

PRELIMINARY REPORT OF THE AL-ḤUMAYMA EXCAVATION PROJECT, 1995, 1996, 1998

by

John Peter Oleson, Khairieh 'Amr, Rebecca Foote, Judy Logan,
M. Barbara Reeves and Robert Schick

Introduction

Large-scale excavation continued at al-Ḥumayma, ancient Ḥawar or Ḥawara, in 1995, 1996, and 1998.¹ In keeping with the rich and continuous history of the small caravan stop and agricultural centre, founded in the 80s BC by the Nabataean King Aretas III, a wide variety of structures from every cultural period was probed or excavated (Fig. 1). Since commencing excavation in the habitation centre in 1991, we have tried to recover information that will allow a well-rounded reconstruction of the settlement's social, economic, and political history. This strategy is now producing remarkable results. Ḥawar, located in a large basin of light, sandy, but arable loess 80 km north of 'Aqaba, on or near an ancient route linking the Red Sea with northern Transjordan, was the only significant settlement in the Ḥisma.

Surrounded by the ash-Sharā escarpment, dramatic mountain ranges and colourful sandstone *jibāl*, Ḥawar evolved through the processes of Nabataean sedentarization, administration by Roman frontier forces, Christianization and extensive church construction in the Byzantine period, and watchful occupation by Abbasid revolutionaries. Although brevity is essential, given the mass of material, we present here the basic results of three fruitful seasons of excavation, organized roughly by culture and chronology.²

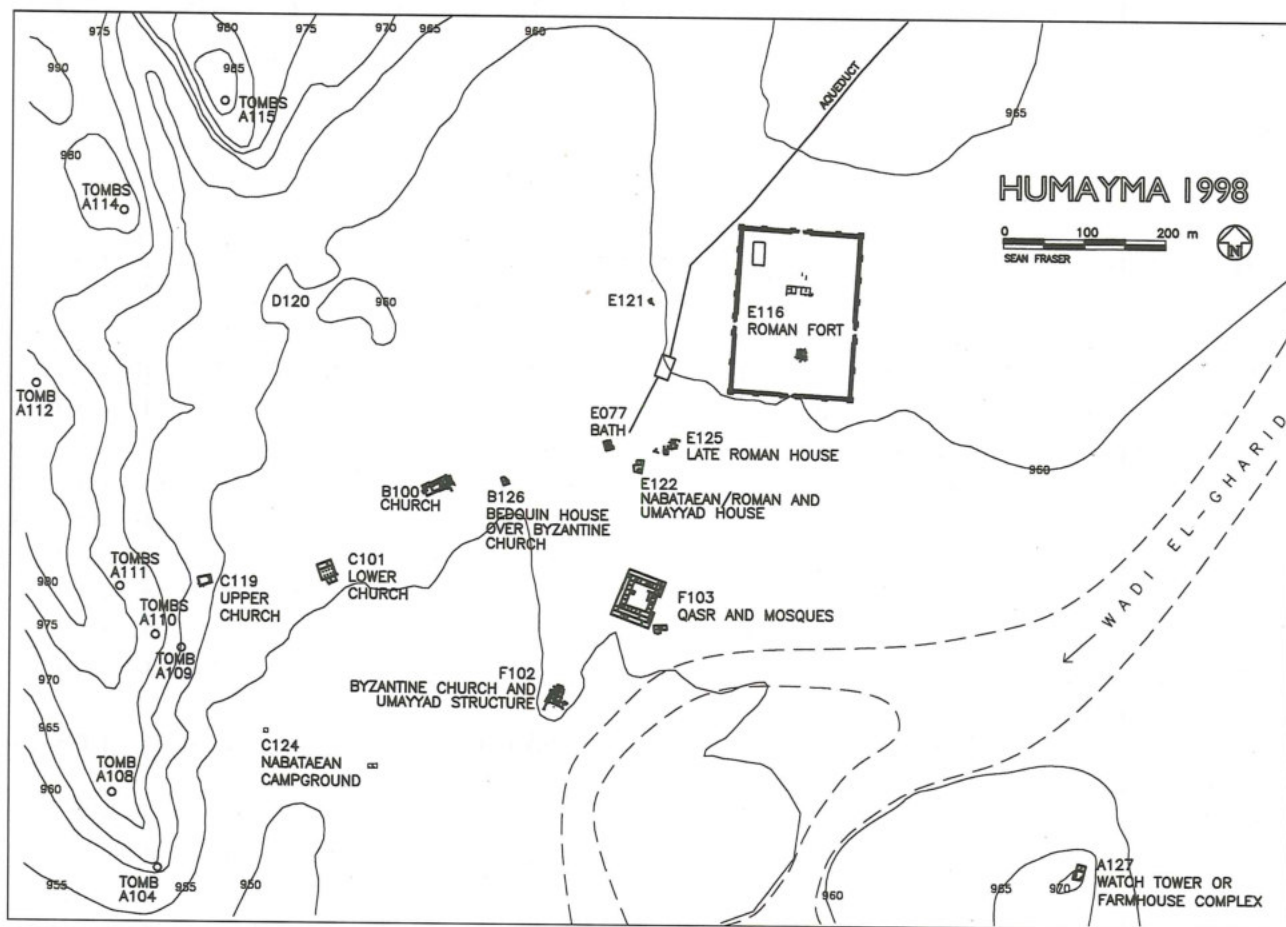
Field C124: Nabataean Campground (J.P. Oleson)

There are many archaeological indications of the Nabataean foundation and occupation of Ḥawar, also reported by the Byzantine historian Uranius (Oleson 1997: 157; Forthcoming). Typical Nabataean fine-

1. The fourth, fifth, and sixth seasons of the al-Ḥumayma Excavation Project took place in June and July of 1995, 1996, and 1998. This preliminary report has been delayed by the press of other projects on several of the individuals involved, although we have presented the results in other forms: see Foote and Oleson 1996, Oleson 1997, Oleson *et al.* 1998, Foote 1999. Preparation of the final report volumes, however, is well in hand. The project was funded principally by the Social Sciences and Humanities Research Council of Canada. A special grant was awarded by the Taggart Foundation to help pay for the costs of artifact conservation and building consolidation, and the van Berchem Foundation of Geneva provided grants to support excavation of the Abbasid manor house in all three seasons. ASOR, ACOR, and the Endowment for Biblical Research provided several small grants to support special technical services or student travel. We are very grateful for all this funding. The Project Director is Prof. John P. Oleson of the Department of Greek and Roman Studies, University of Victoria; Co-Directors were Dr Khairieh 'Amr of the Department of Antiquities of Jordan, Dr Rebecca Foote of Harvard

University, and Dr Robert Schick of the Albright Institute. M. Barbara Reeves of SUNY Buffalo served as Assistant Director in 1998. The Conservator is Judy Logan of the Canadian Conservation Institute. The Architect is Sean Fraser. The al-Ḥumayma Excavation Project is accredited by the American Schools of Oriental Research and licensed by the Department of Antiquities of Jordan. The Project Director and Co-Directors are very grateful to Dr Ghazi Bisheh, then Director - General of the Department of Antiquities, for his assistance with the project, to Dr Pierre Bikai, Director of ACOR, and to Dr Patricia Bikai, Senior ACOR Administrator, for their enormous help with the practical arrangements necessary for carrying out our work.

2. Oleson supervised the excavation of Fields A127, C124, and E116, Foote the excavation of F103, 'Amr the excavation of E122, E125, and F102 in 1995-96, Schick the excavation of B126, C101, and Reeves E125 in 1998. The relevant sections of the following report were written by these supervisors on the basis of notebooks and field reports prepared by the excavators.



1. Plan of the site of al-Ḥumayma.

wares, dating from the first century BC through the third or fourth century AD are common in the surface scatter and throughout the strata of later phases. The water-supply system, which was fundamental to the settlement's survival, is securely dated to the Nabataean era (Oleson 1988; 1995), and there are many rock-cut Nabataean tombs in the necropoleis. Despite intensive efforts, however, we have been unable to locate campgrounds or domestic architecture of the period of the Nabataean kingdom in the main habitation area, which is overlaid by the thick deposits of later occupation periods. In 1996, however, a Nabataean habitation area was found in Field C124, at the very southern edge of the settlement, and a small house of Nabataean/Roman origin in Field E122, on the eastern edge (Fig. 1).

Field C124 was selected for excavation because ploughing in the open field had ex-

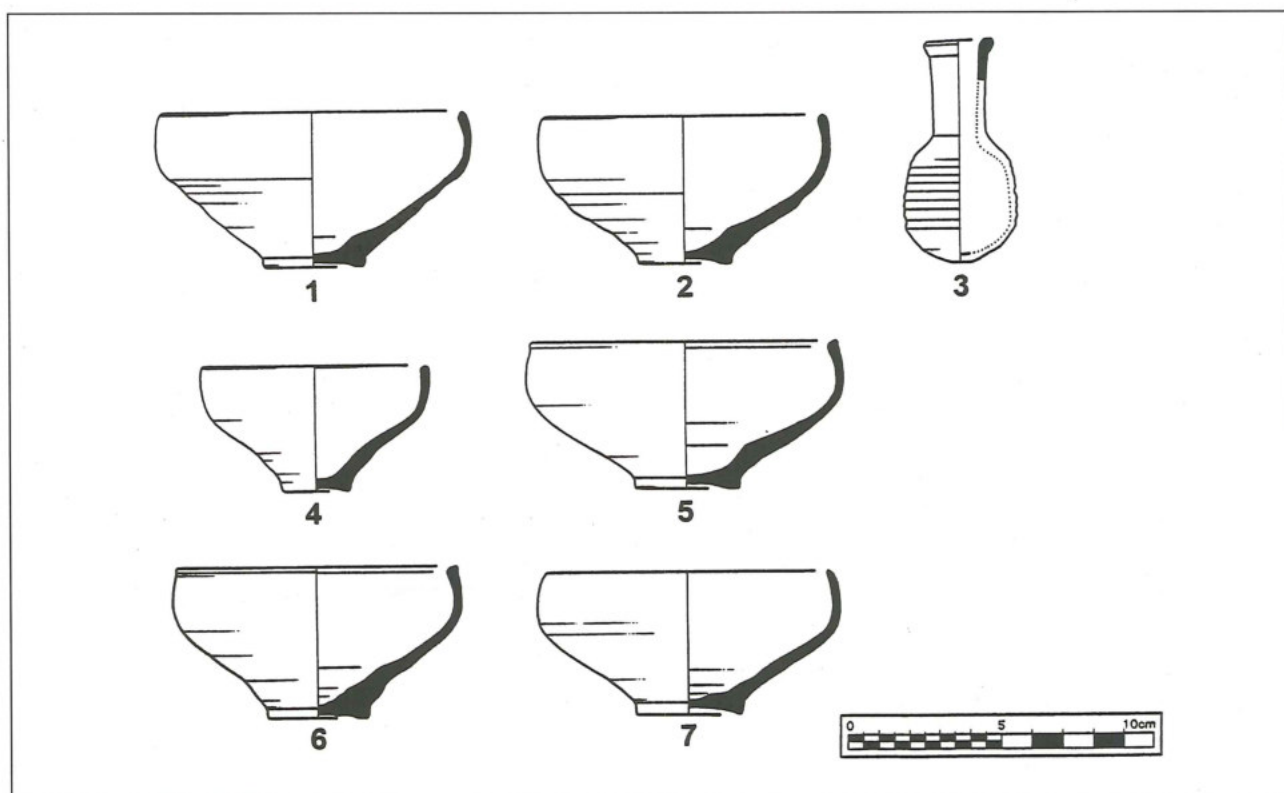
posed enormous quantities of Nabataean ceramics from strata just below the modern surface, particularly drinking bowls, intact or nearly complete, sometimes apparently stacked. Furthermore, the site was adjacent to the large, round Nabataean-type Cistern no. 54, the only round, private cistern in the immediate settlement area which is not associated with massive remains of domestic structures.

Square 01 (5 m x 5 m) was laid out 20 m east of Cistern 54, in an area of very fine, hard loessial soil only superficially affected by ploughing. The surface ceramics and spoil from a small robber pit were removed, allowing excavation of the undisturbed strata in the northern 2 m of the square. The surface sherds were predominantly coarse ware bowls, of Middle Nabataean date. Although there was very little definable stratigraphy, several loci were numbered and excavated,

all containing significant amounts of similar ceramic material, with a few fragments of glass. An intact MN drinking bowl was recovered from Locus 04, with a slightly incurving rim and a string-cut base (Fig. 2:1). Locus 05 contained a coin of Rabbel II and Gamilat, dating to AD 101-2 (96.0007.01; Meshorer 1975: 111, Type 163A). Several other coins of this period were discovered on the surface near Square 01. The various soil loci contained a very high concentration

of Nabataean ceramics, including numerous intact or restorable vessels, mainly small bowls with string-cut bases, along with part of a lamp, and a small piriform unguentarium (Fig. 2:3).

