fragments were isolated but no feature sherds. It seems that less pottery is of the seventh century than previously thought (see below), but further consideration is needed.

Area of V, X and F

Some time was spent on reviewing material from this general area,
initially with a view to sorting out discardable pails. A list of these was passed on to D. Ruscillo. Some material was catalogued, a small amount of material of significance for dating (esp. re F) was retained and further attention was paid to imported amphorae; all fragments of Cypriot origin were extracted and all micaceous material was noted and in some cases extracted. Included in this review was material from 54A1 and 66A. Not all the finds of 1991 could be treated, partly for reasons of time, partly because a significant proportion had been discarded earlier in the season, (as were pails from 65A of relevance for the study of Z and 84A re Y). The micaceous pottery from V/X and Z can be studied in association with material already selected by PJC; this was reviewed this season, with some further cataloguing. Full strewing is needed to study the material to best advantage, and there are yet pails from V/X to be re-examined.

Temple area pottery

A good sample of uncatalogued material from various trenches, associated with the building of Temple B was reviewed. I had not previously worked on any such material. There is still room for further study here. In sum, it must be the largest body of stratified LPG to MG pottery in the Messara, if not the whole of Crete; as such it could be retained as a study collection in whole or part. The material included in Kommos IV is representative but by no means exhaustive in terms of shapes and decoration. More particularly, it is a foil to the Building Z material and it will be instructive to elucidate the differences and similarities. The dating of the black-glazed cups is an important matter, and here Z should throw light on the temple B material, some of which PJC considered contamination of the seventh century. Similarly with the micaceous imports - similarities, dates, range. The Temple B material was catalogued in the old, summary style, and to my mind there is no proper description of the total contents of the pails on record.

Other

A short time was spent reviewing "LMIIC" and "SM" material in the catalogue. It may be noted that no piece from the earliest phase of the temple is catalogued as such, though all experts agree that at least one of the pots is of that period. As an aside, I would consider it useful to allot dates, even if with "?" to all catalogued items. The pieces catalogued as LMIIC and SM are disparate in all senses: three rims, three feet, three areas of discovery (House X, Gallery 2 east, Gallery 4 west); 2 feet are "EPG, but let's say SM/EPG to be on the safe side", and the rims are "sub-LMIIC".

On a brief visit to the Stratigraphic Museum at Knossos I examined unpublished PG and G material from the Royal Road excavations. Suitable text on V, Y and Z was drafted for Kommos IV.
Future work

There remains a good deal of reviewing of excavated material to be done in order to single out discards; I am anxious that the dislocation of efforts of this year should not recur. The publication of the material from Z is of prime importance, though it will need a good deal of artwork. The examination of Temple B material has demonstrated that there is much to be added, in ceramic terms, to what is included in Kommos IV. I have also noted above the review of micaceous wares, together with (other) imported amphorae; it is signalled in Kommos IV that I will treat them further, though whether there is a publication, rather than a site report I am not sure.

Entries for Kommos IV

V. [the text can stand as at present, or with some integration - esp. to take into account the metal-working aspects. The end of the footnote could be expanded: "....was confirmed by the discovery of further Corinthian fragments down to the lowest associable floors." I have no published reference for the pyxis type, no. 271, though the date is clearly correct.]

Y. The terminus ante quem is indicated by sherds of a ladle only roughly datable to the fifth century, found when cleaning the surface. [and since discarded]

Building Z. The period of use of the building is associated with quantities of PGB and MG pottery, to be published separately. The two styles are found together, down to the lowest floor, an indication of contemporaneity; the dating would therefore be close to the early years of Temple B. A broad range of shapes is represented; illustrated are a typical black-glaized cup (C9721), a fragmentary krater, probably stirrup-handled, of MG style (C9766) and one of the better preserved of the amphorae with PGB decoration (C9555). There are few imports, though a handful of body sherds of Phoenician amphorae may be noted. The MG kraters are accompanied by skyphoi and jugs from the same workshop.

