

THE EXCAVATION OF TWO SEVENTH CENTURY POTTERY KILNS AT AQABA

by

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Introduction

The existence of a kiln site at Aqaba was first reported to the Department of Antiquities in 1973, while foundations for buildings in the western residential area of the city were being dug. Mr Baseem Rihani of the Petra Antiquities Office found three kilns destroyed with only their floors still remaining, which he cleaned and photographed (see Fig. 4 below). The buildings went up and in 1987 Mr Najeeb Abu al-Feilat, a contractor working on another building in the western residential area, brought an amphora to the archaeological team working at Ayla, saying it was found along with kilns by the bulldozer digging the foundations of the building (the amphora is now in storage at the Jordan Archaeological Museum, no. J15800).

The western edge of the kiln site was recorded in the archaeological reconnaissance of west Aqaba as site M13 (Meloy 1991: 399 and fig. 1). In September 1993 the owner of that western portion applied for a building permit. A salvage excavation was conducted by the Aqaba office of the Department of Antiquities, which revealed extensive dumps down to sterile sand, but no kilns (Fakhiry and Freihat 1993).

Despite all the destruction, the possibility of still finding intact kilns in the area motivated our excavation in the front yard of building no. 4, al-Jahiz Street (Fig. 1), which formed part of the sixth season of excavations at Ayla, directed by Dr Donald Whitcomb of the Oriental Institute of the University of Chicago (Whitcomb 1994).

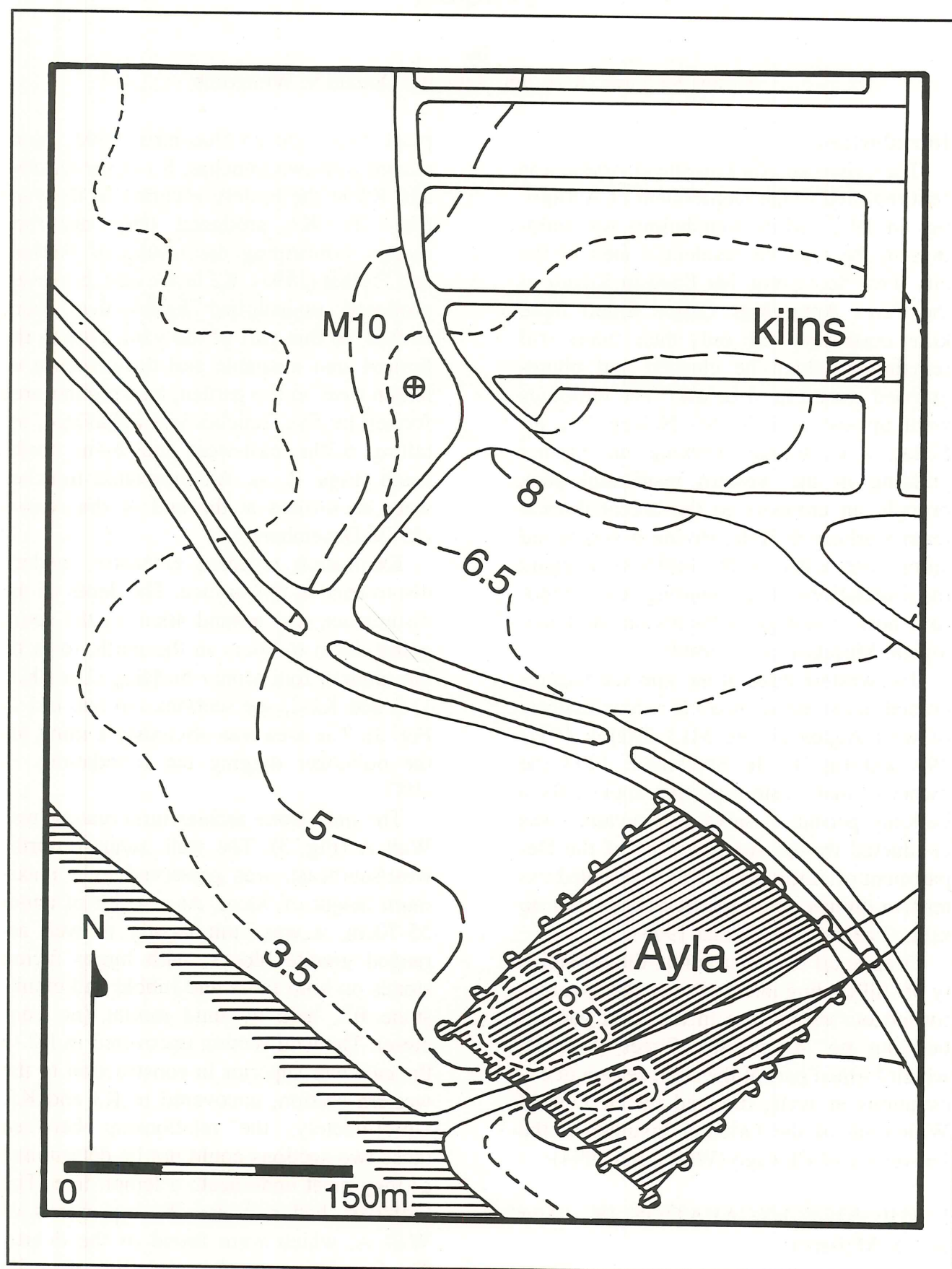
I. THE KILN EXCAVATION (K. 'Amr and A. Melkawi)

The excavation of the pottery kilns took

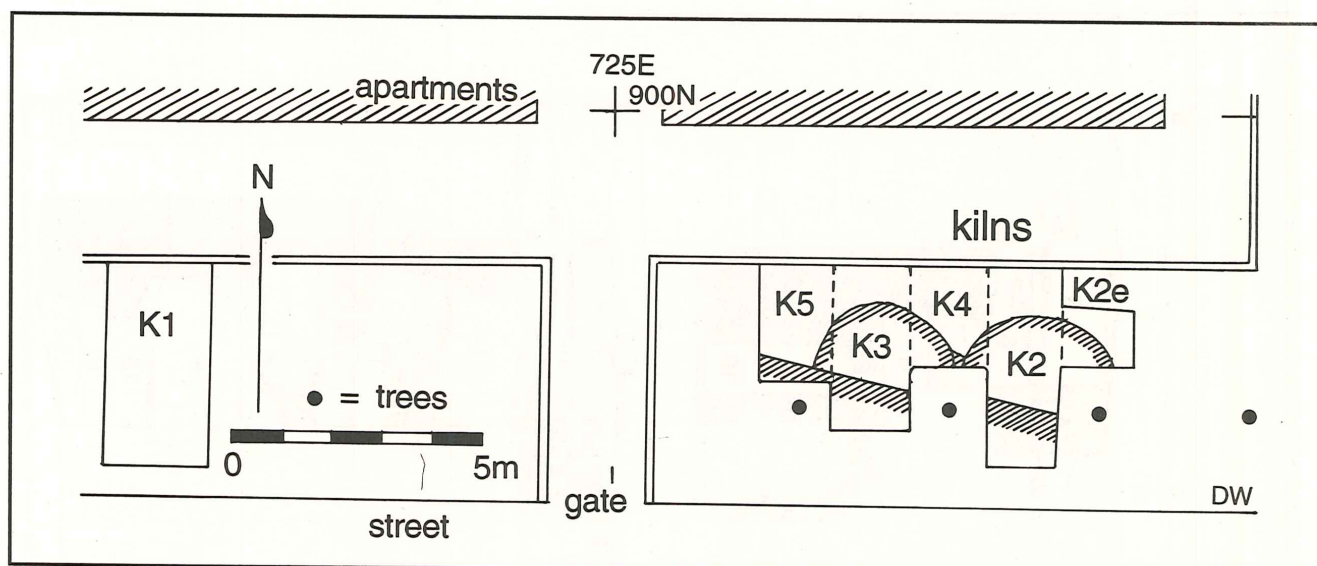
place from 7 to 23 December 1993. Work started with two trenches, K1 in the western and K2 in the eastern sections of the yard (Fig. 2). K1 produced only disturbed dumps, confirming the results of Fakhiry and Freihat (1993). K2 in the east, however, produced undisturbed layers, thus work shifted to that part of the yard. Due to the limited area available and the presence of lemon trees in the garden, an irregular area formed by five trenches was excavated, totalling 6.30m east-west and 2-4m north-south (Figs. 2, 3). All excavated trenches were back-filled at the end of the season (25-26 December).

Excavation revealed extensive modern disturbance at the surface. The depth of the disturbance was around 40cm in the south going down to 80cm in the north, towards the modern four storey building (Loci K3-1, 3 and K2-2, see sections a-b and c-d in Fig. 3). The area was obviously a ramp for the bulldozer digging the foundations in 1987.