The more than 1500 sherds from Loci 06 and 08 all derive from Middle Nabataean (first century BC to first century AD) ceramics—nearly all small coarseware drinking bowls with string-cut bases; only a few sherds from storage vessels appeared. The



2. Ceramic objects from C124 (drawing by C. Mundigler and Q. Tweissi):

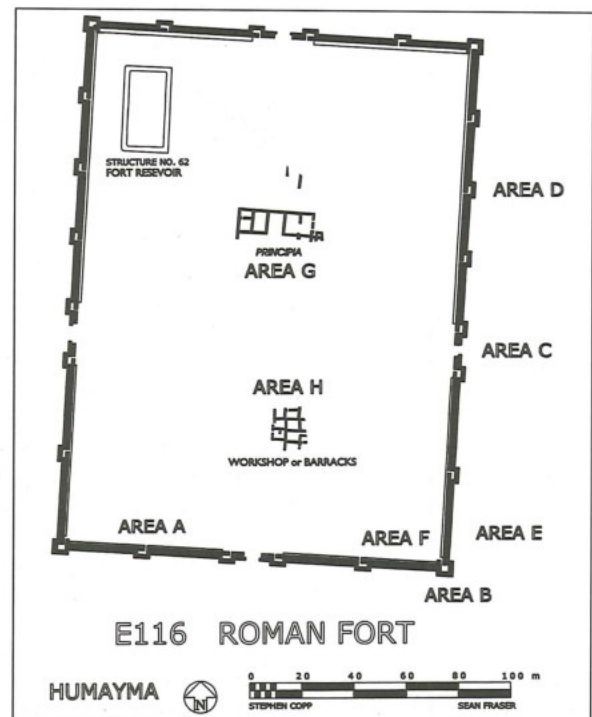
1. H96.0005.01; C124.01.04. Cup with string-cut base, complete and intact. Exterior and interior: 2.5YR 6/6 light red. Many sand and some mineral white inclusions, causing some bloating;
2. H96.0008.01; C124.01.06. Cup with string-cut base, complete and intact. Exterior: 2.5YR 6/5 light reddish brown/ light red with patches of 10YR 5/2 greyish brown and 10YR 6/4 light yellowish brown at body, 2.5YR 5/4 reddish brown at base; interior: 2.5YR 6/5 light reddish brown/ light red. Numerous sand and few mineral white inclusions;
3. H96.0008.02; C124.01.06. Unguentarium with trimmed string-cut base, complete and intact. Exterior: 2.5YR 6/8 light red. Some sand and many mineral white inclusions;
4. H96.0010.01; C124.01.08. Cup with string-cut base, complete. Ware, exterior and interior: 2.5YR 6/8 light red. Many sand and mineral white inclusions;
5. H96.0010.02; C124.01.08. Cup with string-cut base, part of rim missing. Ware, exterior and interior: 2.5YR 6/8 light red, medium core: N5/0 grey. Few sand and mineral white inclusions;
6. H96.0010.03; C124.01.08. Cup with string-cut base, complete and intact. Ware: 2.5YR 5/6 red; exterior: 2.5YR 5/6 red with patches of 2.5Y 6/3 light brownish grey/light yellowish brown; interior: 2.5YR 5/6 red with striations of 2.5YR 5/2 weak red. Numerous sand and few mineral white inclusions;
7. H96.0011.01; C124.01.09. Cup with string-cut base, part of rim missing. Ware: 2.5YR 5/4 reddish brown, wide core: N4/0 dark grey; exterior: 2.5YR 5/4 reddish brown with patches of 2.5YR 4/2 weak red and 2.5Y 7/4 pale yellow; interior: 2.5YR 5/4 reddish brown with striations of 2.5YR 5/2 weak red. Some sand and many mineral white inclusions, causing some bloating.

more complete bowls were often recovered in approximate stacks, indicating that they were associated with some intentional activity at this spot, and not simply dumped. The deepest locus (Locus 13), a compact, greyish soil level above sterile sand, contained very little ceramic material, but all was Middle Nabataean in date. A bronze coin of Rabbel II and Hagru, dating to around AD 106, (Meshorer 1975: 111, type 164) was recovered from the bottom of this locus. Subsequent excavation of the southern portion of the square revealed that it contained a different blend of ceramic fabrics and types. Middle Nabataean finewares predominated, with a large number of painted bowls, along with a larger number of fragments from storage vessels than seen elsewhere in the square.

No architectural remains, stone blocks or slabs, or mudbricks were associated with these loci, and very few blocks or slabs are to be seen even in the deeply ploughed portion of the field. The only possible installation recovered in association with the ceramic concentration of Loci 06 and 08 was a rough semi-circle of stones that partially encircled the ceramics. The absence of architecture other than a cistern, the deposition of the undisturbed ceramics, and the apparent spatial sorting by types suggest that Field C124 is a Nabataean campground (cf. Rosen 1993; Finkelstein 1995: 23-30). It is not surprising, given the flexible character of Nabataean urbanism, that tents should still be in use alongside well-constructed houses (Finkelstein 1995: 37-50; Bignasca *et al.* 1996: 14-17). It is possible that Cistern 54 was constructed to serve a family or related group of families who pitched their tents nearby when staying in town to harvest crops or join in market activities. Unlike the other five similar cisterns in the habitation centre, Cistern 54 never attracted the construction of a house. The economic or social structure of the family may have required a greater degree of nomadism than commitment to a house would have allowed.

Field E116: Roman Fort (J.P. Oleson)

The large Roman fort at the very north edge of al-Ḥumayma is one of the most prominent archaeological features at the site (Fig. 1). It has the typical rectangular plan of Roman forts (206.32 x 148.30 m, or 700 x 500 Roman feet), with a gate in each of the four walls, and virtually all the dimensions can be expressed in rational numbers of Roman feet. The entire plan is rectilinear and carefully laid out, but skewed nine degrees east of magnetic north (Fig. 3). Prior to our first campaign in 1993, the only feature clearly visible was a large reservoir in the northwest corner (29.40 x 14.20 x 3.05 m, or 100 x 50 x 10 Roman feet), fed by the Nabataean aqueduct via a branch line. Probes were carried out around the reservoir in 1987, but could only verify a period of Byzantine occupation (Oleson 1990: 160-62). The location of Ḥawar (also called Auara or Havarra in the Roman period) on the *Via Nova Traiana* and its isolation in the Ḥisma, suggested that the fort might date early in the history of the *Provincia Arabia*. Excavation in 1993 was designed to provide in-



3. E116: overall plan of fort.

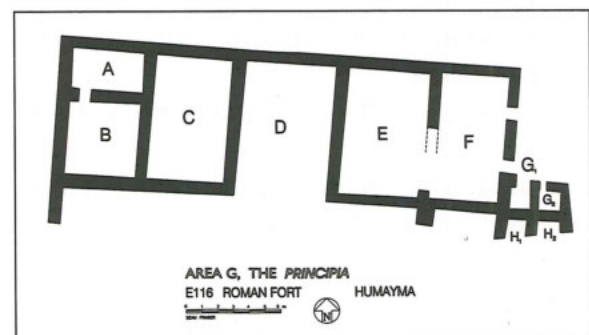
formation on the chronology of the fort's construction and development, and its design (Oleson *et al.* 1995: 321-30). We determined the design and dimensions of the curtain walls, the four corner towers and 20 intermediate towers, and of the east gate. The stratified ceramics and coins found in 1993 revealed that the fort was built no later than the mid-second century, and that the major period of occupation extended only through the fourth century. The fort therefore dates to the original garrisoning of *Provincia Arabia* and not to Diocletian's reorganization of the frontier system.

Excavation in 1995-96 was designed to cast light on the layout and design of major structures in the interior of the fort. Rectangular buildings—barracks blocks, workshops, or stables—are clear in the aerial balloon photographs taken in 1991 (Oleson *et al.* 1995: 322), and a particularly prominent structure in the southeast quadrant of the fort was picked out for excavation. A small robber pit in this area had deposited a large amount of well preserved cooking ware on the surface. This area, presumably a barracks, was termed Area H. The aerial photographs show that the east and west gates are not located in the centre of their respective walls, but are shifted to the south. The east wall extends 119 m north of the center-point of the east gate, and 87 m south of it (400 and 300 Roman feet respectively). It seemed likely that this arrangement indicated the presence of a large headquarters building (*Principia*) in the northern half of the fort, encompassing a rectangular parade ground that could be seen in the aerial photographs fronting the east/west road. This area was termed Area G. Intensive excavation was carried out in both areas in 1995 and 1996, exposing the plan of the *Principia* building in Area G, barracks and workshop rooms in Area H, and confirming a foundation date for the fort in the first quarter of the second century (Phase I). Coins of Trajan, Antoninus Pius, Claudius Gothicus, Aurelian

(?), Probus, Numerian, and Carinus have been found in various loci in the fort, but none of Diocletian, suggesting that the garrison was withdrawn during Diocletian's reworking of the frontier forts of Arabia. The appearance of numerous coins of Constantine and the House of Constantine mark a second phase of occupation. Phase II was accompanied by the addition or alteration of rooms in the *Principia* and barracks, and the dumping of earlier refuse in abandoned rooms. Since no coins later than the house of Constantine have been found in the fort so far, it seems likely that final abandonment took place in the mid-fourth century.

Area G: The *Principia*

In Phase I, the *Principia* consisted of a row of rooms 29.42 m (100 Roman feet) long defining the north end of a rectangular courtyard (not yet excavated) (Fig. 4). The east and west side walls of the *Principia* continue south to frame the courtyard, probably serving as the back walls of two north/south colonnades. Many column drums (averaging 0.54 m diam.) cut from the local white sandstone are found reused in Phase II constructions in the *Principia* and elsewhere around the fort, and the parade ground is an obvious possible source. This colonnade probably passed in front the *Principia* façade, then turned to the south on line with the first crosswall in from either end of the main building, resulting in a courtyard 17.70 m (60 Roman feet) wide (measured from the column axes). A parade ground twice as



4. E116: plan of Area G, the *Principia*.

long (35.4 m; 120 Roman feet) as it is wide would reach almost exactly to the projected north edge of the road connecting the east and west gates (the *Via principalis*). A probe along the centre line of the courtyard did not uncover any paving, but did find indications of a very pebbly, tamped surface.

The main building and the walls framing the courtyard were carefully built of relatively large pieces of un-trimmed and partly-trimmed rubble and occasional re-used Nabataean blocks, facing a narrow core of cobbles set in a slightly limey mud mortar. The walls, which all bond with each other, appear regular, but vary in thickness from 0.60 to 0.70 m, most often measuring 0.68 m thick. Many of them survive to a height of 2 m. Crosswalls mark off six rooms, the central one (Room D, probably the *Aedes*, or shrine for the unit's military standards) is 0.74 m (2.5 Roman feet) wider than the others. An east/west crosswall with door subdivides the westernmost space into a small room at the northwest corner of the building, Room A, (inside dimensions 2.70 x 5.01 m), fronted by Room B (4.90 m x 4.98 m). The architect may have been aiming at room units measuring (from mid-walls) 20 Roman feet wide by 30 long, the *Aedes* 22.5 by 30. Room C, immediately west of Room D, measures 8.13 x 5.01 m. The two rooms east of Room D, Room E (4.90 x 8.10 m) and Room F (4.75 m x 8.10) appear to be slightly narrower than the corresponding rooms A/B and C, but the apparent discrepancy may result from damage to the walls. There should be doors in the south walls of all five rooms, although they have not yet appeared in the excavation.

The original Phase I pavement has been exposed over part of Rooms C, D, E and F. It consisted of rectangular sandstone slabs, the long dimension laid mostly east to west, with neatly alternating short seams. The maximum length for the paving slabs in Room D was 3.78 m; the width ranges from 1.66 to 0.74 m; the thickness varied from

0.03 to 0.06 m. The pavement abuts the adjacent walls at a joint of either thin flat stones or cobbles set in a white mortar containing ground pottery. All the interior and exterior *Principia* walls seem to have been plastered with a hard, off-white sandy plaster laid on a bedding layer of soft, white mortar. Where the joint is preserved, this plaster curves onto the paving slabs. In addition to the white plaster, the upper portion of the walls of the central Room D was decorated with elaborate polychrome frescoes. Deep red borders frame designs in both rectangular and diamond-shaped panels on an off-white background, presumably reproducing the effect of expensive coloured stone revetment plaques. Two types were prevalent, one consisting of pink (5YR 7/4) with red splotches or streaks, the other consisting of brownish yellow (10YR 6/6) with similar red splotches or streaks. Sufficient fragments were recovered to reconstruct a geometric pattern consisting of a light greenish gray (5GY 7/1) right-angled triangle surrounded by a brownish yellow (10YR 6/6) border, all on an off-white background. A large number of fragments were recovered of a swirling "whirligig" pattern of interconnected rounded red triangular shapes and light greenish gray and brownish yellow lenticular shapes, all on an off-white background. Other designs include a broad red border framing intertwined stems and tendrils in pink, red, and brownish yellow on an off-white background, and a possible egg-and-dart pattern painted in red, black, and light green. One small fragment retained a fleck of gold leaf apparently applied to the painted surface.

A probe was excavated beneath the pavement at the north end of Room D, revealing three layers of clay and cobble foundation packing over sterile soil. Only a single, small fragment of a lamp was recovered, probably second century in date. Like the fortification walls (Oleson *et al.* 1995: 325-30), the walls of the *Principia* were built on

foundation trenches filled with cobbles and clay.

Significant numbers of typically Roman terracotta roof tiles were recovered from the rubble fill in the structure: large, flat pan tiles with side flanges, and curved, tapering cover tiles, often associated with great lumps of the light-weight, white mortar into which some of them were set. These tiles indicate that at least some spaces in the *Principia* were covered by gabled roofs in Phase I or II. Since the tiles were all badly broken and were found scattered throughout the fill without any apparent order and not in sufficient quantities to have roofed any of the rooms, it is possible that gabled, tiled roofs were used only in Phase I. The same layers of fill also contained large lumps of mortar and mud that were smooth on one side and carried the impression of bundles of reeds on the other. These fragments may derive from flat roofs laid on some of the rooms in Phase II, consisting of beams holding up layers of sticks and reeds mortared and plastered to shed water. Presumably any tiles used in Phase II could have been salvaged before the roofbeams or walls collapsed, but such tiles are found only infrequently elsewhere on the site.

The excavated portions of Rooms A to F were filled with a generally unstratified, rather uniform fill consisting of windblown soil, wall and ceiling rubble, plaster, iron nails and miscellaneous metal scraps, and ceramics dating to the Middle Nabataean, Roman, Late Roman, and Early Byzantine cultural periods, but with second-century material predominating. In conjunction with the material from Area H, it can be seen that the structure was cleared out at the beginning of Phase II, perhaps after damage or a period of abandonment, minor modifications were undertaken—perhaps to allow civilian habitation—then it was allowed to decay slowly at the end of Phase II. The ceramics and other artifacts suggest a period of particular activity from the very be-

ginning of the second century, with a decline or hiatus in the late third and early fourth century. Phase II, which the ceramic and coin finds date to the first half of the fourth century, left fewer cultural remains.