Alan Johnston
17th August 1994
REPORT ON SHELL SAMPLES FROM TRENCH 93A

Deborah Ruscillo

Contents of Pails:

K94A/93A/10:17 (Sh 15) (1620 gm.) MMIB/II

. 295 *Murex trunculus* Trunk Murex
. 52 *Buccinulum corneum* Euthria shell
.  6 *Murex brandaris* Dye Murex
.  2 *Monodonta turbinata* Checkered Top shell
+ many small fragments of *Murex* and *Euthria* shells

*Monodonta turbinata*

1 small, complete shell (Width 9 mm)
1 large shell with top two whorls missing (Width 24.5 mm)

*Murex brandaris*

1 complete
1 with umbilicus and final whorl only (Length 33 - 48 mm)
2 with umbilicus ("tail") broken off
2 with body holes

*Buccinulum corneum*

25 complete
  8 with body holes (Length 22 - 40.5 mm)
19 miscellaneous pieces

*Murex trunculus*

GROUP A: 68 shells (L. 62 - 90+ mm)

  5 complete (two dead before collection) 7%
  1 with body hole 2%
  62 fragments 91%

GROUP B: 102 shells (L. 36 - 61.25 mm)

  41 complete 40%
  9 with body holes 9%
  52 fragments 51%

GROUP C: 69 shells (L. 28.5 - 39.5 mm)

  32 complete 46%
  4 with body hole 6%
  33 fragments 48%
GROUP D: 56 shells (L. 14 - 31.25 mm)

40 complete 71%
2 with body hole 4%
14 fragments 25%

K94A/93A/10:23 (1575 gm.) MMIB/II

. 352 Murex trunculus Trunk Murex
. 38 Buccinulum corneum Euthria shell
. 4 Murex brandaris Dye Murex
. 1 Monodonta turbinata Checkered Top shell

+ thousands of small fragments

Monodonta turbinata

1 shell with bottom whorl broken (W. 29 mm)

Murex brandaris

4 complete shells (L. 27.5 - 44 mm)

Buccinulum corneum

17 complete
4 body holes (L. 21.5 - 38.5 mm)
17 broken

Murex trunculus

GROUP A: 129 large shell pieces (L. 50 mm +)
129 broken 100%

GROUP B: 66 shells (L. 29.5 - 51 mm)

11 complete 17%
2 with body holes 3%
53 broken 80%

GROUP C: 71 shells (L. 26 - 33.5 mm)

20 complete 28%
8 with body hole 11%
43 broken 61%
GROUP D: 86 shells                      (L. 11.5 - 26 mm)
54 complete                          63%
  3 with body hole                    3%
  29 broken                           34%

K94A/93C/8:37 Burnt fill*             (2100 gm.)  MMIB-LMIA
 . 16 Buccinulum corneum              Euthria shell
  . 9 small Murex trunculus           Trunk Murex
      + hundreds of frags
  . 7 Murex brandaris                Dye Murex
  . 2 Monodonta turbinata            Top shell
  . 1 Charonia sp. frag              Triton shell
  . 1 Patella caerula                Limpet
  . 1 Buccinidae                      Whelk

Buccinulum corneum

  3 with body holes
  13 large fragment                  (L. 18.5 - 38.5 mm)
      + many small fragments

Murex trunculus

  9 complete                         (L. 13.5 - 25 mm)
      + hundreds of fragments from all sizes

Murex brandaris

  2 complete
  5 broken

Monodonta turbinata

  2 small complete

Charonia sp.

    One fragment of siphonal canal ("tail")

Patella caerula

    One complete shell

Buccinidae

    Uncommon whelk with body hole

* No shells burnt
K94A/93A/9:21  
(950 gm.)  
MMIB/II  
- Murex trunculus  
  Trunk murex  
- Buccinulum corneum  
  Euthria  

Thousands of Murex fragments; no complete. Only 3 tiny pieces of Euthria.

K94A/93C/8:33  
(295 gm.)  
MMII-LMIIIA2  
- 276 Murex trunculus fragments, 1 complete (21 mm), 1 with body hole (17 mm), and hundreds smaller fragments.  
- 12 Buccinulum corneum: 3 complete, 5 with body holes and four other fragments.