The only stone architectural feature was Wall A (Fig. 3). The wall, running north-west/southeast, was preserved to a maximum height of 90cm. At a width of about 55-70cm, it was built mostly of well arranged granite blocks, with larger facing stones on both faces and rubble and chink-stone fill, held by mud mortar (no concrete). The wall section uncovered in K2 to the east was superior in construction to the western section, uncovered in K3 and K5. Unfortunately, the relationship between these two sections could not be determined as they meet underneath a lemon tree. The bulldozer had removed the top stones of Wall A, which were found in the debris. The foundation trenches were full of sterile sand. Sterile sand was also present behind



1. Area of the kiln excavation at Aqaba.



2. Plan of the excavation in the front yard of no. 4, Al-Jahiz Street, Aqaba.

the wall to the south (Locus K2-3, see section a-b in Fig. 3). No associated floor level was found, therefore not much can be said about the date of Wall A other than that it was built after the abandonment of the pottery kilns, the preserved tops of which were discovered only a few centimetres below the bottom of Wall A (sections a-b and c-d in Fig. 3).

The Pottery Kilns

We were very lucky to find two kilns in the restricted area available for excavation, however we were only able to uncover less than half of the plans of the kilns due to the presence of the later Wall A, the lemon trees and the periphery wall of the yard (right next to the modern street, see Fig. 2).

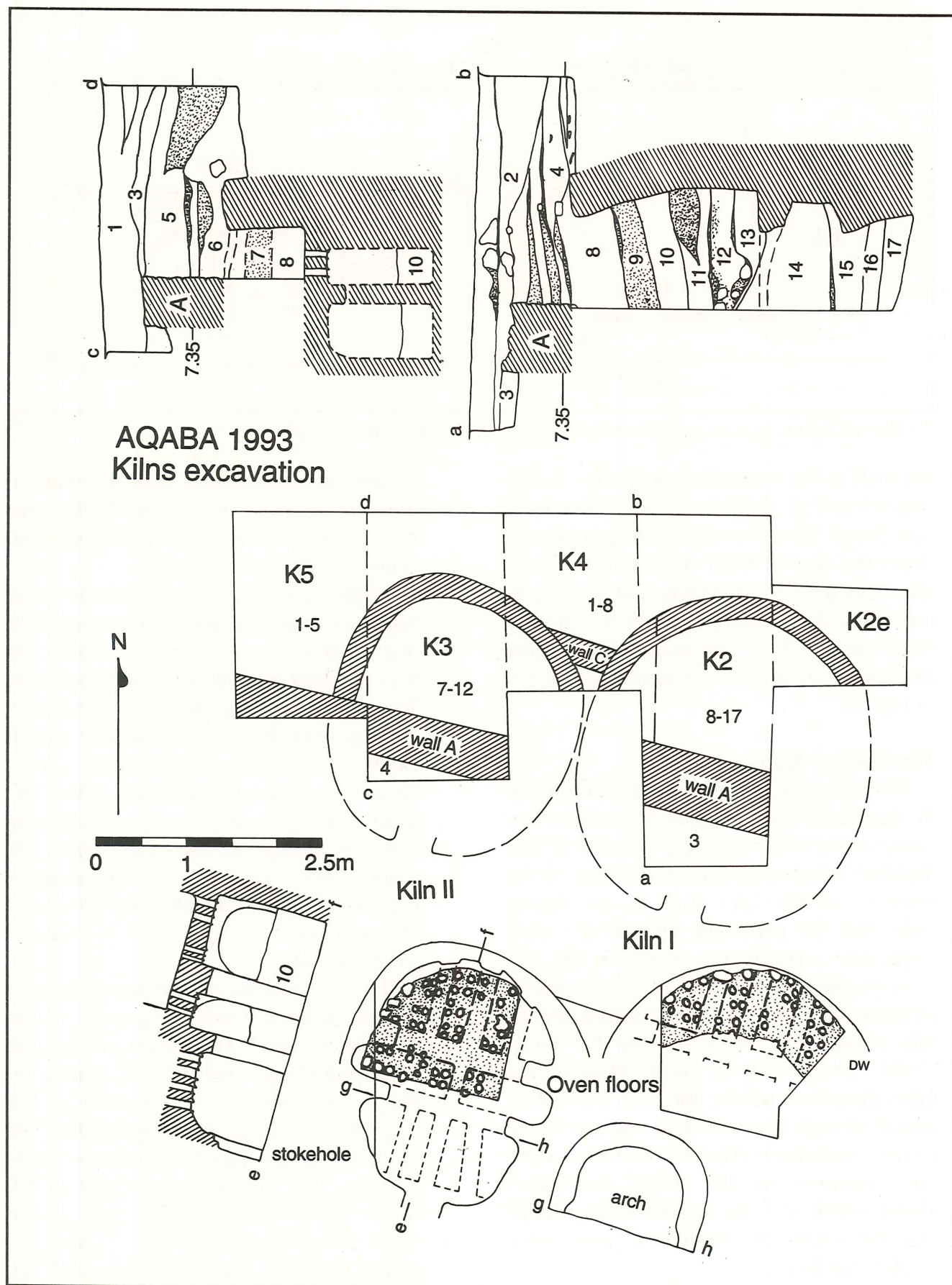
A problem in kiln studies is the variety of terms applied to the kiln components. In this report, the terms defined by Swan (1984: 29-32) will be used. Thus in the kilns described below, the fuel was introduced through the *stokehole*, the fire burnt in the *combustion-chamber*, in which were built *supports* for the *raised oven-floor*, above which was the *superstructure* defining the *oven*, in which the pots were stacked for firing.

The eastern (larger) kiln is termed 'Kiln

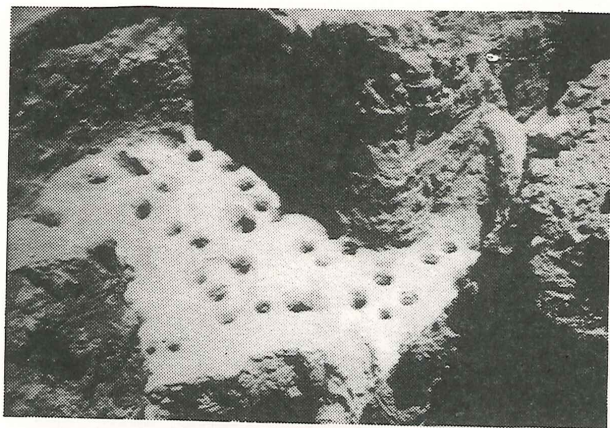
I', and the western kiln 'Kiln II'. They are adjacent to each other, joined by the small mud-brick wall 'Wall C', which may have been a buttress.

Both kilns are of the simple up-draught type—i.e. the combustion-chamber is directly below the oven, and the two chambers are separated by the raised oven-floor. The plan is roughly oval (although a circular plan may have been intended, see for example the plans of the Zizia kilns in Homès-Fredericq and Franken 1986: 247). Both kilns have raised oven-floors punctured by groups of (in most cases four) round holes, with larger flue holes around the sides. These oven-floors are identical to the ones recorded by Rihani at Aqaba in 1973 (Fig. 4).

The oven-floors are supported by cross arches, between which the groups of holes are evenly spaced. The interiors of the combustion-chambers had vitrified turning into deep green-coloured "glass caves", complete with dripping glass "stalactites", due to the extremely high temperatures reached in them. The combustion-chamber of Kiln II was totally cleared; its arch supports span the combustion-chamber at 15° and 105° east of north, i.e. the kiln axis is at 15° east of north. In the following report, for the



3. Kilns I and II: Top plans and sections.



4. Oven-floor of a kiln discovered in Aqaba in 1973 (courtesy of B. Rihani).

sake of simplicity, that orientation will be referred to as "north".

The kilns were originally built with unfired mud-bricks, which were later fired along with the pottery in the kilns, as the superstructure walls were found brown and still unfired on the exterior, with the colour grading to red at around 15cm inwards, then yellowish white on the interior. These colours indicate the variation of heat penetration into the walls. The bricks averaged 25cm wide by 15cm high. The depth could not be determined due to the bad state of the preserved tops, although the maximum preserved width of 30 cm at the wall tops indicates that they were built one brick deep. Pottery sherds were sometimes inserted between the bricks for curvature and to level the courses.

The oven-floors and arch supports were also built *in situ*, of unfired slabs and bricks, as indicated by the holes in the oven-floors, which sometimes cut through the edges of the arches. The oven-floor of Kiln II also had circular impressions left by the inverted pots from the first firing, when the floor was as yet unfired.

Unfortunately, we were unable to reach an exterior floor level, which would have helped determine the relationship between Kilns I and II, and Wall C.

Kiln I

Kiln I is the larger of the two excavated

kilns. Just under half of the kiln could be exposed in the area available for excavation. Projection of the exposed superstructure wall gives approximate dimensions of 3m east-west by 3.5m north-south (Fig. 3).