No evidence has been found for Phase I installations other than a large sandstone statue base or speaker's platform (0.90 x 0.76 x 0.46 m high) with a projecting lower cavetto moulding, set up on two reused blocks with Nabataean dressing. The base itself is probably a reused Nabataean column base. It was installed flush against the south façade of the *Principia*, on line with the party wall between Rooms E and F. A two-line Latin inscription in tall narrow letters (H 0.05 m) was cut in the south face. Unfortunately, the inscription was in poor condition, the first line (L 0.34m) being completely effaced by weathering or mechanical damage, and only the middle portion of the second line (the overall length of which is 0.43m) could be partly deciphered: ...]PRAESENEMP[... Other conjectures are ...]PRAESEDE...RAT[... The character of the inscription should be honorary, and, although neither conjecture makes sense on its own, it might be that *praeses*, the term for provincial governor lies hidden in the text (cf. Gatier 1986: 39 no. 13, from Amman; Sartre 1982: 131, 9060: *praes(es) provinc(iae) Arab(iae)*, from Bostra), or mention of a dedication or structure (*prae sede*). The final letter should be a verb, which would accord well with ...]RAT. The use of Latin for such a prominent monument reinforces the Roman character of the fort, and suggests Italian or western origin for its administrators, if no one else (see Oleson Forthcoming). A silver drachma of Trajan, struck at Bostra between 112-117 was found in the fill near the inscription (cf. Kindler 1983: 100-101, nos. 6-9). Although the stratigraphy is mixed, the fine condition of the coin suggests that it had not circulated for very long before being lost somewhere in the vicinity of the

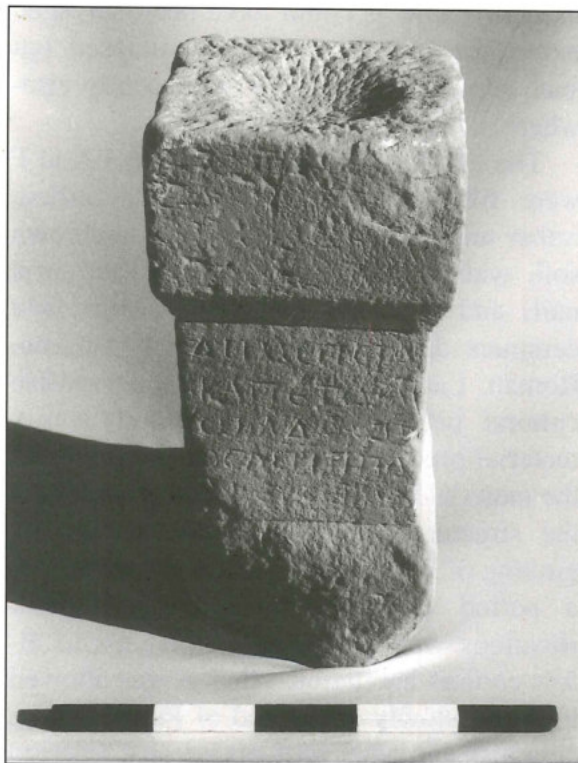
Principia.

Some minor modifications were carried out in Phase II. Benches (W 0.44m) composed of heavy paving slabs on earth and rubble supports were built across the north walls of Rooms E and F, along with a bin or cooking area in the northwest corner of Room F. A series of small rooms was added to the east of Room F and the east portico (Rooms G1-G2, H1-H2), and an access door provided. Further excavation is needed to determine the function of these rooms, but several basins found in Room G2, and west of Room H1 are more suggestive of agricultural occupations than of military activity. It is likely that in the fourth century the north-eastern corner of the *Principia* was turned to uses other than military administration. The structural remains, too, are much shabbier than those of Phase I. It is interesting that the sandstone pavement of Room G2 was laid over an enormous deposit of ground up ceramics (*cocciopesto*), undoubtedly prepared for use in the high quality cements and plasters used in Phase I construction. Further excavation is required to recover the plan of the colonnade, and to define the character of the reuse or renovation of the *Principia* facilities.

About 25% of the fragments of white plaster which were found close to the west wall of Room C carried graffiti drawn with carbonized reeds or twigs while the plaster was still on the wall. The subjects include the hind-quarters of a camel with human rider, an ostrich, palm trees, other trees or shrubs, angled and curving lines, and possibly ithyphallic human figures. The subjects, which resemble similar ancient graffiti pecked on rocks throughout the region (cf. Jobling 1983; 1984), may have been drawn during Phase II, or after final abandonment of the structure. Many of the plaster fragments also exhibited drip marks made by muddy water running down the wall, indicating that the roof of the structure was no longer complete at the time the building be-

gan to crumble.

Two inscribed sandstone altars or statue bases with square bodies (0.27 m sq.) flaring to a wider base and top were found in the rubble fill in Room F. One base (95.0599.01) was standing upright next to the Phase II door the east wall of the room, but it was broken and incomplete (H 0.36 m), probably indicating reuse. A Greek inscription was carved in careless letters ca. 0.02 m high: CΩTHP.../ΠIPΩTON.../THN ANEΘHKEN... A steep-sided, shallow oval recess was carved in the upper surface, probably the base for the statue of the political or religious image mentioned in the dedication. A second altar, of identical design and dimensions, but complete (H 0.60m) was found in the rubble fill of the room (Fig. 5; 95.0596.01). A shallow oval recess was pecked into the upper surface, either for a statue base or for offerings. The inscription, which begins ΔΠ ΜΕΓΙCΤΩ / ΚΑΠΙΕΤΩ [ΑΙΝΩ]? / ΗΑ[ΙΟΠΟΛΙΤΗ]/..., may dedicate the altar to Jupiter Heliopolitanus (cf. Rey-Coquais 1967: 59-64, nos. 2728-31,



5. E116: inscribed altar from Area G.

from Baalbeck). The last line is still undeciphered. Since the rest of al-Ḥumayma is nearly devoid of inscribed material, the appearance of several Greek and Latin inscriptions in one small area of the *Principia* is a strong testimony to the Roman “epigraphic habit” (see Oleson, Forthcoming).

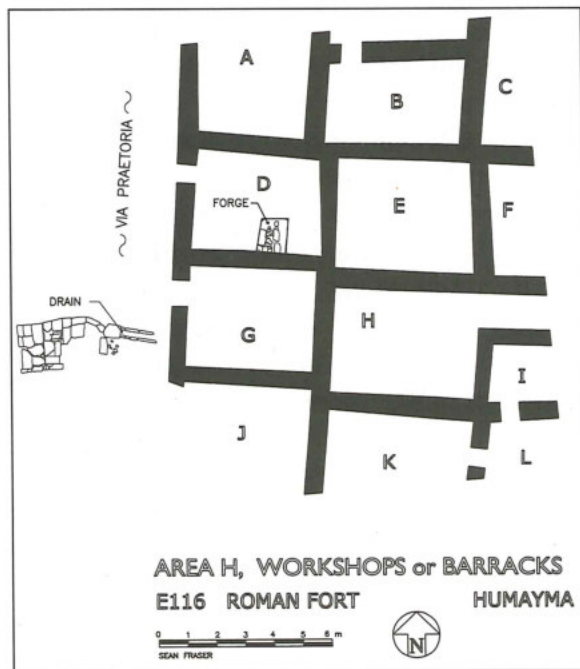
Area H: Barracks and Workshop

A portion of a block of barracks and workshop rooms was excavated in 1995-96 in the southeast quadrant of the fort, adjacent to the main north/south road (*Via praetoria*)(Fig. 6). Twelve rooms were identified and at least partially excavated (Rooms A to L) exposing numerous installations of both Phase I and II, and an enormous corpus of ceramics and metal artifacts. The walls were built less carefully than those of the *Principia*, using poorer qualities of stone, fewer large or carefully shaped blocks, and larger quantities of mud mortar and chinking stones. As a result, the upper sections of many of the walls have slumped or collapsed, giving the published plan a more irregular appearance than the structure actually embodies. The walls vary

from 0.56 to 0.62 m in thickness, but probably were designed to be 0.59 m (2 Roman feet) thick.

The original, Phase I design can best be seen in the better preserved Rooms D, G, and J, along the east edge of the *Via praetoria*. Measurement is difficult, but the rooms are all close to 4.50 m long and 3.5 m wide, very close to 15 x 12 Roman feet. There are doors 0.74 and 0.75 m wide (probably 2.5 Roman feet) near the northwest corner of Rooms D and G (this portion of Rooms J and A is unexcavated), opening onto the slightly raised earth and cobble sidewalk outside (W ca. 1.40 m, probably 5 Roman feet). A low step of cobbles and mortar was built on this surface just outside the door of Room D. The rooms along the street may be better preserved because they served as dumping areas during at least part of Phase II, while the rooms to the east and north were more thoroughly renovated and reused. During Phase I, rooms in Area A, like those in the *Principia*, were paved with sandstone slabs. This paving is still well preserved in Rooms D, G, and J, but elsewhere it was partially or totally removed in favour of beaten earth floors.

Room D is the most interesting in the complex. Although we expected the warren of rooms in Area H to be a military barracks, a forge had been installed in Room D, which seems incompatible with sleeping quarters. A thick layer of soft black ash (from charcoal?) covered the paved floor, incorporating small (D 0.08 m), bowl-shaped forging blooms—formed during the working of iron rather than during its refinement. The ash layer concealed hundreds of iron and copper artifacts, apparently mostly scrap metal meant for re-working or resulting from repair: buckles, three-bladed arrow heads, spear points and butts, sections of scale armour, hobnails for boots, and the cheekpiece of an iron helmet, with fragments of leather still adhering to its inside surface (Fig. 7). The presence of a bronze



6. E116: plan of Area H, the workshop or barracks.



7. E116: cheek piece of helmet, found in Area H.

coin of Constantine in the ash layer indicates that the forge was in use in Phase II. The forge table itself, however, a waist-high platform (L 0.90 m, W ca. 0.50m, H 0.82m) built of fairly well shaped blocks, bonds with the south wall of the room, possibly indicating the presence of a forge in Phase I as well. A stepped arrangement of blocks in the southeast corner of the room may have been used as a tool bench or bellows support. A thick circular disk of hard sandstone (D 0.52 m, Th 0.27 m) with several deep, round-bottomed depressions on the upper surface was found on the pavement by the north wall, possibly in secondary use as a pounding surface. A probe beneath the paving yielded Middle Nabataean and Roman wares of the early second century.

The Phase I paving was preserved over much of Room G as well, but in one place the collapse of a slab revealed the presence of a drain running under the slabs from east to west. The drain, approximately 0.15 m wide and deep, was constructed of upright stone slabs and an earth floor. It was found

to continue under the west wall of Room G and below the street, where it was accessed by a white sandstone drain cover (ca. 0.48 m square) at the edge of the sidewalk, perforated by five petal-shaped holes arranged in a rosette. The drain continued west to the very middle of the *Via praetoria* (30 Roman feet wide from building façade to building façade), where it emptied into a large north/south drain (W 0.30 m, 0.25 m deep) very solidly built of neatly cut white sandstone slabs. This main drain must have been expected to carry run-off water from most of the area of the fort safely beneath the south gate and into the adjacent fields. The road surface itself clearly had been patched from time to time and consisted of irregular slabs of sandstone, limestone, and granite. A probe into the cobble and red clay bedding for the the paving yielded a single late first century or early second century sherd. A probe beneath paving in Room G exposed Middle Nabataean and Roman period pottery, and a denarius of the deified Faustina was associated with the unpaved surface of the floor (95.0161.01; after A.D. 141; Mattingly and Sydenham 1930: no. 384).

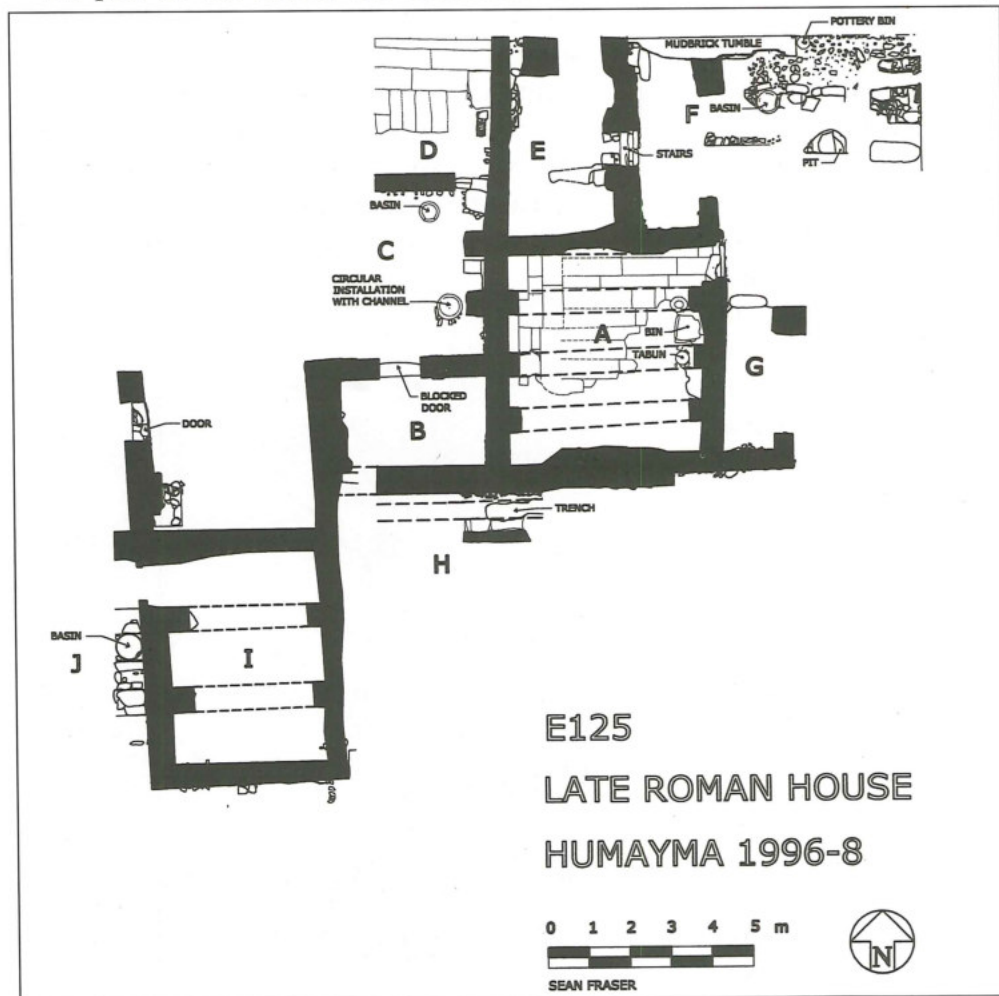
No Phase II renovations were noted in Room G, but at some point during the early fourth century the room was used as a dump for old and new rubbish. This stratum yielded hundreds of large fragments of second, third, and fourth-century ceramic vessels, mainly coarse and cooking wares, butchered animal bones, fragments of glass, and a wide variety of fragmentary metal artifacts in iron, bronze and lead. Room J was filled with a slightly less dense deposit of similar character. The bones include significant quantities of pig, chicken and fish, alongside the more usual sheep and goats. The remains of food and cookware presumably were generated by a barracks area in or near this building. Similarly, large quantities of oyster shells were found in and around the *Principia*, perhaps deriving from the officers' mess.