K94A/93A/9:21  
(105 gm.)  
MMI/II  
- 33 Murex trunculus fragments, 2 complete and 2 with body holes.  
- 6 complete Euthria, 2 with body holes, 5 other fragments.

K94A/93C/7:35  
(55 gm.)  
MMIB/II-LMIA  
- 35 Murex trunculus fragments, one complete (25.25 mm)  
- 2 complete Euthria, 1 with body hole, 5 fragments.

K94A/93C/9:34  
(70 gm.)  
MMII  
- 58 Murex trunculus fragments, 3 complete, 1 with body hole (26.5 mm).  
- 2 complete Euthria, 1 with hole, and 2 whorl shafts.
**STUDY IN BREAKAGE**

(*K94A/93A/10:17  Sh 15*)

**Murex trunculus**

**GROUP A:**

Largest murex shells likely cracked open with a rock. Shell cortex too thick to penetrate with tool. One example of a body hole in this group has the bored hole near the aperture, where the shell is thinnest. The animal within the heavier shells is larger and stronger creating more difficulty in extracting the creature and organs by way of pulling legs.

Control experiment: Whole murex hit with rock three times. The first blow hit a spiny projection in the shell creating a hole in the whorl. A second blow opened the gape wider, and a third blow completely pulverized the shell.

**GROUP B:**

Most body holes occur in last whorl where the bulk of the organs are and where the shell is the thinnest. Holes occur between the spiny projections suggesting that the shells were punctured with a tool rather than a stone. Crushed shells presumably created by using a stone to open the contents.

Control experiment: A whole murex from this size group was hit twice with a stone. The first blow broke the shell open, and the second blow created smaller fragments which resembled those in the archaeological sample in size and shape.

**GROUP C and D:**

Most shells complete. The location of body holes varied more than the larger shells. The shell in the smaller shell groups is more thinly distributed and holes can be made easily with a boring tool anywhere on the shell so dye within can run out, or the animal can be removed more easily. Presumably, animal could have otherwise been pulled out by the legs. It could also be possible that smaller shells were largely ignored in dye extraction since energy cost in removing organs and the small amount of resulting dye output proved non-profitable.

Control experiment: Small shells were hit once with a stone which completely pulverized them. Perhaps another reason why smaller shells were recovered mostly complete is that crushing these shells would make production slow and messy by having to separate the organs from the crushed shell.

Thousands of crushed fragments were recovered from all sizes of shell.
CONCLUSION

All samples from Trench 93A and 93C present very good evidence for the production of dye in Middle Minoan Kommos. Murex trunculus is the main source of dye in these samples. Found also in abundance and with evidence of dye extraction as well is Euthria shells. It is unclear what colour or substance is produced by extracting the animal from within the Euthria shells. Further research is required to determine this; the results of such research could enlighten us more on dye production in the Bronze Age and at Kommos.

Reese (1987) reported finding an abundance of Murex shell, but stated that the quantity of Murex from Minoan Kommos did not indicate dye industry (p. 203-206). Reese suggested, however, that Murex evidence from 7th century Kommos was more convincing of dye production. In his report of Murex trunculus found in the Middle Minoan period, Reese reports that the shells were usually found broken "possibly to extract meat for consumption". It is unlikely that the Murex samples extracted from 93A and 93C were consumed as food. Murex are almost never eaten in modern times, but used as bait instead. Its slim little legs and viscous inards make the Murex a difficult and unpleasant candidate for food. Furthermore, the regular occurrence of holes in the body whorls of the shell coincide with other Greek archaeological evidence for dye production.

The sample from 93A was recovered associated with a channel indicating some sort of run-off or drainage. This context perhaps further supports the suggestion of dye industry in Minoan Kommos. It should be said, in conclusion, that while the shell and context evidence obtained from excavation in these areas strongly suggests dye production, further research, both practical and literary, should be conducted before any firm judgement is made on the crushed Murex and Euthria of Kommos.