The superstructure wall is preserved to a height of over 2.10m above the raised oven-floor. The wall was built straight up then curved in at around a height of 1m (see Fig. 3, section a-b). This form is still common for traditional commercial pottery kilns in Palestine and Jordan (Fig. 5 and Zayadine 1982: 568 pl. CXLIV, 1).

The oven-floor was found preserved at the edges and collapsed in the centre. It is punctured by groups of round vent holes, 7-8cm in diameter, and larger flue holes at the edges up to 20cm across. The floor is built of seven layers of clay—each between 3-8cm in thickness—making up an average thickness of 35cm excluding the molten slag on the interior of the combustion-chamber.

The interior of the combustion-chamber was melted and formed into vitrified slag. Excavation stopped at around 1.70m below the top level of the oven-floor, where a large chunk of very hard plaster with pottery embedded in it was encountered (K2-17), directly below what seemed to be fragments of the collapsed oven-floor (K2-16). The combustion-chamber floor was not reached.

Excavation revealed three north-south arch supports. What may be an east-west arch support was revealed in the western section but the partial collapse and disfigurement due to vitrification excludes definite identification. The three north-south arches are of square cross-section, built with bricks measuring 21 x 21 x 4cm excluding the surfaces transformed into slag. The arches are placed approximately 25-35cm apart. They spring from the sides of the combustion-chamber, which slope inwards as would be expected of a hole dug



5. Modern commercial pottery kilns at Msheirfeh, east of Amman (1981).

in the ground. Underground combustion-chambers are very common in kiln construction as the insulation offered by the surrounding earth saves on fuel consumption.

Kiln I was found covered up with and full of dumps containing much ash, bricks and pottery wasters (loci K2-4 and 8 to 15), probably resulting from later kilns in the area. The pottery, however, was homogeneous throughout the fill (see section II below) and no complete vessels or tools were recovered.

Kiln II

Kiln II is the smaller of the two excavated kilns. The combustion-chamber was found complete and intact, giving the dimensions of 2.10m east-west by 2.60m north-south (Fig. 3). The superstructure is preserved to a height of about 90cm (eight courses of brick) above the raised oven-floor.

The fill in the oven above the oven-floor consisted chiefly of collapsed bricks and soil that had filtered in between the bricks. The oven-floor was found completely preserved, punctured by groups of (mostly four) adjacent round vent holes averaging 10cm in diameter and larger flue holes at the edges. Like the oven-floor of Kiln I, it was built of several layers making up an average thickness of 18cm for the floor, excluding the molten slag and arch supports on the interior of the combustion-chamber. Ancient breakages of the floor, especially between adjacent holes, were mended with pottery sherds and clay.

The interior of the combustion-chamber was found intact. It was partially filled with soil Locus 10, which is chiefly soil filtered through the holes of the oven-floor. At the bottom of the combustion-chamber were patches of dark ash, most probably remains of the fuel used. Several samples were collected for analysis. Underneath the ash was

a layer of lime defining the combustion-chamber floor directly above sterile sand.

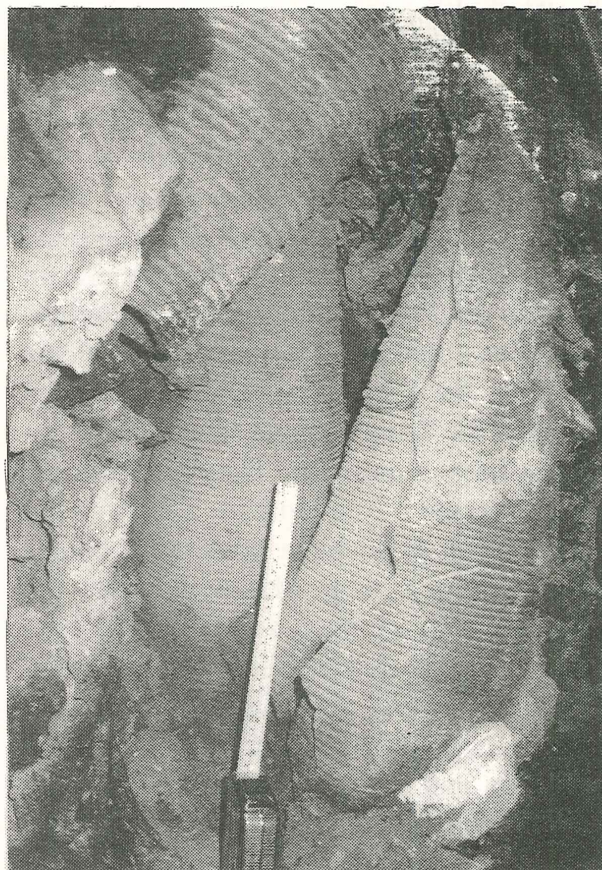
Springing from the sides of the combustion-chamber are two main east-west arch supports, with three secondary north-south arches in the north and three semi-arches in the south joining these two main arches (Fig. 3 sections e-f, g-h). The southern secondary semi-arches are rather flat and pierced by square holes, perhaps for improving the circulation of air at the beginning of the firing process. A small secondary north-south semi-arch joins the two main east-west arches. The secondary arch in the southeast corner was mended with three almost complete amphoras which had also melted and vitrified (Fig. 6).

A door, the stokehole, was found in the south measuring 60cm in height, 30cm in width and 20cm in depth (Fig. 3), built with bricks measuring 5 x 5 x 12cm.

Conclusions

It is obvious that Kilns I and II are part of an industrial pottery production centre. The general form of the two kilns is similar to modern Jordanian kilns (which tend to be over 2m in diameter, see for example the Zizia kilns in Homès-Fredericq and Franken 1986: 247-248; Zayadine 1982: 568 pl. CXLIV 1, 2 and the Msheirfeh kilns in Fig. 5). The oven-floors of these modern kilns are also supported by arches (Zayadine 1982: 382).

Larger modern kilns of up to 4.5m diameter are known from Upper Egypt, e.g. Deir al-Gharbi near Ballaṣ. These kilns are also built of mud brick that fires *in situ*. The superstructure walls are built straight but the oven-floors spring directly from the walls and have no supports (Nicholson and Patterson 1989: 73-74). Slightly further south in Wadi Ḥalfa, "Coptic potteries" (of around the late seventh-ninth centuries AD, see Adams 1961: 42) included cylindrical kilns with perforated oven-floors and cross



6. Secondary supporting arch in the Kiln II combustion-chamber mended with three amphoras.

arch supports, and some with buttressing mud brick walls (Adams 1961: 33-38; 1962: 62-71; 1986: 32). Like the Aqaba kilns, the walls of these Nubian kilns were built of unfired brick averaging 30cm in thickness, and some had (internal) diameters of up to 280cm (Adams 1986: 31-32).

In Jordan, Jarash is noted for the profusion of "late Byzantine" and "early Islamic" kilns. The published kilns from Jarash, however, bear no similarity to the Aqaba kilns, but then neither do their products (see for example Gawlikowski 1986: 108, 117, 130; Pierobon 1986: 184-187; Walmsley 1986: 351-357; Schaefer and Falkner 1986; Parapetti 1989: 14, 17; 'Amr 1993: 96-98; Abu Dalu 1993). This dissimilarity in material cultural remains between the north and south of Jordan and Palestine is noticeable

throughout the ages.

Therefore, the examples closest to the Aqaba kilns are southern, with the modern Jordanian kilns being of the "Hebron" tradition of southern Palestine, brought to Jordan by immigrant Palestinian potters. Both modern Palestinian/Jordanian and Egyptian kiln types produce cream pottery similar in colour to (and may be considered a continuation of the tradition of) the major products of the Aqaba kilns. The modern kilns are also used for firing various sized vessels including large water jars. They vary mainly in the structure of the top part. The Palestinian/Jordanian kilns have permanent domes perforated by a large chimney, while the Egyptian kilns are open at the top and covered with large sherds prior to each firing. Both modern kiln types are stacked from the top (Zayadine 1982: 568 pl. CXLIV, 2; Nicholson and Patterson 1989: 76-77). The size of Kiln II at Aqaba is close to the modern Palestinian/Jordanian types, while the size of Kiln I lies in between the two modern parallels. No definite openings into the oven chambers of the Aqaba kilns were found. The form of the stokehole opening into the combustion-chamber of Kiln II shows it to be complete as such, i.e. it does not connect to an upper opening into the oven. Therefore stacking of the pottery from the top has to be assumed at Aqaba. As for the roofing, the slight inward incline of the Kiln I superstructure suggests a form close to the modern Palestinian/Jordanian examples (Fig. 5).