The remaining rooms so far excavated in Area G show a careless renovation of the original structure, involving the removal of some or all the paving slabs, the construction of bins, platforms and fire pits, and the reuse of sandstone column drums as stands or paving. The fill throughout contains a mix of second through fourth-century ceramics, along with fragments of glass vessels, and a modest amount of iron or bronze clippings. The character of the structure in Area H is not entirely clear. It may originally have served as a barracks and been transformed at least partly into a workshop in Phase II, or it may have accommodated both functions in both phases.

Roman period houses at al-Ḥumayma, in 1996 we began excavation of a low mound located 60 m east of Bath E077 (Figs.1 and 8). The mound, approximately 30 m across, was chosen for excavation because traces of wall-lines and the scarcity of vegetation suggested the presence of a buried building, while the high concentration of painted plaster fragments on the surface implied a richly decorated structure. In addition, the location of the building in the midst of structures of Nabataean (Reservoir E066; the structure under E077) and Roman origin (Bath E077, Fort E116) pointed to a pre-Byzantine construction date. It was hoped that the structure would be domestic in character and date to the period of the Nabataean kingdom, or that it might be part of the vicus associated with the fort. Two seasons of excavation (directed by K. 'Amr in

Field E125: Late Roman House (B. Reeves)

As part of our search for Nabataean or



8. E125: plan of Late Roman house.

1996 and by M. B. Reeves in 1998) revealed it to be a Late Roman house post-dating the construction of the Roman fort, but embodying interesting construction techniques and remarkable fresco decoration. As the excavation of this building is not yet complete, the structural analysis and phasing are preliminary.

Ten 6 m x 6 m squares were laid out over the mound, but once rooms were identified, recording and description naturally shifted to room designations. House E125 contains at least nine rooms or areas (labeled A to J) of which only two (A and I) have been fully excavated. The external walls have not yet been located. Four phases of occupation were defined.

Phase I. During Phase I, the structure was built of neat mudbrick walls on multi-course cobble foundations. These walls rested directly on hard, sterile earth which was used as a ready-made floor in Rooms C and F. In Rooms A and D a more impressive flooring was laid down, consisting of local white sandstone flagstones overlaid by plaster.

Neatly-cut sandstone blocks were also used for the doorjambs of Rooms A, D, and I, and for the arches and roofing slabs in Rooms A and I. The small spaces between the roofing voussoirs were chinked with cobbles and mortar. The pressure of these arches on the mudbrick walls was relieved here and there by means of buttressing piers or walls installed against the opposite face of some walls (e.g. in Room C, opposite the north and central arches of Room A).

The walls, arches and visible areas of the roofing slabs were coated with hard, sandy white plaster applied directly to the smooth mudbrick of the walls, to the mudplaster coating on the arch-springers, and to the mortar between the voussoirs. Most of the rooms (e.g. C, F, I) displayed either simple white plaster or a white plaster surface decorated with simple red lines and/or daubs. In marked contrast, Room A was decorated

with figured frescoes.

Analyses carried out at the Canadian Conservation Institute after the 1996 season indicated that the true fresco technique was used for the figured scenes, the pigment being applied while the final plaster surface was still wet (Corbeil *et al.* 1996). The motifs on the walls and arch voussoirs of Room A included human figures, a stemmed bowl or basin, volutes, grape clusters, and wreaths—one held in an eagle's beak. Yellow, brown, gray, red and pink borders marked out the rectangular figure panels. The motifs employed are common in Graeco-Roman art and probably originated in an artist's copybook. A neatly painted Greek inscription below one draped figure, of which only the bottom half is preserved, identifies her as Κλειώ—Kleio—the Greek Muse of history (Fig. 9). Since the Muses seldom appear alone, it is likely that at least some of the other figures in more fragmentary condition represent either some of the other eight Muses or gods who commonly accompany them, such as Apollo.

There is evidence that in its first phase of use, some sort of domestic production took



9. E125: fresco of Muse Κλειώ.

place in the structure. A circular basin of white sandstone (D 0.62 m), with a thick base and thin peripheral walls perforated by a drainage hole, was installed during this phase over a channel cut in the earth floor of Room C and lined on either side with low stone slabs. The installation was damaged and dismantled in antiquity, but three other similar sandstone basins or disks were found reused throughout the building. The function of these installations is not clear: the sandstone is too friable to have allowed their use as durable presses for olives or grapes. Moreover, the floor of the drainage channel in Room C consisted of hard-packed soil rather than stone, which would have allowed much of the fluid pouring from the basin to escape. Although the situation remains unclear, it is possible that the basins were used for dyeing or fulling woolen garments, or even for washing laundry, and the drain was meant to contain the water neatly until it could be absorbed by the soil. Unfortunately, all other installations and artifacts that might have indicated the function of the structure and its rooms were cleared out in Phase II.

It is difficult to date the phasing of the E125 building. Although still under analysis, much of the pottery from E125 is a transitional ware combining elements of both second and fourth century AD typologies (K. 'Amr, Y. Gerber, personal communication, May 1999), and many ambiguities remain concerning the chronology of the Late Roman and Byzantine ceramics of Southern Jordan (Frösén *et al* 1999). The fresco, however, seems to have been painted in the late second or early third century. This date is appropriate for the figure types, drapery style, and inscription, and for the deployment of polychrome pictures one above the other on the wall, starting at different heights, contained within solid frames of

several diverse colors, and without any architectural elements characteristic of Pompeian Second to Fourth Styles (cf. Ling 1991: 176-78). Since the fresco was painted at the time the original coat of wall plaster was applied, the building itself should date to the late second or early third century AD. Similar mudbrick architecture found in a probe under the building in F102 suggests that mudbrick construction may have been common on the site during the Nabataean and Roman periods (Oleson *et al.* 1993: 141). It is therefore possible that the Roman period house in E125 continues a local tradition of mudbrick construction with stone reinforcement and roofing. This construction method may be one reason it has been difficult to identify Nabataean and Roman houses in the archaeological record at the site.

Although constructed later than the Roman fort, the E125 house was well placed to interact with the military structures. It was located 160 m southwest of the south gate of the fort—the gate closest to the barracks—along the busy route between the fort and the garrison's bath-house.³ One possible interpretation of the situation is that an entrepreneur built a structure in the vicus containing a domestic industry aimed at the military market. The owner displayed his Romanness by decorating a public (?) room with common Graeco-Roman motifs and Greek inscriptions. In view of the fact that the first forces to garrison Arabia included many Egyptian units (Speidel 1977), it is interesting that several Egyptian objects were found within the house: a faience ram's head amulet, a faience scarab, and faience beads. Although the identity of Ḥawar's garrison is not known, it is possible that E125 was built by a retired Egyptian soldier or by an Egyptian camp-follower who followed the garrison to Arabia. An Egyptian

3. Sommer (1984: 47-48) notes a consistent spatial relationship among Roman forts in Roman Britain,

their vici, and military bath buildings.

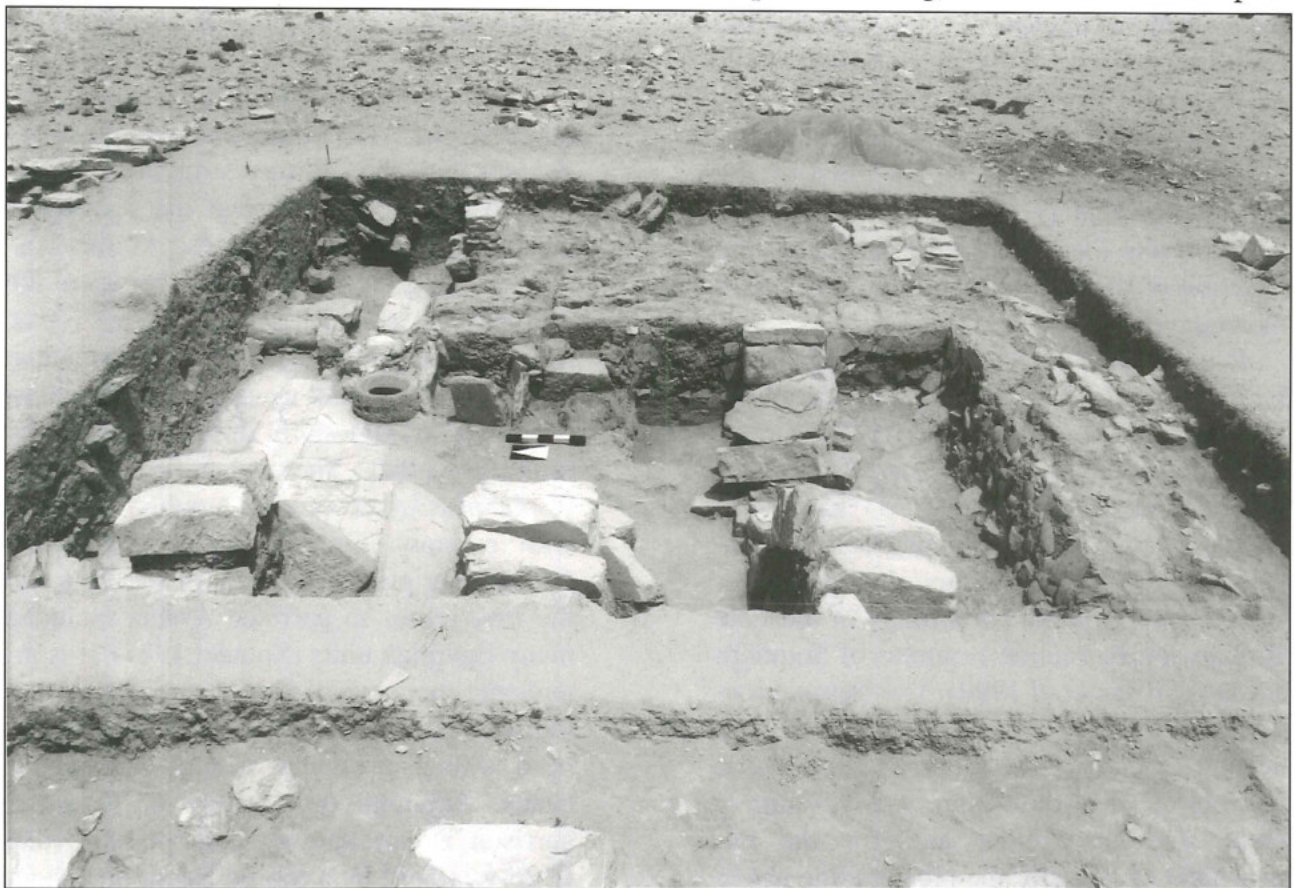
origin for the owner might also explain the mudbrick construction of the building, as opposed to traditional Nabataean construction using cut stone blocks (cf. Strabo 16.4.26).

Phase I ended with damage to the building. A dump in Room H, beneath an area where plaster was mixed for Phase II renovations, contained building debris and sandstone sling balls associated with the damage.

Phase II. Major renovations were made to the building during Phase II, but carelessly executed. Many of the mudbrick walls were repaired or reinforced on one or both sides with facings of pottery or cobbles held in place by mudplaster. The north face of the south wall of Room A was faced with

large potsherds set in mud (Fig. 10). Other sections of the walls (often adjacent to renovated sections) were not repaired, but the wall decoration (both figured designs and red lines/daubs) were covered with white-wash. The flagstone pavers were taken up in the southern halves of Rooms A and D.

A possible rationale for these renovations is suggested by debris thrown into Room H during Phase III, and partly sealed under a trench filled with mud-plaster which may have been used in the renovation of the building. In addition to fresco fragments, this dump contained seven sandstone balls. The stone balls vary in diameter from 0.038 to 0.047 m and average 102 g in weight. Similar balls found elsewhere have been interpreted as sling stones.⁴ It is therefore pos-



10. E125: Room A (foreground), Room G (background), to east.

4. The spherical stone balls from the contemporary Roman fort at Buciumi (Romania) are 0.03-0.05 m in diameter (Bishop & Coulston 1993: 139). Moreover, although individual diameters/lengths vary,

the average length of lead sling-shot was 0.04 m (Griffiths 1989: 259), strikingly similar to the diameter of these balls.

sible that the building was damaged in a military engagement. E125 is located only 90 m from the southwest corner of the fort, 160 m from the south gate, well within contemporary sling-shot range (cf. Griffiths 1989: 261-63). It is tempting to link the damage to this building with Zenobia's revolt in 270-272. Graf attributes much of the contemporary destruction in Provincia Arabia, Egypt and Palestine to this revolt, including damage to the Qaṣr al-Bint at Petra (1989: 144). At present, however, the pottery suggests that the damage occurred no later than the mid-third century.