1 Reese (in print) Kommos I.1, Ch.5.

APOTHEKE REPORT, 1994

Niki Holmes Kantzios

August 24, 1994
The 1994 season was reasonably quiet, due to the reduced number of trenches undertaken. My thanks to my assistant Debbie Ruscillo for taking care of the apotheke until my arrival on July 15, two weeks after the beginning of excavation. As of the twenty-fourth of August, nearly 400 objects have been accessioned and catalogued, almost all of them from this year. The few exceptions are chiefly Iron Age material located by Alan Johnston among the sherds of former years. Every object accessioned -- i.e., designated for entry into the catalogue -- was in fact completely catalogued. Due to Debbies’s departure, however, 71 of these remain to be entered into the D-base and to have their computer-printed cards generated. 282 catalogued objects have yet to be photographed; 141 of these are still to be sketched. Only seven ceramic vessels remain to be mended, thanks to the presence of two conservators and a trained assistant.

Three vessels were drawn and inked for Alan Johnston; five more were penciled for Aleydis Van de Moortel. Two crates of objects remain for drawing in 1995.

For temporary purposes of study, "special collection" boxes were isolated for the Kiln Dump and for wasters. A permanent special collection box for foreign vessels was organized, to be kept here after the contents of the Kitchen Annex are sent to Heraklion. This includes all sherds pulled from all trenches, and also uncatalogued sherds, from the following categories: Canaanite, Phoenician, Cypriot, Italian, Egyptian, East Greek/Cycladic, Corinthian/Attic, Mycenaean and Unidentified Imports.
During the course of the season several visitors appeared for the purpose of studying material from the excavation. Brooks Ellwood, a geologist from the University of Texas at Arlington, took samples from the kiln for archaeomagnetonmetric analysis, and from the anchors in order to identify the source of the stone. Sarah Vaughan (Wiener Lab) and Michael Sugarman (Harvard) independently expressed interest in analyzing an overlapping collection of Canaanite sherds; and while a sample box was begun for the former, the project was postponed until these two could reach an agreement about the scope of their respective studies. Samples of cooking pots were prepared for Richard Evershed (Bristol University) to pick up during the winter for study. In addition Ora Negbi of Tel Aviv University examined briefly some insecurely identified Canaanite pieces.

It was decided that it would be impossible to begin the physical transfer of artifacts from the Kitchen Annex to the Heraklion Museum until next year, in part because the confused condition of the earlier trench boxes needs to be corrected before they are consigned to permanent storage. Towards that end, the former "LWV" collection has been reintegrated into twelve of the forty-one relevant trench boxes, and the necessary first step (one which has proved unexpectedly time consuming) of rebagging and labeling artifacts has been carried out for an additional twelve trenches, thanks to the help of D. Ruscillo and Ippokratis Kantzios. Since a number of the remaining boxes have already been rebagged at other times, less than half the task remains—perhaps two or three full days' work for two people. In addition,
the "Clay Lumps" and "Clay -- General" categories of objects were rebagged and consolidated from two complete dexion shelves into the contents of two labeled crates in preparation for the move. Ironworking and stone tools have still to be culled for the transfer. Bone artifacts were repackaged in rigid containers with an eye to their eventual permanent storage, and in accord with the advice of Barbara Hamann. I am happy to report that the new glass jars procured for the storage of bronze and iron objects on her recommendation last year last year have proved to be almost a hundred per cent moisture proof. Wooden storage boxes were also made for the compact storage of decorated plasters, although without a cabinet which would allow us to stack them they remain wasteful of shelf space.

As I foresee the work of the Apotheke staff in 1995, it will include the continued preparation of artifacts for their final transfer to Heraklion as each group is studied. They should be organized in as neat and and self-evident a way as possible, in order to make it possible for scholars to locate artifacts without the presence of our own staff. The "devancing" accomplished so far already shows that many objects which have seemed irretrievably lost may turn up in the course of this process. Likewise all anomalies or gaps -- e.g., lost cards -- should be addressed in order to finalize a complete, consistent and user-friendly registry. At some point after all the material has been studied for publication (not next year for most things, I realize), it should be "sealed" for a period of one or two weeks in order to make an accurate final count before turning
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over control to the Museum. This, I experience daily at the end of each season, is impossible as long as people are removing things which have already been organized.