As mentioned above, no outside floor level was reached. A floor level at around the level of the oven-floor is plausible, making an underground combustion-chamber with a cleared entryway towards the stokehole and a free-standing superstructure. If this were to be applied to both the Aqaba kilns, then Kiln II (with its oven-floor at c. 6m asl) would have had a higher outside level than Kiln I (oven-floor at c.

5.20m asl). The combustion-chamber floor of Kiln II, indicating the outer stokehole floor level, was found at 4.75m asl, while the combustion-chamber floor of Kiln I was not reached despite excavation down to c. 3.50m asl. These levels, combined with the fact that Kiln II was found empty except for collapsed bricks while Kiln I was full of debris—presumably from later kiln production—may indicate that Kiln II is later in date than Kiln I. This conclusion, however, should be stated with caution. In industrial potteries, the placement of at least two kilns next to each other, sometimes of unequal sizes, is the norm. This is chiefly for allowing production to go on whenever the main large kiln needed repairs, although cases where kilns of different sizes or forms are used for firing different wares are known (see for example Fig. 5 and Peacock 1982: 30-31; Homès-Fredericq and Franken 1986: 247; Gawlikowski 1986: 108; Abu Dalu 1993: 24, 33). At Zurrabah near Petra, the floor levels of the adjacent and contemporary Kilns I and II vary by well over a metre, with steps joining the stoking areas (Zayadine 1982: 380-382; 'Amr 1991: 314). At Aqaba, this would be the southern area of the excavations that cannot be investigated due to the presence of the modern street.

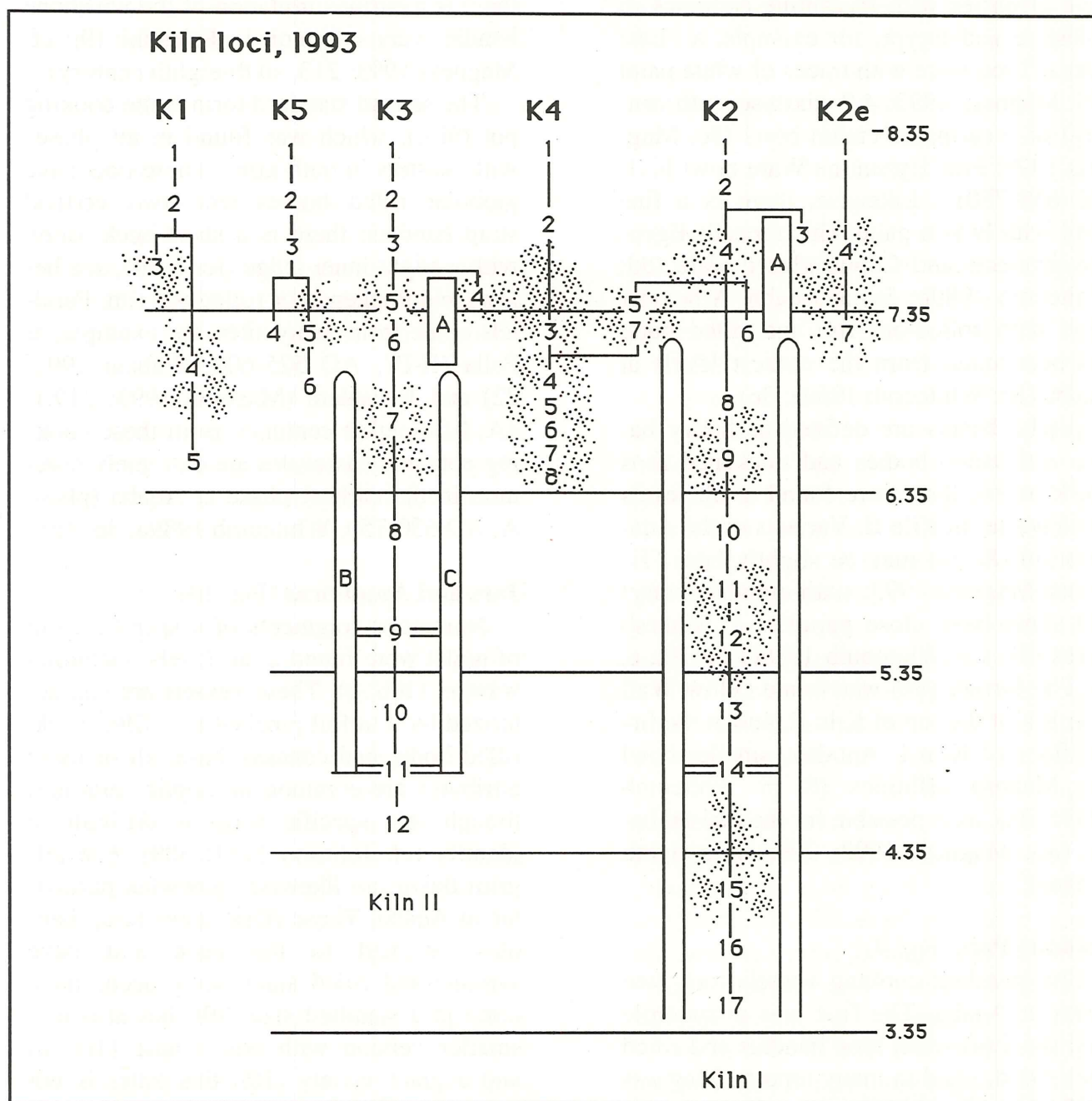
II. THE POTTERY (D. Whitcomb)

The technology implied in the structure of the two kilns excavated is only one aspect of their importance; another is the ceramics produced in these facilities. Both kilns were found empty of any primary pottery; there were wasters of several ceramic types, especially the amphoras used as floor supports (Fig. 6), which imply production in these or nearby kilns. All sherds were found in secondary deposits, usually together with ashy debris from later activity. Thus, the stratigraphy is of extreme impor-

tance, and the high quality of excavating and recording by the two principal authors is evident.

The loci excavated appear on the matrix chart (Fig. 7) and may be grouped into the following arbitrary phases. The uppermost layers include modern construction debris and those associated with the two manifestations of Wall A. The stratigraphic association of these wall fragments implies construction after the destruction of Kilns I and

II. The continuing deposition of ashy debris against Wall A suggests continuity of production using other kilns nearby. These loci are: K1-1, 2, 3, 4, 5; K2-1, 2, 3, 4, 5; K3-1, 3; K4-2/3; K5-3, 5/6. A slightly earlier phase, or better a sub-phase, is represented by the layers excavated between the exteriors of the two kilns. These deposits continued the ashy debris and are loci K4-4, 5, 6, 7, 8. The latest loci within the kilns are suggested to be those in Kiln II (see below),



7. Stratigraphic chart of kiln loci.

late ash and fallen debris over the oven floor, K3-7, 8, and limited materials in the firing chamber, K3-10, 11, 12. Likewise the fill in Kiln I consists of episodes of ashy fill, K2-8, 9, 10, 11, 12, 13, down to the level of the oven floor. Below the broken floor was further ash deposition, principally locus K2-15.

Bowls and Basins (Fig. 8)

There is a series of fine bowls which have affinities with Byzantine ceramics of Palestine and Egypt; for example, a "Late Roman" red ware with traces of white paint (8b; Magness 1993: 4.9, sixth-seventh century) or a carinated cream bowl (8c; Magness 1993: Fine Byzantine Ware bowl IC.1, AD 650-750). Likewise, there is a fine bowl with brown paint which recalls Egyptian products and Coptic glazed ware (8d; Whitcomb 1989b: 5h) at Aqaba. A heavier bowl with rolled-out rim and rilled body has been cited from the earliest levels at Aqaba (8e; Whitcomb 1989a: 3e).

Aqaba basins are defined as heavy basins with rilled bodies and thickened rims (8j, k, n, o); they were found at all levels and a waster in Kiln II. Variants of the Aqaba basin (8l, m) may be slightly later (Tiberias; Magness 1993: sixth-eighth century) and some have close parallels to Mahesh wares (8h, i = Whitcomb 1989c: 2g, 3d, e, k). The former (8h) was found below Wall A in K4, at the top of Kiln II, and at the firing floor of Kiln I. Another, smaller bowl has Mahesh affinities (8f = Whitcomb 1989c: 2h), as is possible for the incised basin (8p; Magness 1993: 209, sixth-eighth century).