Phase II ended with the sudden collapse of the building. The arches in Rooms A and I fell, bringing down the ceilings. The wall separating Rooms A and G fell to the east, its courses still visible lying horizontal just below present ground level (Fig. 10). A heap of large flat sandstone slabs in Room C represents either roofing slabs which fell at this time or floor slabs pulled up in Phase II or III. In Room F, a similar slab fell into a pit (Locus 13). Tumbled stones beneath a bin (Locus 35) in Room F represent either stones which collapsed into a pit or which were thrown into it at this time. Complete cooking ware vessels crushed under the arches in Room A have been tentatively dated to the mid to late third century. The reason for the building's collapse is unknown. No major earthquake is known to have occurred in the area at this time (Amiran *et al.* 1994: 265). Possibly the earlier phases of damage and renovation had simply undermined the structural integrity of the building.

Phase III. The Phase II collapse was followed by a period of abandonment, during which deposits of soil and ash were dumped in Rooms B, C and F. Given the date of Phases II and IV, the abandonment probably only lasted 20 to 50 years.

Phase IV. Portions of the building were cleared out for limited reuse in Phase IV. The voussoirs of the northern and central

arches in Room A were removed from the northeast corner of the room, while the voussoirs in the northwest corner and all those of the southern arch were left where they had fallen. A kitchen area was set up in the cleared space, consisting of a *ṭābūn*, a storage bin, and a millstone. The doorway from Room A to G was also blocked at this time. Room B was reused in this phase, but with a higher floor level; the door connecting it with Room C was filled in. The southern portion of Room C was not used at this time, but a sandstone basin was set up in the northern half. Room F saw the most intense reuse in Phase IV. A new threshold was inserted into the western wall, leading to a hard-packed earth floor, with cobbled surface in the northeast quadrant of the room. A recessed bin (floored with cobbles and lined with large blocks) was built into this area and used for the storage of coarse ware and cooking ware vessels. These vessels date this phase to no later than the late third or early fourth century. Like Room A, Room F was apparently now used as a cooking area, incorporating a *ṭābūn* and a reused sandstone basin. Given the limited and un-coordinated character of these renovations, the re-use of the building in this period should be attributed to squatters.

Phase IV ends with the final collapse and abandonment of the building. The mudbrick wall along the north side of Room F collapsed and crushed the pottery in the adjacent bin, marking the end of the building's occupation. This event occurred in the late third or early fourth century, before the re-occupation of the fort and the subsequent renovation of the bath-house signal the return of some prosperity to the neighborhood.

Two seasons of excavation have provided a great deal of information about this structure, which dates to one of the most important but least known phases of Ḥawar's occupation—the period between the construction of the fort in the early second century and the departure of its garrison in the

late third century. Analysis of the finds, and especially of the pottery, much of which seems to represent a new transitional ware, is still underway. One more season of excavation is planned in 2000. The goals of that campaign will be to define the extent of the building and to finalize its plan, throwing new light on domestic architecture in Roman Ḥawar. It is also planned to investigate further the loci associated with the Phase II damage, and its possible military source.

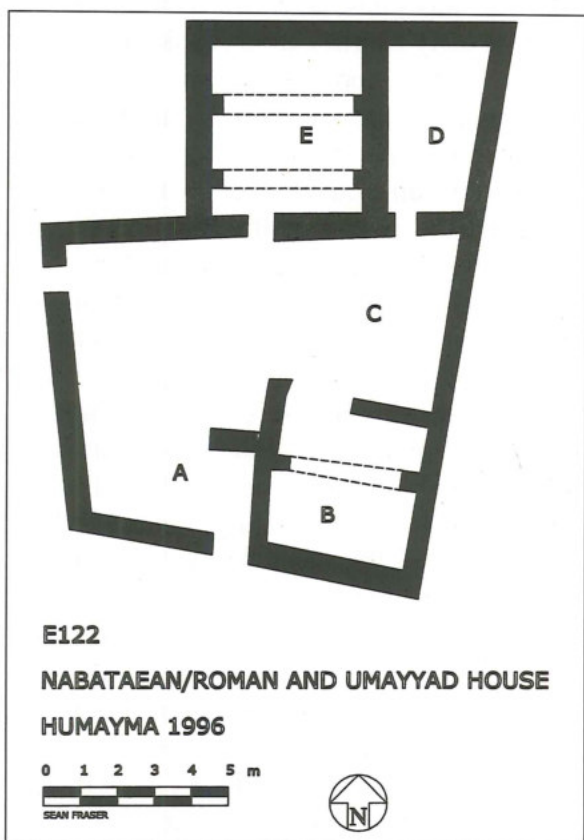
Field E122: Nabataean/Roman and Umayyad House (K. 'Amr)

Traces of the walls of a small structure were noted on the surface of the ground 20 m southeast of the Bath (E077) in 1995 (Figs. 1 and 11), 30 m southeast of the centre of the mound later found to cover the Roman house E125. This structure, termed E122, was selected for excavation as a possible Nabataean domestic structure, based

on the assumption that the Nabataean structure on which the nearby Bath was built may have been adjacent to other structures of the same period. The presence of a badly weathered column base just to the east of the structure (unearthed by illicit digging) further encouraged this assumption. Complete excavation of E122 in 1995-96 revealed a small domestic building built during the later second century AD and abandoned sometime during the third century AD. Following a typically Near Eastern house plan, it was composed of a large central courtyard with rooms opening off the north and east sides. During the later seventh century AD, the eastern part of the structure was remodeled in two phases before its final abandonment and collapse, most probably in the mid-eighth century AD. Excavation revealed at least three phases of development.

Phase I. Walls of this phase (the initial, second-century phase of building) are oriented more or less east-west and north-south and were built of medium-sized sandstone blocks with alternating courses of flat wedging stones. The walls vary in thickness from 0.44 to 0.60 m and are only roughly finished. The plan is a courtyard house measuring overall approximately 12.5 m E/W and 16 m N/S. The only entrance is through a door 0.90 m wide in the west wall, near the northwest corner of the courtyard, an L-shaped space approximately 8.8 m E/W by 8.6 m N/S. In this phase the structure seems to have had three rooms, all accessed through the courtyard in typical Near Eastern fashion. In general, very little fill covered the structure, whose walls were preserved to a maximum height of 0.75 m. The stratigraphy consisted of a thick layer of stone tumble (Loci 01.03, 05) directly on top of a beaten earth floor (Locus 01.06) associated with the walls.

Room A was built into the southwest corner of the courtyard, but only traces of the partition walls have survived. Room B, in



11. E122: plan of Nabataean/Roman and Umayyad house.

the southeast corner of the courtyard (3.8 m N/S by 4.0 m E/S), was roofed by a single arch springing from imposts built against the east and west walls, which probably carried stone roofing slabs. This room was reworked in the Phase II renovations.

Room E was entered by a door 0.84 m wide in the north wall of the courtyard. It was 4.0 m square and roofed by two arches carried by imposts built into the east and west walls. A niche or closet was built into the middle of the east wall, and a bin built out from the northwest corner with carefully dressed blocks. A closet built into the west face of the west wall of this room suggests that there may originally have been another room to the west of Room E, now completely lost. A sounding below the beaten earth floor of Room E (Locus 05.13) revealed a layer of ash (Locus 05.14) which contained small sherds dating up to the later second century AD, and one fragment of a flue pipe. It seems likely that before construction of the house, this area was used for dumping rubbish from the nearby Bath building.

The house seems to have been abandoned sometime in the later third century AD. A layer of soft, sterile soil (Locus 05.12) was deposited on the floor of Room E by the wind, then covered by a layer of ash 0.37 m thick containing a large quantity of flue pipe and hypocaust tile fragments, along with ceramics of the Early Byzantine period (Locus 05.06). This layer was probably produced by the renovation of the bath.

Although smaller and simpler, the plan of this house bears a general resemblance to that of the first Nabataean house on az-Zanṭūr in Petra, where the enclosed courtyard is to the east of the rooms. The roofs of the az-Zanṭūr house, however are supported by columns and walls, not by arches as in E122 (see Bignasca *et al.* 1996: 18, 41-44).

Phase II. After the abandonment of the Phase I house and its use as a dumping ground for the Bath building, the eastern house wall and the east wall of Room A

were robbed out. A new wall was constructed of irregular stones of varying sizes piled up with no definite courses and oriented 10 degrees east of north, as opposed to the better construction and the cardinal orientation of the Phase I walls. The construction of this wall created Room D at the northeast corner of the building, which had a roughly rectangular shape (4.0 m N/S x 2.4-1.5 m E/W) and a door (W 0.78 m) in the south wall. No evidence for the roofing arrangement has been preserved. A platform of roughly set stones in the northwestern corner of Room D still retains some of its original compacted surface. The east end of the court may have been divided off to form Room C as well.

The dating of this phase comes from a probe below the packed earth floor (Locus 02.15) within Room D, which produced a small amount of pottery, including two Umayyad sherds.

Phase III. This seems to be the latest phase of use of the structure. A wall was built blocking the northern arch in Room B and separating Rooms B and C. An interesting feature in this wall is a built-in niche or closet (Locus 02.08C) which opens onto the interior of Room B. Wall 02.08B is built directly on the Phase II floor (Locus 02.12) which indicates that Phases II and III are chronologically very close to each other.

After this phase, the structure suffered from extensive destruction (perhaps due to the AD 747 earthquake, as Early Abbasid sherds were found in the upper collapse of Room B). All excavated areas showed abundant tumble and collapsed stones in the topsoil levels.

Field A127: Watchtower or Fortified Farm (J.P. Oleson)

During the 1998 season of the al-Ḥumayma Excavation, wall definition work and a small sounding were conducted in structure A127, thought to be a Roman watchtower contemporary with the fort, to

determine its design and chronology.⁵ The structure is located on the northern end of a low rise on the east bank of the Wādī Qalkha, ca. 603 m east of the Abbasid qaṣr and 630 m southeast of the Roman fort (Figs. 1 and 12). The hill is approximately 20 m higher than the surrounding landscape and provides clear views of the escarpment to the north, the al-Quwayra/Wādī Ramm region to the south, and the entire site of al-Ḥumayma. Despite the clearing and probing, the date and purpose of the structure remain unclear.

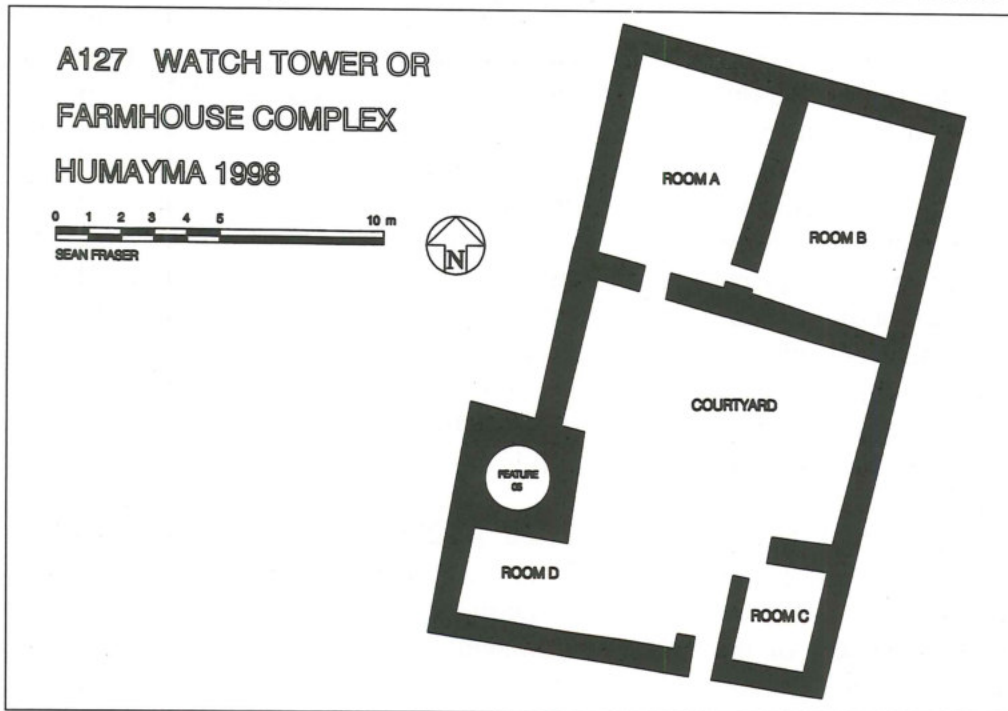
Even before clearing of the light cover of soil over the walls, A127 could be seen as a large walled enclosure roughly 16 x 12 m with a courtyard and at least two interior rooms. The walls seem to survive to only one or two courses, now mostly flush with the surface of the soil. Wall tumble was heaviest along the north and east sides, where the hill is steepest. The only clearly defined element before the wall cleaning was Feature 05, a square structure along the western edge of the complex, the interior of which had been largely cleared out by illicit excavation. Per-

haps owing in part to the large number of previous archaeologists who visited and surveyed the site (e.g. Graf 1979: 122, 125), few surface sherds were visible.

Wall Definition

Wall cleaning was conducted by brushing or trowelling; no work was conducted below topsoil. The walls were uniform in character, constructed of large, very roughly trimmed limestone blocks facing a core of flint-cobbles packed in mud-mortar. Several walls included dressed Nabataean limestone blocks, and three pieces of yellow marl from the Nabataean aqueduct appear in the northern wall.