At this point, the close of the final excavation season of Kommos, I would like to express once again my thanks for allowing me to be a part of this splendid project. I look forward to joining the team again in 1995, although it is only fair to warn you that I may not be able to stay for an entire long season, depending upon the state of my dissertation and other factors.
STATE OF SUPPLIES AS OF THE END OF 1994 SEASON

Sledge hammer: 1
Large picks: 15 (2 w/o handles)
Hoes: 2
Shovels: 7
Pins: 47
Brooms: 3 (2 w/o handles)
Knives: 8
Clipboards: 11
Conversion rulers, short: 5 (3 long) Plumb bobs: 11
Line levels: 10
Ball points: 35
White-out: 13
Brushes: 12
Zambilia: 16

Trowels: 11
Small picks: 14 (1 w/o handle)
Rakes: 1
Corner pins: 28
Whisk brooms: 4
Dust pans: 12
Tape measures: 7 either size
Compasses: 12
Black markers: 15
Pencils: 4 boxes hard, 1 box soft
Clear nail-polish: 15
String: 10 lg., 25 sm.
Buckets: red - 37; green - 33
Blue - 26; Yellow - 39; White - 31
Conservator's Report

Kommos 1994

Barbara Hamann
KOMMOS EXCAVATIONS -- 1994

Conservator's End of Season Report  (August 5, 1994)

Barbara Hamann
Kommos Field Conservator
July 5 - August 5, 1994

Clarissa Hagen-Plettenberg
Conservation Intern
July 5 - August 18, 1994

CERAMICS

As in previous seasons, the adhesive used was HMG. When necessary, break edges of powdery ceramics were first consolidated with a dilute solution of Paraloid B-72 in acetone, applied on a brush. Both HMG and B-72 can be removed with acetone. Ceramics were mended by C. H.-P., by Nikki Holmes-Kanzicou, and by B.H.

As of this writing, vessels mended by the conservation staff totaled 29 (not including about two dozen objects which required re-mending for photography after their original repair last season). C. H.-P. mended 23 complete or partial vessels, notably a very large MMIII cooking pot (C9337) and an LMIIIA2 tall, 4-handled jar with handprints (C9004). B.H. mended 6 complete or partial vessels, the largest being a thin-walled hydria (C8939).

As of this writing, with one more week of excavation to come, only one or two bags of Minoan pottery await mending (not including the pithoi) and all Greek pottery submitted this season so far by AWJ has been mended.

Conductivity testing of the acid-washed pottery:

Last season, several groups of sherds washed in 1992 and 1993 were soaked in tap water for 5 to 18 hours and the bath water tested to check how effectively the chlorides introduced by the acid washing are being removed by the rinsing and overnight soaking. As noted in last year's report, in every case the conductivity reading of the bath water was only slightly higher than that of clean tap water. These results, and the good condition of Kommos sherds washed twenty years ago, seemed to indicate that the washing procedure was probably sound.
This season, in order to get a more accurate indication of the chloride content of the acid-washed pottery, and to determine if an additional soaking step in purer water might be called for, conductivity readings were taken after soaking several groups of washed sherds in de-ionised water. The groups of sherds were chosen in consultation with Aleydis Van der Hoortel as being representative of the thicknesses and ware types found at Kommos.

The conductivity reading of the clean de-ionised water was less than 10 uS. After soaking for 5 hours, pail K94A/95A/2:5 gave a reading of 100 uS. After soaking 7 hours, pail K93A/88A/2:15 gave a reading of 180 uS. After soaking 5 hours, G9437 (K93A/86F, 887B/various pails) gave a reading of 170 uS. These readings are lower than that of Chicago tap water and are commonly considered to be safe levels. Therefore, the installation of a de-ionising column and the introduction of an additional soaking stage does not seem to be warranted.