Cooking Pots (Fig. 9)

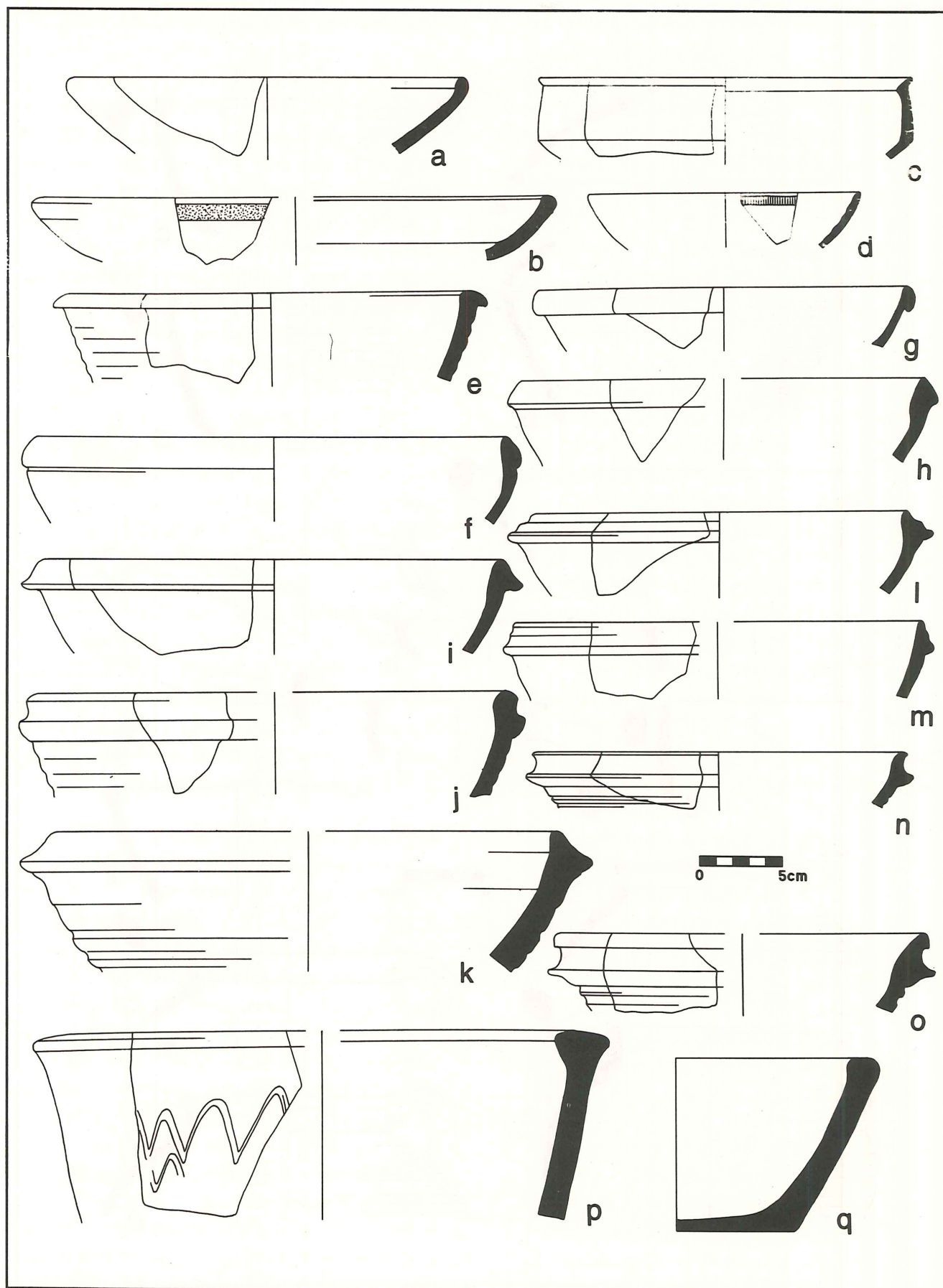
The standard cooking vessels took two forms at Aqaba. The first was a casserole with two horizontal loop handles and rilled body (9a-d; cited in many reports, Magness 1993: 212.13, 215.1, third-ninth century).

The casserole was accompanied by lids, often cut from the body of the casserole producing a bevelled edge with perfect fit (9a, b). Both casseroles and their lids were found in all phases, including wasters. A number of smooth, smaller casserole variants occur (9e-k), including an Egyptian example (made from brown Nile silt). A few pieces have a pie-crust folded rim with parallels from Kellia in the Egyptian delta (9h, k; Egloff 1977: 78.7, 81.3). Finally, there is a curious imitation of the wishbone handle, very common in Palestine (9j; cf. Magness 1993: 213, sixth-eighth century).

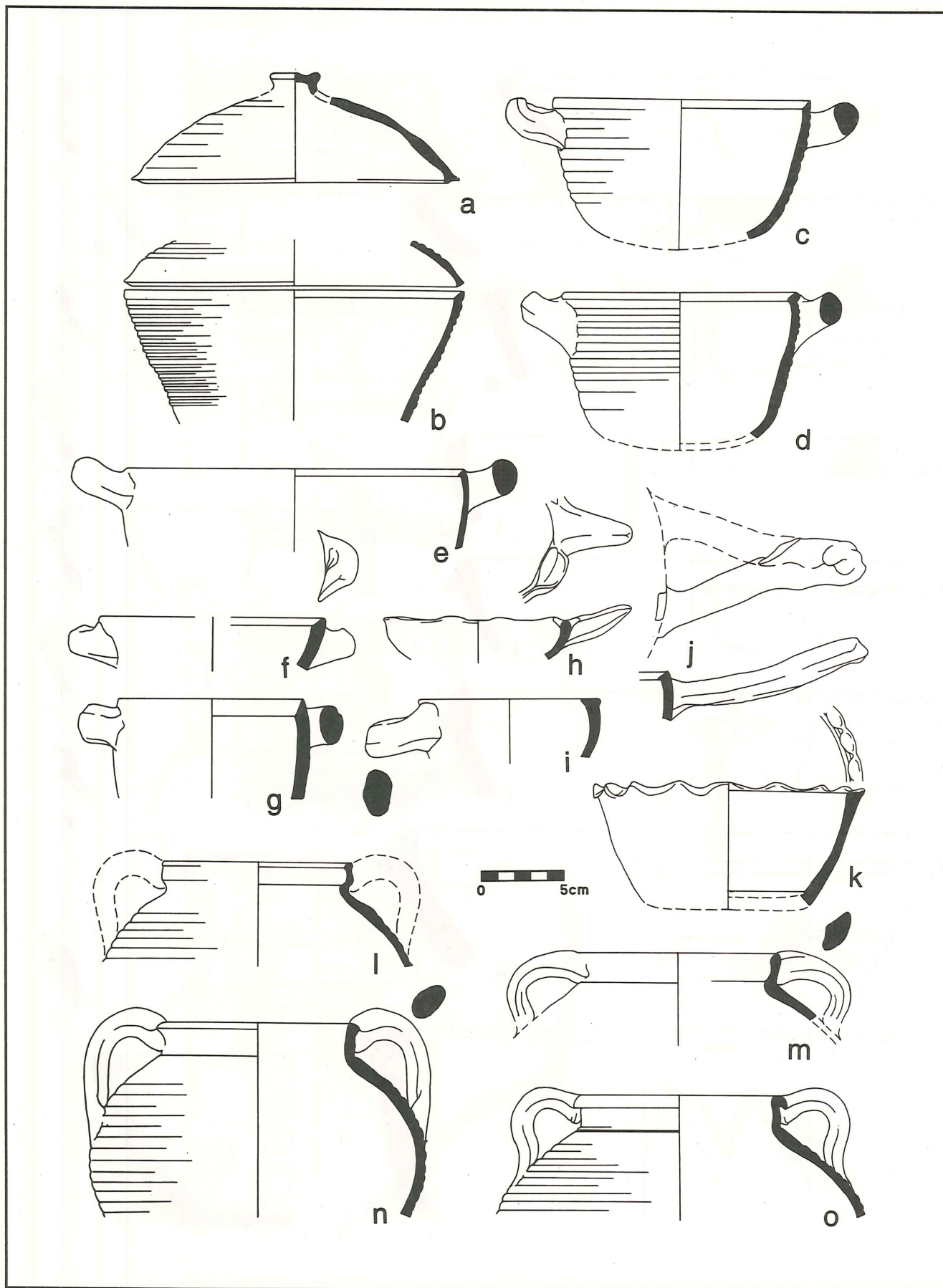
The second standard form is the cooking pot (9l-o), which was found in all phases with wasters in both kilns. These pots have globular rilled bodies with two vertical strap handles; there is a short neck, often with a slight inner ledge (for a lid?, see below) and thickened or rolled out rim. Parallels come from many sites, for example, at Pella (II-IV, AD 525-600; Watson 1992: 22) and Jerusalem (Magness 1993: 219.1, 4A, fifth-eighth century). Both these cooking pots and casseroles are extremely common in the earliest phase at Aqaba (phase A, AD 650-750; Whitcomb 1989a: 3o, 4h).