A door (W 0.90 m) in the south wall (L 12.22 m) provides access to a roughly square courtyard (ca. 10 m E/W, 11 m N/S). Badly damaged walls seem to define a small room (Room C, 2.98 x 3.25 m) in the southeast corner of the court, while Feature 05, the tower or silo, straddles a jog in the west wall of the complex. There are two rooms at the north end of the courtyard: Room A at the northwest corner (4.95 x 6.45 m) and



12. A127: plan of watchtower or farmhouse complex.

5. This section is based on the field notes of J. Cook, and I have benefitted greatly from his observations and hypotheses.

Room B at the northeast corner (4.22 x 6.30 m). Their side walls abut the north wall of the court. A door (W 0.75 m) in the south wall of Room A provides access from the court, and there are possible remains of a door at the south end of the party wall, allowing access from Room A to Room B. The eastern, outside wall is 17.90 m long, and the north wall is 10.56 m long.

Feature 05 is a square structure (ca. 3.67 m square) built for the most part of regular sandstone blocks faced with mortar and framing a circular shaft ca. 2.10 m in diameter. The circular inner wall and the outer wall frame a cobble and mud-mortar packing, reinforced with occasional headers entering from the exterior. The inner face is constructed of roughly hewn stones in courses, 0.30-0.40 m thick, alternating with leveling courses of flat stones ca. 0.10 m thick. The minimum wall thickness, in the centre of each side, is ca. 0.75 m. The square retaining wall appears to be built entirely of sandstone ashlar blocks (0.65 x 0.22 x 0.20 m). The construction materials and method differentiate this feature from the rest of the walls in A127, as does its orientation, several degrees off the orientation of the rest of the structure. The other walls do not bond with it.

Probe 01

A probe (Probe 01) dug in the northeast quadrant of Feature 05, revealed 11 courses of alternating blocks and flat leveling slabs extant above the foundation, which consisted of a leveling course of hard yellow clay in a trench cut into the bedrock. There was a sterile layer of hard-packed red sand (Locus 05) at the bottom, just above limestone bedrock. It is difficult to date Feature 05. The interior was cleared out in the past, possibly several times. This is indicated both by the presence of a dump of soil, rubble, and mortar found just north and east of the feature and by modern debris found in Probe 01. As a result, the small number of Roman, Byzantine and Umayyad sherds

found in the probe can provide only a very tentative date for the chronology of construction and use. Moreover, the few Roman sherds may have come from a single African Red Slip vessel. Middle Nabataean sherds found during wall definition work may predate any construction on the hill, or they may belong to Phase I, when Feature 05 was constructed. In the latter case, however, a rich scattering of such sherds would be expected in and around the feature.

Phasing and Interpretation of A127

Analysis of the architecture allows definition of three building phases, but at present the phases cannot be dated securely.

Phase I. The skewed orientation of Feature 05 to the rest of A127, and its location straddling a courtyard wall that does not seem to bond with it indicate that it was built before the rest of the structure. Furthermore, the unique construction technique and materials, including mortar facing not otherwise found in A127, suggest that it belongs to a completely different chronological period. The use of neatly coursed sandstone blocks is particularly characteristic of the Nabataean period at Ḥawar, as seen in the structure below the Roman bath (Oleson 1990: 289-94), but this type of masonry also appears in the Byzantine church apse in B100 (Oleson *et al.* 1993: 492, Fig. 2). The Byzantine church apse in F102 is built of limestone and marl, but the blocks are neatly cut and are laid in alternating thick and thin courses as in Feature 05.

Phase II. The walls surrounding the courtyard (all 0.72 m wide) were constructed in a single phase and incorporated Feature 05. Room C may also date to this phase.

Phase III. The structure was extended to the north by creating Rooms A and B. The similarities in orientation, wall dimensions, and construction technique and materials suggest that Phase III dates soon after Phase II.

The function of Feature 05 is not clear. It

is obvious that it was designed very solidly, and the volume of tumble surrounding it seems to suggest that the original height was significant, perhaps two to three metres above the outside ground level. The circular design resembles that of a cistern, but no hydraulic mortar was found on its inner face or in the fill, and the interior coursing would have made it difficult to seal. In addition, given the absence of a catchment area at the top of the hill, it could only have been filled with water carried in from elsewhere in containers. Feature 05 would have functioned better as a silo, and the number of storage sherds found in and around it may support this conclusion. It is interesting to note that the field southwest of the hill is carefully tended today, probably because the slope of the long hill forms a natural water catchment. Feature 05 was a solitary structure during phase I. Although it seems unlikely that such a solid silo would be built apart from a farmhouse, it is at least conceivable that it was meant to serve tent-dwelling farmers.

The significant height of Feature 05 also suggests that it could have served as a watchtower either by itself in Phase I or along with the rest of the structure in Phases II and III. Unfortunately, it is notoriously difficult to distinguish between ancient watchtowers and fortified farmhouses (Killick 1986: 438). There is no standard shape and size for these types of structures (Kennedy and Riley 1990: 216-21), and many documented towers, such as Rujm Banī Yāsir at al-Lajjūn, were earlier structures reused as watchtowers (Bloom and Parker 1987).

In his survey of structures surrounding the Roman fort at al-Lajjūn, Parker relied on three criteria to distinguish watchtowers from other features: the topography of the site, the nature of the structure, and the pres-

ence of Late Roman/Early Byzantine sherds (Clark and Parker 1987: 170). Certainly, A127 has a good line of sight to the fort and provides views not available from the latter, but the pottery repertoire and the construction technique do not match those of the fort. In addition, there are no watchtowers on the hills just north of the fort, which provide an even more comprehensive view. The size and ground plan for both Feature 05 alone and the whole complex are atypical compared with watchtowers found elsewhere in the region.⁶ For the moment, it seems most reasonable to explain Feature 05 as a silo constructed in the Byzantine period, which was later on, perhaps in the Umayyad period, incorporated into a farmhouse.

Field B126: Byzantine Church (R. Schick)

During his brief visit to al-Ḥumayma in 1935, Alt noticed digging activity by the local Bedouin in a three apse Byzantine church in the immediate area of the settlement. As part of his description of the site he published a photograph that shows the east end of the church (Alt 1936: 94-95, plate 3B), revealing seven courses of neatly cut blocks forming the central apse and seven courses of the north portion of the south apse curve and a doorway into a southeast room. The photograph shows that the locals had begun to clear earth out of the central and south apses and in front of the doorway to the southeast room. We had puzzled for years about the fate of this church, since the remains clearly did not correspond to those of the Byzantine churches so far identified at al-Ḥumayma (C101, C119, B100, F102), and yet the structural remains seen in 1935 seemed substantial and prominent. Finally, in 1996, the apses were recognized built

6. It may be inappropriate to presume a uniform typology of watchtowers in the *Provincia Arabia* or elsewhere. Johnson (1983: 270-79) provides a listing of known watchtowers in northern Europe which exhibit significant differences in archi-

ture even among towers constructed in the same period for similar purposes, e.g. watching river fords. One must wonder if there is a standard type of Roman watchtower in southern Jordan or if they all vary due to local circumstances.

into a modern Bedouin house in the very centre of the habitation area, concealed by darkness and dust.

The house (10.20 m N/S x 7.5 m E/W) incorporated the central apse and south wall of the church, and the walls of the southeast room, with new north and west walls and a wood and mud roof (Figs. 1 and 13). An east/west arch springing from imposts built into the back of the apse and the west wall helps support the roof. An Arabic inscription has been cut into the lintel: "There is no god but God and Muhammad is the Messenger of God," above "Muhammad 'Ali al-Hijazi." No features of the church are visible from outside the post-1935 building, although it occupies only the east end of the structure. Large heaps of earth and rubble cover whatever remains of the rest of the nave and façade. In recent years the owner has carried out illicit digging inside, lifting some of the

original church-phase pavers in the central and south aisles and cutting as deeply as 0.80 m into the fill below.

Room 01

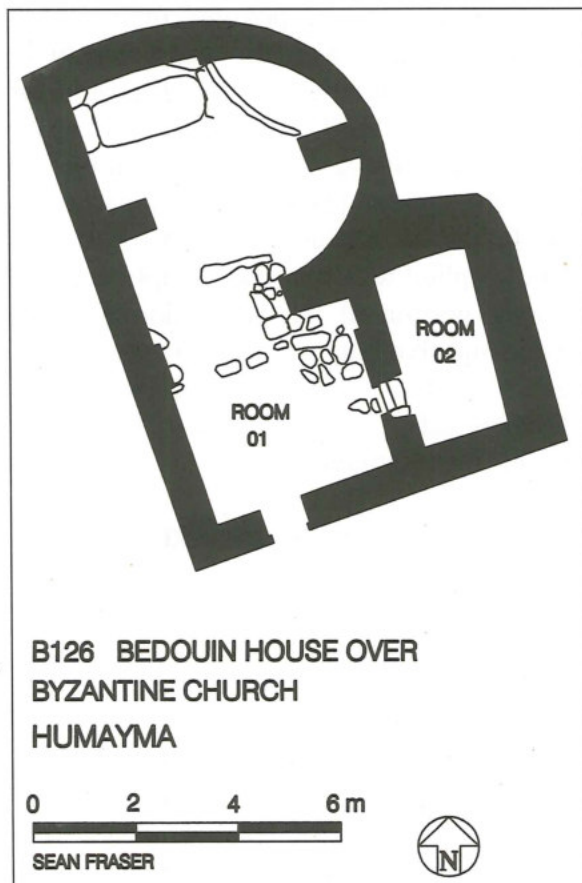
The stratigraphy in the chancel area indicates that the post-1935 builders cleared the collapse debris of the church completely down to the original pavement. In the chancel area this consists of thin, rectangular slabs of purple to white sandstone, but in the south aisle it consists of roughly dressed, irregularly laid blocks with a few chinking stones in between. The pavement of the south nave is 0.20 m lower than the apse pavement, but the location of the chancel screen mounting and step down is obscured by the recent digging. Two cupboards built into the modern west wall are framed by four large, finely dressed blocks of shelly Ma'an limestone that could originally have served as steps up to the chancel area, as in the B100 church. A fragment of a yellow marl aqueduct block found in the robber pit may have been part of the chancel screen base, as in the C101 church.

A shallow probe in the southwest corner of the house, near the modern door in the south wall quickly reached the top of a cobble layer, similar to Locus 02 in Room 02. No pieces of marble, glass, or other liturgical equipment were found.

No trace survives of the northern half of the curving south apse, which appears in the 1935 photograph; that apse has been totally dismantled, obscuring the relationship between the south apse and the southeast room (Room 02). In the photograph, it looks as if the south apse was simply built up against the flat north/south wall that now survives, with packing to fill the corner. The door to the southeast room either opened through the centre of the apse or was blocked by its construction.

Room 02

The door and much of the wall coursing



13. B126: plan of bedouin house over Byzantine church.

in the southeast room (Room 2; 3.6 m x 2.0 m) seem to be original, although they were built up to a uniform height when the modern roof was installed. No paving stones remain in the room, but a probe along the doorsill revealed a layer of cobbles, pebbles, and silt (Locus 02) similar to the bedding layer below the intact church flagstone pavers in the central aisle. Locus 06, below Locus 02, consisted of a 0.90 m thick layer of silt with occasional random cobbles and pebbles, extending down to the bottom of the west and south walls as far as the sterile orange sand layer (Locus 07) that underlies all the ancient structures at al-Ḥumayma. The few sherds found in Locus 06 were Late Byzantine and Umayyad in date. The character of this bedding layer is radically different from the fill below the pavement in the C101 church, which produced enormous quantities of pottery in variegated layers of silt, sand and ashy silt.

Analysis

Further investigation is needed to determine the dimensions of the church, to verify the presence of a north apse, of which no trace is visible, and to confirm an Umayyad construction date. The relationship of the south apse and the southeast Room 02 also requires clarification. While there are numerous examples of triple-apsed Byzantine churches in which the central apse projects farther east than the two side apses, and numerous examples of churches with rooms like Room 02 to the southeast of the central apse, the presence of a room as large as Room 02 behind the south apse is anomalous. The anomaly could be explained if the southeast Room 02 belonged to either a pre or post-church phase, but only further excavation can clarify that point. The church appears in general to be humbler than any of the other churches at al-Ḥumayma. The poor nature of the pavement in the south area of Room 01 demonstrates that point best.

The B126 church is the fifth church to be identified at al-Ḥumayma (cf. Schick 1995). The large structure just north of the modern school house (E128) may be a sixth. There were five churches at Faynān, and four churches are known at Petra. As is the case with so many other places in Jordan, this number of churches seems to be excessive. Analysis of the local and regional water resources suggests an absolute maximum population of 650 people for Ḥawar. A more realistic total would be only half that (Oleson 1997). In general, Christians of Arab background followed Orthodox belief (Shahid 1984: *passim*). It is possible, however, that the multiplication of churches at Ḥawar resulted from competition among Orthodox and heterodox believers in the settlement. It is also possible that some of the churches were built as others went out of use. The mid-seventh century construction date for the F102 church and possibly of the B126 church coincides with the abandonment of the church in C101, and the renovation of the church in B100, but that still leaves al-Ḥumayma with a significant number of churches. Negev (1991: 228) suggests that the Byzantine towns in the Negev seem over supplied with churches simply because a large portion of the population was nomadic and lived out of the town centre or in tents, which are difficult to document archaeologically. This situation certainly would fit al-Ḥumayma as well.

Field F102: Church and Islamic Houses (K. 'Amr)

Extensive excavation was carried out from 1991 to 1993 in F102, a large, apparently domestic structure and associated cistern at the southeast edge of the settlement (Figs. 1 and 14; Oleson *et al.* 1993: 476-84; 1995: 337-43). The scale and complexity of the structure, however, had remained puzzling, along with the reason for the presence of several Byzantine cist graves inside the east wall. Further excavation in the south-

east portion of the structure in 1995 clarified its outlines and revealed that the core of the structure was a church with associated rooms to the north and west, rebuilt in the Abbasid, Fatimid and Ottoman periods. As the primary aim of the season's work was architectural definition, only tops of walls were cleared in Trenches 14, 15 and 17, and floor levels were reached only inside the apse in Trench 16. The phasing of most of the uncovered walls, however, can be deduced from their relationships with the walls uncovered in other trenches (Fig. 14). To avoid confusion, the same phasing is used here as in the previous reports, the numbers decreasing from early to later periods rather than increasing.