STONE

Two stone objects, both anchors, were treated by the conservation staff.

S2233

The underside of the anchor was sampled by Brooks Elwood, who used a portable circular saw. Removal of the sample resulted in a long, superficial gap. After sampling, the anchor was washed in tap water with soft brushes by C. H.-P. and allowed to air dry slowly in the shade. The inside of the gap was sealed with a dilute solution of Paraloid B-72 in acetone. The gap was then filled with plaster of Paris mixed in a 5% solution of CM Bond M-3 for additional strength. When dry, the plaster was filed and toned with Liquitex Acrylic Artist Colors.

S2234

Most of B.H.'s season was spent on the treatment of this anchor. See the conservation treatment record for details.

GLASS AND FAIENCE

A condition survey of the glass and faience housed in Apotheke 4 was carried out by C. H.-P. Overall the objects appeared to be stable and in good condition, with the exception of a few fragments which were badly deteriorated. No treatments were performed.
COPPER ALLOY

Five copper alloy objects were cleaned by the conservation staff.

B391 was cleaned by B.H. with a scalpel blade and needle to remove soil and carbonate accretions. It was then given two brushcoats of a dilute solution of Paraloid B-72 in acetone to even out the appearance of the surface.

B392 was cleaned by B.H. with scalpel blade and needle to remove soil and carbonate accretions. Small areas of bronze disease on the ends were excavated using a needle, and treated with silver oxide in alcohol by C. H.-P. It was then given two brushcoats of a dilute solution of Paraloid B-72 in acetone to protect and consolidate the fragile surface.

B393 was cleaned by B.H. with scalpel blade and needle to remove soil and carbonate accretions.

B389 was cleaned by C. H.-P. with scalpel blade and needle to remove soil and carbonate accretions. Small areas of bronze disease were treated with silver oxide in alcohol. It was then given several brushcoats of a dilute solution of Paraloid B-72 in acetone to protect and consolidate the fragile surface.

B378 was cleaned by C. H.-P. with scalpel blade and needle to remove soil and carbonate accretions.

PLASTER

The plasters in the conservation area were organised by MCS according to their provenance.

Several uncatalogued plaster groups were cleaned by B.H. and by C. H.-P. Catalogued plasters cleaned by B.H. were P187 (part of a table and associated fragments), P192 (a representation of rockery), and P193 (a poorly preserved floral motif).

Treatment of painted plaster can include: application of a gauze backing using a concentrated solution of Paraloid B-72 in acetone, acetone removal of the gauze (and B-72 or PVA) facing applied in the field, removal of soil from the painted surface using alcohol or alcohol/water solutions applied on cotton swabs or a fine paintbrush, consolidation of the plaster surface and edges with B-72.
CONSERVATION TREATMENT RECORD -- KOMMOS EXCAVATIONS

Object: Anchor
Material: Limestone
Number: S2234

Date Excavated: 7/93
Date Treated: 7/93 and 7/94
Date of Report: August 5, 1994

Conservator: Barbara Hamann
Kommos Excavations Conservator
Assistant Conservator
The Oriental Institute Museum
University of Chicago

DESCRIPTION:

Stone anchor weighing 75 kg, triangular in outline with rounded corners and three holes. Flat, with one face smooth (face A) and one rough showing chisel marks (face B). Cream colored stone with rose banding. All exterior surfaces are weathered gray.

Thirteen cm. thick, 72 cm. long, 60 cm. wide at bottom.

CONDITION:

The anchor was split into two layers along a horizontal bedding plane. The thicker layer (which was the underside when the anchor was found) contains face B and is 8 cm. thick. The thinner layer contains face A and is 5 cm. thick.

The thick layer itself was in 6 large pieces, while the thin layer was in approximately 25 pieces (not including chips and flakes). Soil and fine roots were found on many of the break edges when the fragments were lifted. A lower corner was missing from layer/face A when the anchor was found.