Jars and Amphoras (Fig. 10)

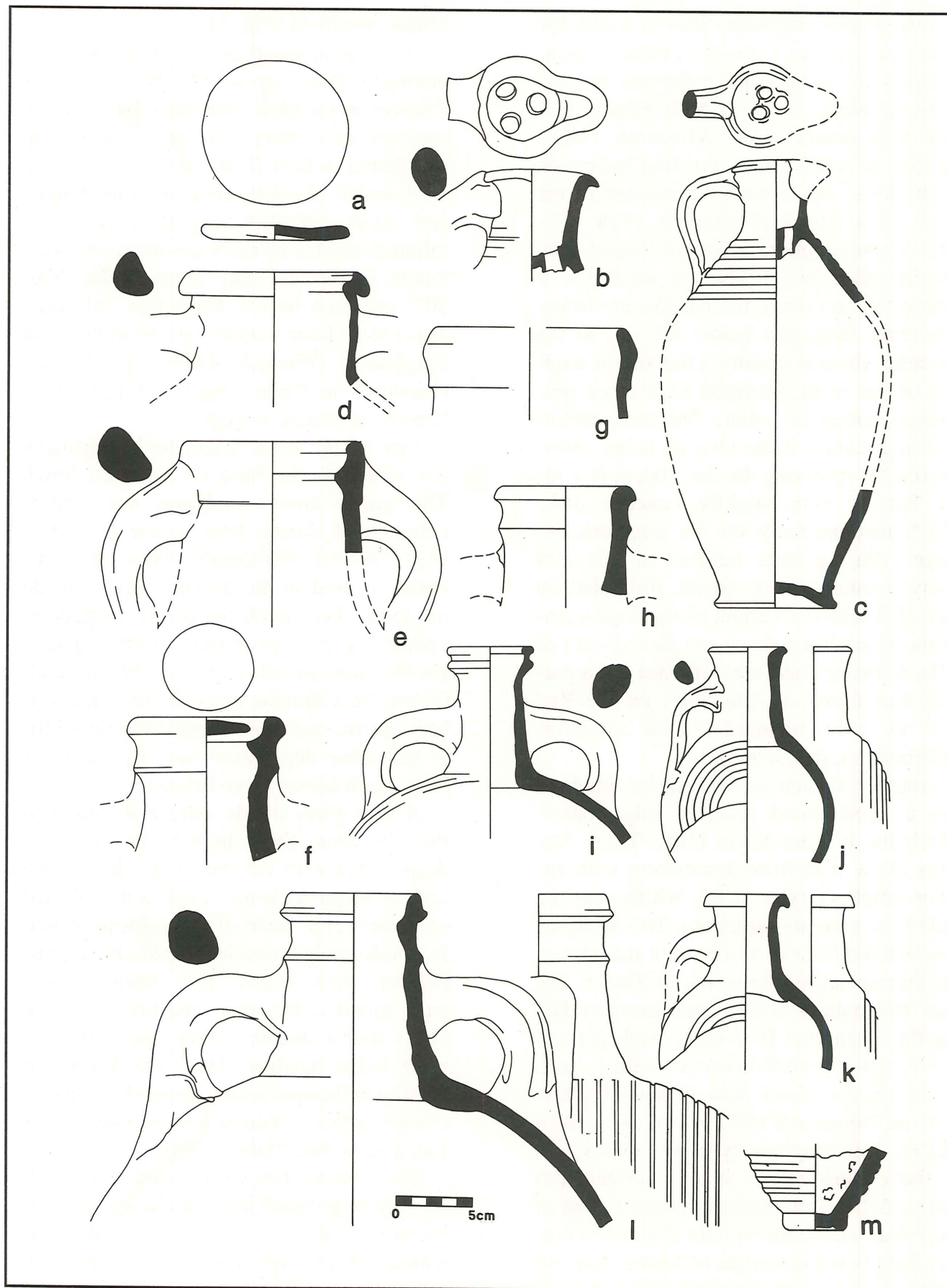
Numerous fragments of a specific form of juglet were found in all levels, including wasters (10b, c). These vessels are characterized by a trefoil pinched rim, filter neck, rilled body, and concave base; all of these attributes are common in Coptic ceramics, though this specific form is difficult to identify (cf. Johnson 1981: 389). The pilgrim flasks are likewise somewhat particular to Aqaba. These flasks have strap handles attached to the neck and have symmetrical rilled sides; they occur most often in a standard size (10i) but also in a smaller version with one handle (10j, k) and a giant variety (10l; this latter is not dissimilar to Aqaba amphoras in style).



8. Bowls and basins (descriptions in appendix).



9. Cooking pots (descriptions in appendix).



10. Jars and amphoras (descriptions in appendix).

The Aqaba amphora (10e) is a specific type of amphora produced in these or nearby kilns and ubiquitous in the site of Ayla (wasters were found in both kilns). This type was described in Whitcomb 1989a: fig. 5a; as noted above, the first indication of the kilns was a waster presented to the 1987 excavations (Whitcomb 1988: 25). The Aqaba amphora is carrot-shaped with heavily rilled body. The toe usually is a simple button (10m), the handles are heavy extending from just below the rim to the shoulder, there is usually a line on the exterior of the neck, vestigial of a more pronounced ridge or collar. The most distinguishing feature is the internal ledge below the rim for receiving the lid (10d, e, f). Lids are flat or very slightly concave disks which rest precisely on the amphora rim ledge (10a); a large number of lids (not really wasters) were found discarded in Kiln II. There is a variant of the Aqaba amphora which has a shortened turned-out rim (10e; a waster was found in Kiln II); a parallel was found at Abu Sha'r on the Red Sea, as were standard Aqaba amphoras (Sidebotham, pers. com.).

Another variant of the Aqaba amphora has a pronounced exterior ridge below which the handles begin (10f). These features allow a stylistic association with another amphora type (10h), which may be called the common amphora. This designation derives from its ubiquity in the eastern Mediterranean; in the words of Zemer, this was "the main jar used in sea transport during the Byzantine II to early Arab period" (1977: 63-66; sixth-seventh century; also found on the Yassi Ada shipwreck, Bass and van Doorninck 1982: 8.1-5, and at Abu Sha'r). This amphora type was also found in the earliest phase at Ayla (Whitcomb 1989a: 5c). A few sherds of another class of amphoras was found in Kiln II; this is a typical Egyptian form made of brown Nile silt (10g).

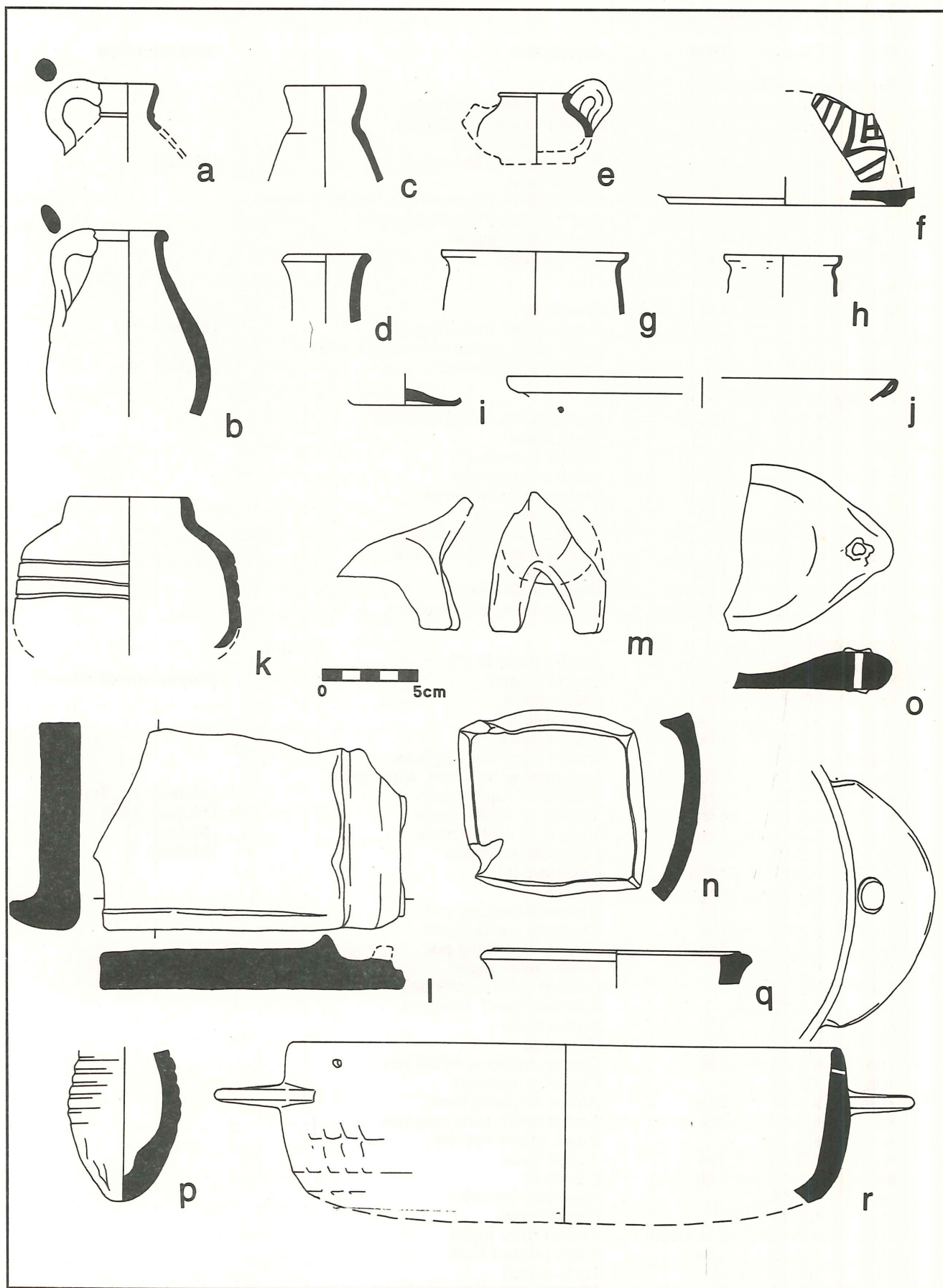
Other Artifacts (Fig. 11)