Phase V

During this phase the southern part of the structure was a single apse church with three aisles, the flagstone pavement of which was already partially uncovered in 1991 in Trenches 03 and 04. The internal dimensions of the church are approximately 19.3 m east/west by 9.4 m north/south (Fig. 15). The west façade was formed by a wall in Trenches 04 and 05 with three symmetrical doorways leading into the three aisles. Traces of the south wall found in Trench 04 included a single doorway, while the north wall in Trenches 03 and 15 included two door openings; on the south Walls 04.02, 10.04 and 12.02 with one doorway in Trench 04; on the east the apse is Wall 16.02; and on the north Walls 03.08, 03.02 and 15.02 with two doorways in Trenches 03 and 15. Although the evidence is not entirely clear, it seems most likely that the plan is not symmetrical, the north wall making a jog to accommodate the pre-existing cistern. The apse wall is the highest preserved wall in F102, while the area to the north of it is badly eroded, sloping steeply towards the cistern. The two rooms that project from the east and west ends of the south wall (in Trenches 09 and 12) constitute an-

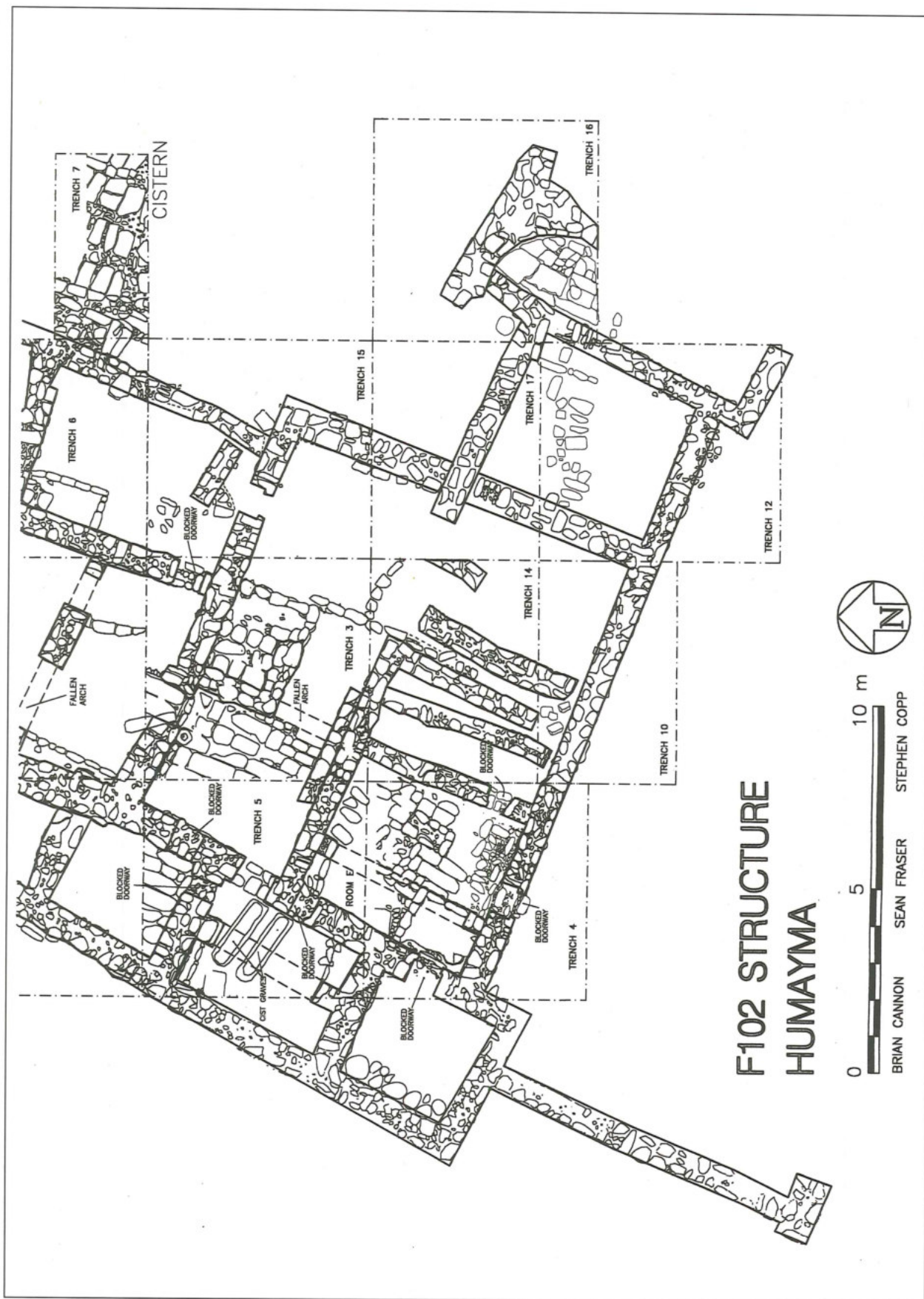
other peculiar feature of the church. They may constitute the towers that can be seen on several representations of churches on mosaics dated to the sixth century (Piccirillo 1993: 243, 289, 325, Figs. 397, 545, 677). Traces of white plaster were found on the south and north walls and on the apse.

The inner face of the apse wall is constructed almost entirely of limestone ashlar with a few marl blocks. All of the stones had been cut specifically for this purpose, as each was slightly curved to form the apse. They were laid in alternating thick and thin courses. The only Phase V floor reached in 1995 was inside the apse in Trench 16 (Locus 20), a flagstone pavement made of comparatively large sandstone blocks similar to those found in Trenches 03 and 04. Its elevation is 0.40-0.50 m higher than the pavement inside the aisles, suggesting the presence of an elevated chancel. Marl blocks were placed on this pavement at the western edge of the apse, perhaps as a base for the marble altar table or chancel screen of which many fragments were recovered from various parts of F102. At a later stage of Phase V, the pavement was covered with greyish plaster which extended over the marl blocks.

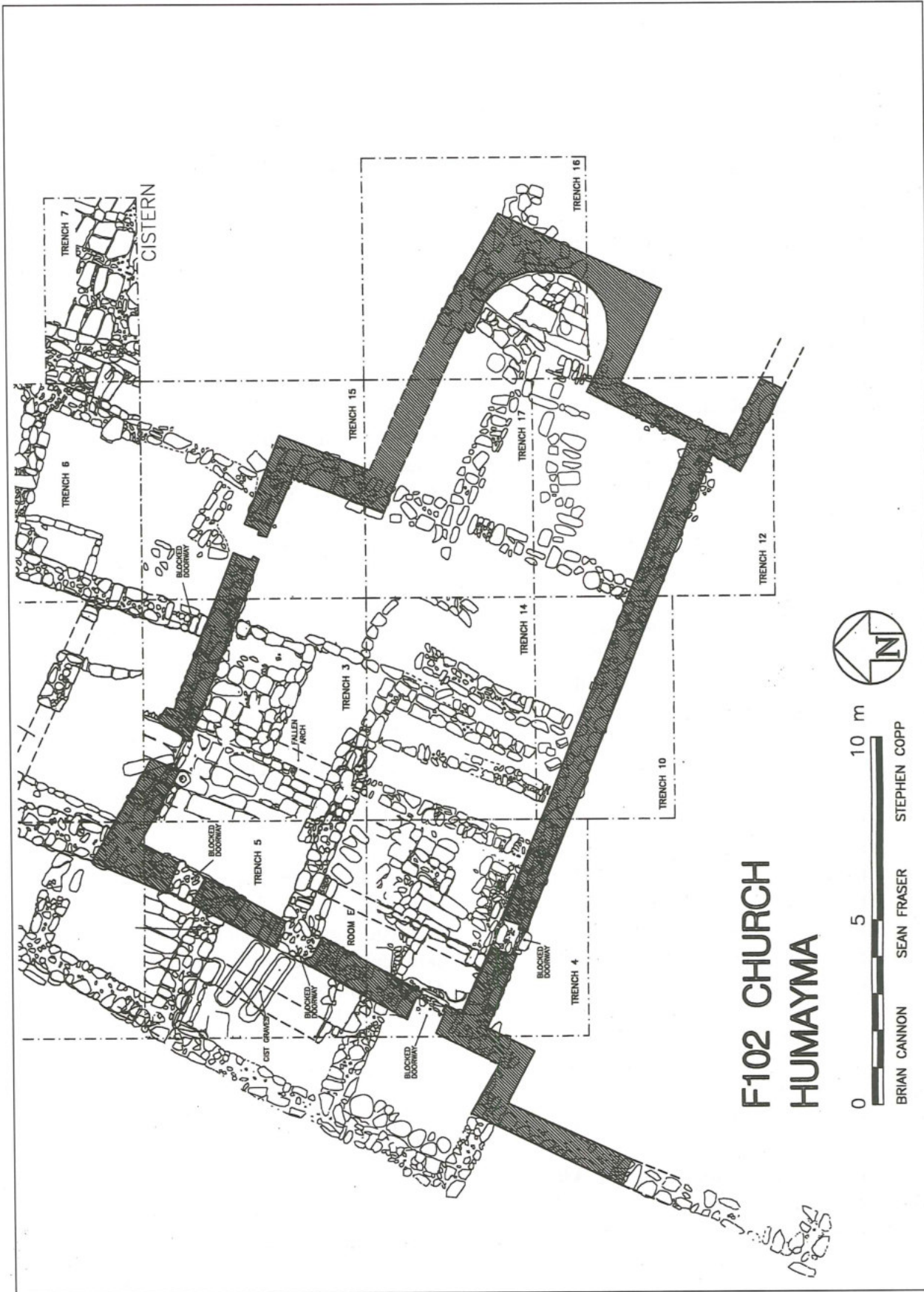
Further evidence for the Early Islamic dating of Phase V and the church came from a sounding under the apse pavement, which yielded the body sherd of an Ayla amphora of the mid-seventh century. This fill also contained many glass sherds and a fragment of the rim of a large marble bowl.

Phase IV

The main Phase IV (mid-eighth century) walls uncovered in 1995-96 were in Trench 14, the wall defining the Phase IV Room E, uncovered in Trenches 03, 05, 04 and 14. The room is 5 m wide in the west narrowing down to 4.75 m in the east, and has a maximum east/west length of 6.6 m. It re-uses the Phase V church doorways in the south and west, however four north/south span-



14. F102: plan of southern half of Islamic structure.



15. F102: plan of church.

ning arches were built during Phase IV to support its roof. The original plaster on the inner face of the southern church wall continues behind the arches.

In Trench 16, a pilaster (Wall 16.01B), was built on top of the base for the chancel screen or altar table (Wall 16.01D). A beaten earth floor was found inside the apse directly overlying the Phase V. Beaten earth floors covering flagstone pavements are typical of Phase IV as already noted in Trenches 01, 03, 04 and 05.

Phases I-III

Several walls in the area of the nave could be assigned to the eighth-century Phase III. The three centuries of abandonment between Phase III and the twelfth-century Phase II are best represented in the over 0.40 m thick layers of laminated silt and sand in the apse (Loci 16.11, 15, 16). During Phase II a wall was built blocking off the apse area as a separate room with an earth floor. As in all the other trenches in F102, the Phase I Ottoman period is typified by extensive tumble in light, dry ashy soil, some of which is very orderly, denoting instantaneous collapse (e.g. Loc. 16.03).

Conclusions

Discovery of the mid-seventh century F102 church adds to the astonishing list of churches at al-Ḥumayma. Whatever the reason for building this church, the major period of re-modeling at the structure seems to date to the mid-eighth century Phase IV, around the time the Abbasid family left al-Ḥumayma for al-Kufa. The F102 church site shows that very dynamic changes and adaptations were taking place at least in this corner of the site for centuries afterwards.