The stone of the thicker layer seems solid and in good condition. In the thin layer are several hairline cracks and where they intersect the stone has a tendency to flake or break off in small irregular chunks.
TREATMENT:

7/93

The anchor pieces were lifted individually. To aid in reassembly, each of the two layers was traced before the pieces were removed, and the thinner, more badly broken of the two (layer A) was also photographed. The central area of that layer, where the fracture pattern was complex and the pieces were small, was bandaged before lifting with gauze strips and a solution of Paraloid B-72 in acetone. Loose chips which were detached and out of position, especially adjacent to the missing corner, were collected and saved.

All pieces (except for the bandaged group) were washed in tap water using soft toothbrushes to remove soil and roots. Chips and flakes which became detached in the water were reattached with CM Bond M-3. The washed pieces were allowed to air dry slowly in the shade.

Because the anchor may have been used in the sea before it was used as a column base, and may have absorbed a dangerous amount of chlorides in the marine environment, conductivity tests were carried out to determine if desalination would be required. Two pieces from layer A were soaked separately in tap water, each for four hours, one before washing and one after. The conductivity of the bath water of each was then measured using a Corning PS-17 meter. The reading for the unwashed piece was 80 uS higher than that of tap water, while the reading for the washed piece was exactly that of clean tap water, indicating that desalination would not be necessary.

7/94

Due to the size and weight of the object, the decision was made to use an epoxy for the re-assembly and to dowel the 6 pieces of layer B to each other. The pieces of layer A were not drilled at all, because of the stone's greater fragility in this layer. The epoxy selected, Akepox A-283, is manufactured by Akemi of Germany for use specifically as a stone adhesive.

Fifteen stainless steel threaded rods were used as dowels. Each was three inches long and 1/4 inch in diameter. (See accompanying sketch for placements.) The holes were made with a single speed drill fitted with carbide-tipped masonry bits, 1/4 inch, 5/16 inch, and 3/8 inch in diameter. Each hole was first drilled small and then progressively enlarged so that it would take both the dowel and the adhesive. The Akepox was used both on the break edges and in the dowel holes.
The pieces of the thinner layer were positioned on and joined to the already assembled layer B. All the main joins were made with Akpox, although some small layer A fragments were first stuck to each other with HMG.

After repair, the decision was made to fill the gaps in face A which were distracting or misleading or which posed a potential danger to the unsupported or unprotected pieces adjacent to them. Superficial gaps were filled with Ace Hardware Spackling, while the missing corner was cast in dental plaster, using walls of dental wax. The plaster was mixed in a 5% solution of CM Bond M-3, for additional strength. Most of the gaps were partially filled with straight plaster and then finished off with a thin coat of spackling. Gap edges were first sealed with a dilute solution of Paraloid B-72 in acetone before the plaster was poured into them. Gap fill surfaces were textured with stippled spackling and toned with Liquitex Acrylic Artist Colors.

Loose chips and flakes whose original position could not be determined were saved. Powdered stone produced by the drilling was also saved.

RECOMMENDATIONS FOR HANDLING, STORAGE, AND DISPLAY:

Please carry and move anchor on board to avoid placing undue stress on the repairs. Store flat, with the plated more fragile surface (face A) up. Display flat if possible.

MATERIALS USED:

Paraloid B-72 (an acrylic polymer). Soluble in acetone.
CM Bond M-3 (a polyvinyl acetate emulsion). Soluble in acetone.
HMG (a cellulose nitrate in solvent). Soluble in acetone.

Truwax Baseplate Wax (hard sheets of dental wax).
Dental plaster (a fine gypsum plaster). Softens in water.
Ace Hardware Spackling (a vinyl-based putty). Soluble in water.
Liquitex Acrylic Artist Colors. Soluble in acetone.

Stainless steel threaded rods (15). 3 inches x 1/4 inch.

PHOTO DOCUMENTATION:

B/W: Before, During, and After Treatment. See accompanying contact sheet for During and some After Treatment photos. Negatives on file with Kommos Excavations.

Color slides: Before, During, and After Treatment. On file with Kommos Excavations.