A series of small cream juglets seem to belong to this corpus (11a-d) which have Palestinian parallels (Magness 1993: 1C, 5, sixth-eighth century). A cream ware lamp was found in Kiln II; this type of lamp is a very small wheel-thrown jar with handle and short cylindrical spout (11e). One might liken this to more common red ware lamps (Rosenthal and Sivan 1978: 506-507) common to late Byzantine Palestine. This cream lamp may be related to lamps at Epiphanius (Winlock 1926: fig. 38) and elsewhere in Coptic Egypt; it remains a lamp form unique to Aqaba.

One of the most disconcerting artifacts discovered is the base of a glazed bowl. The type is known as H̱ijazi ware and is common at Aqaba from phase B and C (AD 750-950; Whitcomb 1989c: 6p). This sherd occurred in the deepest locus outside the kilns; there is no reason for suspecting contamination (and indeed no other glazed sherds were found, even on the surface). Given the common associations with Mahesh wares, one must suggest the possibility that these depositions are late eighth or early ninth century (see below).

A few glass sherds were also found in the kiln area; these include two rims of deep bowls with cut rims (11g, h), a base with a slight kick-up (11i), and a folded over rim (11j). Each of these forms would fit comfortably into a late Byzantine corpus (Meyer, pers. com.). Two stone vessels were found: a fine rim, possibly of marble (11q), and a steatite cooking pot with two wide ledge handles (11r). The form and carving technique seems to pre-date the extensive Abbasid sequence of steatite vessels found at Aqaba (Hallett 1990).

The ceramic types illustrated in Figs. 8-11 may be grouped into the phases suggested above. Table 1 also gives the field designation (Whitcomb 1986). This selection masks the fact that, in general, the ceramic



11. Other artifacts (descriptions in appendix).

Table 1: Ceramic types.

Fig.	Locus	1986	description	identification
<i>Surface and Wall A phase</i>				
11m	K1-2	--	Cream figurine (unique)	
9f	K1-5	15g	Brown Egyptian casserole	
11a	K1-5	--	Small cream juglet	
8 l	K2-5	13l,o	Variant of Aqaba basin	[Mahesh ?]
8o	K2-5	13s	Aqaba basin	
9h	K3-3	--	Cream bowl, pie-crust rim, handle (unique)	
9j	K3-3	--	Red wishbone handle (unique)	
10b	K3-3	17r,s	Trefoil filter juglet	
11 l	K5-5	14i,j	Tile (pantile)	
<i>Below Wall A phase</i>				
9c	K4-7	15g	Casserole	
8f	K4-8	--	Cream bowl, incurving rim	[Mahesh 2h]
11d	K4-8	--	Juglet neck, cream ware, black surface	
11f	K4-8	--	Base of glazed ware	[Hijazi]
<i>Inside Kiln II</i>				
8g	K3-7	13v	Brown bowl, rolled over rim	
8q	K3-7	--	Small basin	
9i	K3-7	--	Small casserole (?)	
11b	K3-7	--	Small cream juglet	
8c	K3-8	12a,b	Carinated cream bowl	
10e	K3-8	19d	Aqaba amphora	
10j	K3-8	--	Small cream pilgrim flask	
10k	K3-8	--	Small cream pilgrim flask	
10a	K3-11	11w	Amphora lid	
11e	K3-11	--	Wheel-made lamp	
10f	K3-12	19d,18oa	Variant of Aqaba amphora	
<i>Inside Kiln I</i>				
9g	K2-8	--	Small casserole (?)	
8d	K2-9	--	Coptic painted	[Coptic glazed ware ?]
8k	K2-9	13s	Aqaba basin	
9b	K2-9	12da	Casserole lid	
10i	K2-9	17x,n	Pilgrim flask	
10g	K2-10	--	Brown Egyptian amphora	
8b	K2-11	12q	Late Roman red ware, white paint	
8h	K2-12	13g	Variant of Aqaba basin	[Mahesh 2g, 3k]
8i	K2-12	13h	Variant of Aqaba basin	[Mahesh 3d,e]
8m	K2-12	13o	Variant of Aqaba basin	[Mahesh ?]
8p	K2-12	--	Large incised basin	[Mahesh ?]
9a	K2-12	12da	Casserole lid	
9e	K2-12	15g	Casserole	
9l	K2-12	18b	Common cooking pot	
9m	K2-12	18b	Common cooking pot	
9n	K2-12	18a,f	Common cooking pot	
11c	K2-12	--	Small cream juglet	
11n	K2-12	--	Lantern cut-out (unique)	
11o	K2-12	--	Kiln furniture? (unique)	
8j	K2-13	13r	Aqaba basin	
9b	K2-13	15g	Casserole	
10d	K2-13	19o	Cream amphora, rolled rim	
10h	K2-13	--	Common amphora	
10m	K2-13	24w	Aqaba amphora base	
8a	K2-15	16i	Cream bowl, incurving rim	
8e	K2-15	--	Bowl, rolled-out rim	
8n	K2-15	13s	Aqaba basin	
9d	K2-15	15h	Casserole	
9k	K2-15	--	Pie-crust rim bowl	
9o	K2-15	--	Cooking pot	
10c	K2-15	17r,s,24b	Trefoil filter juglet	
10 l	K2-15	17w	Giant pilgrim flask	
11k	K2-15	--	Jar (unique)	
11p	K2-15	--	Miniature amphora (unique)	

assemblages were remarkably uniform in composition. Those implications drawn for type occurrence and association have seemed invalid due to the small sample size.

Date and Meaning of the Aqaba Kilns

There is little doubt as to the general identification of this ceramic corpus as part of a late Byzantine Palestinian corpus (no earlier than the sixth century). Moreover, there are consistent indications of types now recognized as continuing through the seventh and into the eighth centuries. Independent stratified parallels from the Ayla excavations suggest a partial overlap with the Mahesh assemblage; Mahesh ware is defined as a transitional corpus of ca. 750, a clear stylistic change marking the beginning of the Abbasid period and the end of the Byzantine/Umayyad tradition (Whitcomb 1989c). The unique occurrence of a glazed sherd should not carry too much weight but does dispose one toward later dating.

The second factor relevant to this assemblage is the presence of Egyptian imports and the occurrence of Coptic ceramic attributes. Reference has been made to kilns in Nubia (see section I above); the intensive excavations in that region have produced three kiln complexes (at Debeira East, Serra West, and Faras; Adams 1986: 12-33). These industrial centers would appear to be contemporary or slightly later than the Aqaba kilns (ca. 650-850; X-group and Early Christian). The ceramic forms from the kilns (group N.III; Adams 1986: 480-490) show an influence from Coptic Egypt, as do the ceramics from Aqaba. The city of Ayla was situated on the periphery of the Egyptian cultural sphere, as well as part of the *jund* of Filistin in the seventh century.

This tentative assessment concerning the "when" and "where" of these kilns leads to an obvious question, "why." This third fac-

et of the kilns and their ceramic assemblage might have an initial response, as a new industry supportive of renewed and enlarged settlement at Ayla. Construction and operation of large kilns, apparently in some number, would seem to suit the economic and political circumstances of southern Palestine in the early Islamic period, rather than late Byzantine and Persian occupations. During the first decades after the Muslim conquest, this region experienced a period of commercial growth spurred by unification, the new prominence of the Hijaz, and the availability of entrepreneurial capital. One of the results was the foundation of the new port of Ayla under 'Uthman ca. 650 (Whitcomb 1989a).

An implication of this context is that the Aqaba kiln complex was necessary for more than local consumption demands. The prime evidence is the large scale production of the Aqaba amphora, a very special and diagnostic industrial product. There would appear to have been no local produce (wine, oil, fish, etc.) requiring such numbers of containers. Yet there was certainly an explosive demand for such products (not to mention grain and even luxury goods such as fruits and nuts) from Syria and the Mediterranean region and the means to pay for them in the Hijaz. Amphoras were suddenly necessary at Ayla in order to repack these commercial goods from land transport to shipboard; amphoras are specialized containers designed for ship holds.

One may further suggest that this circulation of goods affected the entire Red Sea region, at least as far as 'Aden and Ethiopia. Ribbed amphoras and basins, most probably from the Aqaba kilns, are common in the "upper" period at Qana in South Arabia, datable to the seventh century (Sedov 1992: fig. 2). Numerous examples of Aqaba amphoras were found in the excavations at Adulis by Paribeni (1908). Farther

afield, Aqaba amphoras were imported into Axum in Ethiopia, where they are suggested to be early Islamic, within sixth to ninth century contexts (Munro-Hay 1989: 314, fig. 16. 469). It should be noted that two late Axumite coins have been found in the Ayla excavations, both in stratigraphic association before the mid-eighth century. The strong implication of these coins and, more importantly, these wide-spread and diagnostic ceramics is that Axum continued well into Islamic times and participated in a commercial network, the parameters of which remain for future research.

Conclusions

There is a broader issue involved with this pottery production, not just the inventory of the kiln products, but the general corpus of ceramics found in this context. As has been seen above, the corpus has strong affinities with late Byzantine Palestine and with Coptic Egypt, and yet numerous ceramic forms common in these two core areas are absent from Ayla. Further, a number of identifiable types at Aqaba do not have ready or even vague parallels elsewhere; in fact, the corpus bears the characteristics of a separate regional center marked by a strong new tradition. This is a feature which one may readily associate with the experience of early Islamic times. The same case has been argued for the plan of the city being excavated. The similarity to a Roman legionary fort is entirely misleading; the style is a combination of attributes suggesting sophisticated innovation, not unlike the ceramic products.

The idea that early Islamic culture adopted aspects of older cultural entities wherever Muslims settled is hardly new. Detailed understanding of the mechanisms whereby this happened have been elusive; even more so is the fundamental nature of change. Recent discussion of change has

begun to adopt linguistic concepts, specifically creolization. When applied to cultural contexts, this concept suggests that hybridization is a fundamental condition in the origin of important cultures, that is, the stress is on the dynamic nature of initial diversity. The expansion of Islam, as evidenced in material culture, initiated a dramatic period of experimentation when one might expect to find new city plans or ceramic corpora. The discoveries at Aqaba may be properly seen, not as some strange regional aberrations, but as evidence of a stage in the formation of Islamic culture. The archaeology of the early Islamic period must suspend the normative criteria of typological analysis; what one seeks here are the mechanisms of transition between "periods," an inquiry constantly frustrated by uncertainties of dating and opacity of historical events. This latter characteristic assumes greater importance because of short time spans, when the patterning upon which archaeologists depend is less operative. The kilns of Aqaba and their ceramics offer only one element in the unfolding archaeological documentation of the beginnings of Islamic culture.

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Appendix: Kiln artifacts*Fig. 8: Bowls and basins.*

	Locus	RN	Description
a	K2-15	93-725	Cream ware, common medium sand.
b	K2-11	93-609	Dark orange ware, red slip on interior and exterior, trace of white paint on exterior, fine, diameter unknown.
c	K3-8	93-617	Orange ware, cream surfaces, common medium sand.
d	K2-9	93-104	Orange-tan ware, cream slip on interior and exterior, dark brown paint on interior, fine.
e	K2-15	93-725	Red-tan ware, cream surface on exterior, common medium sand.
f	K4-8	93-719	Cream ware, abundant medium sand.
g	K3-7	93-108	Gray-brown ware, burnt exterior, moderate medium sand.
h	K2-12	93-711	Red-brown ware, cream surfaces, common medium sand, diameter unknown.
i	K2-12	93-712	Orange-cream ware, cream surfaces, moderate coarse sand.
j	K2-13	93-714	Red-brown-gray ware, cream-buff surfaces, common medium sand, diameter unknown.
k	K2-9	93-104	Red ware, brown core, cream surfaces, common coarse sand, diameter unknown.
l	K2-5	93-110	Cream ware, moderate coarse sand.
m	K2-12	93-711	Orange-tan ware, cream surfaces, common medium sand, diameter unknown.
n	K2-15	93-725	Cream-buff ware, cream surfaces, moderate medium sand.
o	K2-5	93-110	Red-brown ware, cream surfaces, abundant medium sand, diameter unknown.
p	K2-12	93-711	Red-orange ware, cream surfaces, incised exterior, abundant medium sand, diameter unknown.
q	K3-7	93-108	Dark red ware, cream surface on exterior and rim, common medium sand.

Fig. 9: Cooking pots.

	Locus	RN	Description
a	K2-12	93-111	Gray ware, common medium sand.
b	K2-13	93-713	Red-brown ware, cream surfaces, common medium sand.
	K2-9	93-104	Orange-red ware, burnt exterior, common medium sand.
c	K4-7	93-610	Red-orange ware, cream surface on exterior, common medium sand.
d	K2-15	93-725	Cream ware, common medium sand.
e	K2-12	93-712	Red-orange ware, cream surface on exterior, abundant medium sand.
f	K1-5	93-111	Brown ware, moderate chaff, diameter unknown.
g	K2-8	93-113	Red-orange ware, cream surfaces, moderate coarse sand.
h	K3-3	93-107	Cream ware, common medium sand.
i	K3-7	93-108	Cream-buff ware, cream surfaces, common medium sand.
j	K3-3	93-107	Dark red ware, gray-brown surfaces, moderate medium sand, diameter unknown.
k	K2-15	93-725	Orange-buff ware, cream surfaces, common medium sand.
l	K2-12	93-711	Gray ware, common medium sand.
m	K2-12	93-711	Gray ware, common medium sand.
n	K2-12	93-712	Gray-brown ware, cream surfaces, common medium sand.

- o K2-15 93-725 Orange-gray ware, cream surface on exterior, tan surface on interior, common medium sand.

Fig. 10: Jars and amphoras.

Locus	RN	Description
a K3-11	93-717	Red ware, cream surfaces, common medium sand (3; 6 other identical lids green ware).
b K3-3	93-107	Red-orange ware, cream surface on exterior, common medium sand.
c K2-15	93-725	Buff-orange ware, buff-cream surface on exterior, common medium sand.
d K2-13	93-713	Cream ware, common medium sand.
e K3-8	93-715	Cream ware, common medium sand.
f K3-12	93-718	Red-orange ware, cream surfaces, abundant medium sand.
g K2-10	93-106	Dark brown ware; moderate chaff.
h K2-13	93-713	Greenish cream ware, common medium sand.
i K2-9	93-105	Red-buff ware, cream surface on exterior, moderate coarse sand.
j K3-8	93-617	Red-orange ware, cream surface on exterior, common medium sand.
k K3-8	93-617	Cream ware, common medium sand.
l K2-15	93-731	Red ware, cream surface on exterior, abundant medium sand.
m K2-13	93-713	Red ware, cream surface on exterior, common medium sand (baked clay fill).

Fig. 11: Other artifacts.

Locus	RN	Description
a K1-5	93-111	Greenish cream ware, tan slip on exterior, fine.
b K3-7	93-109	Gray ware, greenish surfaces, common medium sand.
c K2-12	93-711	Cream-tan ware, cream surfaces, common medium sand.
d K4-8	93-719	Cream ware, black surface on exterior, common medium sand.
e K3-11	93-717	Cream ware, common medium sand.
f K4-8	93-611	Orange-buff ware, white slip on interior and exterior, brown, green (?), and clear glaze on interior, moderate medium sand.
g K1-3	93-490	Yellow-brown glass, brown patina, cut rim.
h K4-7	93-492	Yellow-clear glass, cut rim.
i K5-6	93-693	Yellow-green glass, white patina.
j K4-1	93-491	Green-clear glass, white patina, diameter unknown.
k K2-15	93-725	Orange-buff ware, cream surfaces, abundant medium sand.
l K5-5	93-619	Dark gray ware, abundant coarse sand.
m K1-2	93-592	Cream, moderate medium sand.
n K2-12	93-710	Red-orange ware, cream surface on exterior and four cut sides, common medium sand.
o K2-12	93-709	Gray-cream ware, overfired, common coarse sand.
p K2-15	93-725	Orange-red ware, cream-tan surface on exterior, common medium sand.
q K5-6	93-740	Black stone, burnt.
r K2-12	93-629	Gray steatite, repair hole, blackened exterior.

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