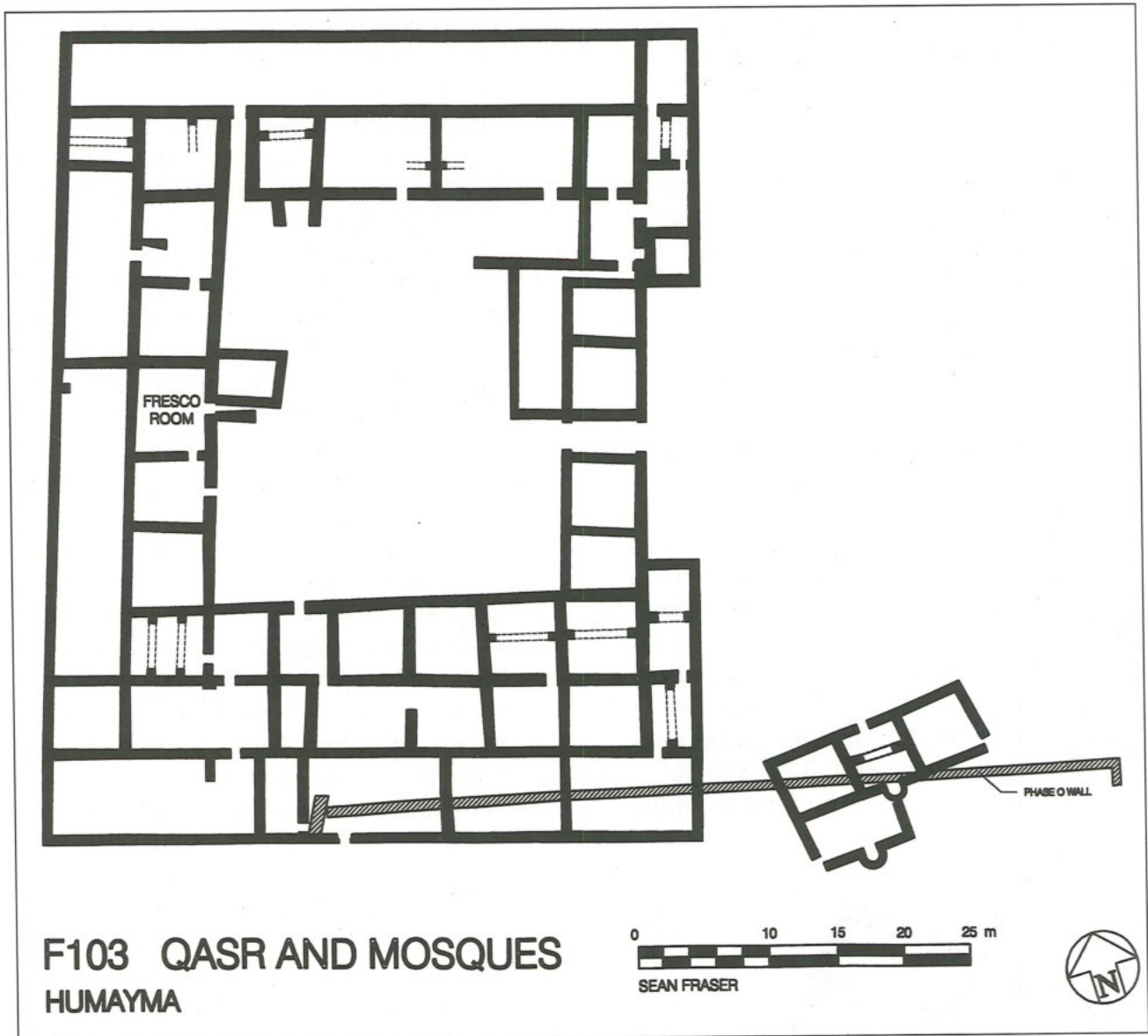
F103: *Qaṣr-Masjid* Complex of the Abbasid Family (R. Foote)

The two Early Islamic structures identified at Field F103 during the 1992 and 1993 seasons were intensively excavated

during the 1995, 1996, and 1998 field campaigns (Fig. 1). At the *qaṣr*—a large, rectangular (ca. 61 x 50 m), building with central courtyard—40 new squares (5 x 5 m) were opened, two squares reopened, and work in the “Fresco” Room (Room 02, originally Probe 02) nearly completed (Fig. 16). Just southeast of the *qaṣr*, the entire area in and around the *masjid* (mosque)—a small, rhomboidal structure with projecting *miḥrāb* on its south side—was also fully explored. The results of the excavation confirm the late seventh or early eighth-century date for the complex and its identification as the Abbasid homestead at al-Ḥumayma mentioned in early Islamic historical texts. Upon purchasing al-Ḥumayma, ‘Alī ibn ‘Abd Allāh, son of ‘Abd Allāh ibn al-‘Abbās, built a *qaṣr* with a garden there, and a mosque which later figured in the conspiracy against the Umayyads (al-Duri and al-Mutallabi 1971: 107-8, 149, 154, 195; al-Tabari 1985: 84, 148-50, 158; al-Bakri 1945-51: 130; Foote and Oleson 1996). An enigmatic Byzantine-period wall was found to extend beneath the southeast quadrant of the *qaṣr* and the *masjid*, and there was evidence as well for a significant Ottoman-period phase of modification and reuse in and around both buildings. Exquisitely carved ivory panels (perhaps furniture veneer), first noted in Room 02 in 1992, continued to dominate the small finds assemblage, illuminating the Abbasid family’s material culture and wide political connections while based at al-Ḥumayma, before usurping the caliphate in AD 749/50.

Pre-Islamic Use of the Site

Excavation in 1993 exposed a pre-Islamic wall (Wall 12) running under the southeast corner of the *qaṣr*, the ashy soil along its north face containing a number of mid-fourth century bronze coins. Further excavation of Wall 12 in 1998 revealed that it extended at least a remarkable 58.90 m, from the west baulk of Square 55, beneath



16. F103: plan of Qasr and Mosques.

the N/S walls of the *qasr*, beneath Mosque 01, and into a field to the east of the mosque, where it finally terminated at a short spur wall to the south. No other intersecting walls have yet been found. Excavation of a deep probe in Square 78 revealed that the remains of Wall 12 consist only of two courses of roughly shaped blocks on a footing of small flat stones. A construction date in the Byzantine period is likely, given the recovery of eight fourth-century coins, mostly of the house of Constantine, dating from 317 to 351. Although eight more coins

found in this context could not be read after cleaning, and one more coin may possibly date to the fifth century, the narrow chronology of the legible coins suggests the structure was in use a relatively short time.

Since Wall 12 was covered by a thick layer of silt deposited by runoff from the fields to the north or by overflow from the adjacent wadi, the builders of the *qasr* and mosque probably were unaware of its presence. The walls of the later structures certainly follow different orientations than Wall 12. The presence of a possible floor

surface and of coins along its north face, and the proximity of the wadi bed to the south, suggest that if Wall 12 was part of a structure, then the “interior” lay to the north. Alternatively, the great, uninterrupted length of the wall may indicate that it formed part of a barrier or corral for animals or that it served as a property boundary. The Byzantine artifacts probably washed down the natural slope from the north and west and were caught against the north face.

Mosques

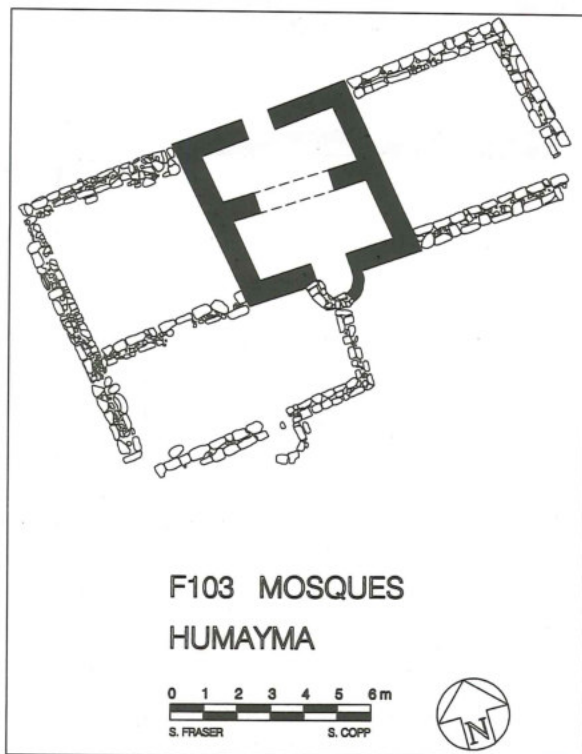
The original mosque (Mosque 01), discovered in the final days of the 1993 season, is small and rhomboidal, the walls ranging from 5.60 to 5.75 m in length, with wall thickness, as in the *qaṣr*, averaging 0.68 m (Fig. 17). The interior niche of the *miḥrāb* measures 1.04 m across its opening and is 0.67 m deep. The original walls and *miḥrāb* are bonded and built, again as in the *qaṣr*, of coursed stone blocks laid with a mud mortar. The original doorway (0.74 m wide) in the north wall, which was blocked up during

the modern rebuild, was still distinguishable and has been reopened. Only the three lowest wall courses belong to the original, eighth-century phase (Phase I), the upper courses and the single roofing arch were rebuilt on the ancient wall footings and arch springers after the building was cleared out to foundation level in the present century. Although the few original courses of the arch springers that survive do not bond with the foundation blocks of the adjacent walls, the construction and coursing are similar, and the springer foundations extend one course deeper than the mosque walls, suggesting that the springers belong to the initial phase. The *miḥrāb*, which had collapsed and been covered with fill, was not recognized by the modern builders, and the gap above was used as the structure’s door.

Extensive excavation was carried out both inside and outside Mosque 01 over the course of the 1995 and 1998 seasons. Ceramics recovered from beneath the wall foundations and the entire area of the mosque floor, including a small amount of Byzantine, Late Byzantine and Umayyad material, confirm a date of construction in the first half of the eighth century.

Several walls built of a single course of large blocks enclose rectangular areas extending east and west of Mosque 01. When cleared, these walls were found to abut the east and west walls of the mosque, and to be bedded half a course higher, indicating they probably were added in a second, later phase (Phase II). Ceramic evidence did not allow secure dating. Since no doorways could be positively identified in these walls or in the original east and west walls of the mosque, access to the flanking areas remains uncertain. Their function also is undetermined, and we have simply labeled them “pens.”

To our surprise, the removal of earth and stone fill outside the southwest corner of Mosque 01 and south of the west pen in 1995 revealed a second mosque (hereafter



17. F103: plan of Mosques.

referred to as Mosque 02). Mosque 02 is rectangular, measuring roughly 7.50 m x 4.00 m, its north wall formed by the south walls of the west pen and of the original mosque. The other three walls survived to only one course of facing blocks and a rubble core. Although at present the remains resemble those of the open-air mosques well-attested in the Ḥisma and the Negev from the early Islamic period to the present (Finkelstein 1995: 19-21; Sharon *et al.* 1996), the wall construction seems too solid. Further examination is needed. Curiously, its east wall abuts the *miḥrāb* of the original mosque, thereby creating a convex northeast inside corner. The *miḥrāb* of Mosque 02 is 1.03 m wide, 0.75 m deep, positioned slightly west of the center of its south wall (3.40 m from the west wall and 4.43 m from the east wall). Although one block in the southwest corner was oriented perpendicular to the others, no door or doorsill could be identified. Because the walls of Mosque 02 clearly abut the original *miḥrāb* and the west “pen,” it is certainly later than both and indicates a third phase of use (Phase III). Foundation pottery for Mosque 01 was scant and inconclusive, with all sherds very small and non-diagnostic.

Qaṣr Plan and Date

In 1995, the *qaṣr*'s plan was clarified and the principal entry located in a recess 21 m wide in the east perimeter wall (Fig. 16). The wide door sill of worn limestone and sandstone blocks (2.25 x 0.75 m) was discovered in the north-south Wall 03 (Squares 83 and 94), east of the courtyard's perimeter wall (Wall 05, Squares 72 and 83), but set back 4 m from the eastern, outside wall of the *qaṣr*. The threshold allowed entry to a narrow, east-west hall (W 2.50 m x L 6.00 m) which opened onto the courtyard through a doorway over 2.0 m wide in Wall 05. Foundations for arch springers flank each end of the entry hall. These springers, plus the great amount of unfired mudbrick

in the collapse of the hall, suggests that a mudbrick barrel-vault roofed the entry. The floor was of beaten earth.

An Early Islamic, post-reform, silver dirham struck in Wasit (Iraq) in 115 H (AD 733/4), was found at a depth of 0.53 m below the surface, less than 3.0 m outside the *qaṣr* gate (Fig. 18)—the first and only Islamic coin yet discovered through excavation at al-Ḥumayma. It is a standard type in common circulation, with formulaic Arabic inscriptions (Walker 1956: 197; Broome 1985: 8-11). Unfortunately, the stratigraphic context outside the *qaṣr* does not lend itself to use the coin for dating, but the coin fits in with what we know of the important connections between al-Ḥumayma and Iraq just prior to the Abbasid revolution.

The identical foundation levels and the stratigraphic connections of the inner perimeter wall and crosswalls, along with the character of the ceramics recovered in the foundation deposits, at first suggested that the *qaṣr* was erected in one phase in the first half of the eighth century. By the close of the 1998 season, however, several discoveries had begun to indicate that the original *qaṣr* consisted of only one ring of rooms surrounding a central courtyard, and that additional rings of rooms surrounding the “core” were built in two immediate sub-phases. All excavated crosswalls in the outer rings of rooms abut their perimeter walls, while all the walls of the innermost ring of



18. F103: silver dirhem found outside entrance to *qaṣr*.

rooms, surrounding the courtyard, bond. It is possible that walls laid at the same depth and which have contemporary foundation pottery, but which abut instead of bonding do not necessarily belong to sub-phases; they may simply reflect an unconventional or unsophisticated building technique. Nevertheless, there is a perceptible difference in building technique as well between the inner ring of rooms and the outer one, and a Mahesh Ware sherd was embedded in the construction fabric of the outer ring at the junction of Walls 01 and 02 (Square 98). Whitcomb considers this ware to date after AD 750, though he concedes it could have appeared as early as the second quarter of the eighth century (Whitcomb 1989 and personal communication).

Although further excavation in 2000 will focus on clarifying this question, for now we reconstruct the initial phase (Phase I), the *qaṣr* as a single ring of rooms around a courtyard, the whole complex measuring approximately 43 m north/south by 39 m east/west. The complex subsequently was enlarged by the addition of a second ring of rooms on the west and south, and on the east by two projections that flanked the entrance and thereby emphasized it (Phase II). Slightly later, another set of rooms was added along the whole north side (which still awaits excavation), including an unroofed oven room at the northwest corner (Squares 01A, 02A)(Phase III). During this phase, a third set of rooms was also added along the south wall, including another entrance to the *qaṣr* in Square 55. Phases I-III probably date to the late seventh and early eighth century. Some more subdivision of space by means of abutting walls laid at a higher elevation took place considerably later, probably in the Ottoman period, and particularly in the courtyard (Phases IV-VI).

Twenty-five rooms throughout the *qaṣr* have now been excavated fully enough to determine that most are unique in their dimensions, placement and type of supports

for superstructure, fenestration, and span and placement of doors. The use of a repeating *bayt* module (coherent apartment-like units) is not indicated. Nevertheless, the piers along the north and south walls of two rooms off the southeast corner of the courtyard (Squares 75, 80) were aligned, despite the dissimilar dimensions of the rooms themselves. Excavation of more rooms along the south edge of the courtyard may uncover more indications for the coherence of the superstructure design there. In Square 24, off the northwest corner of the courtyard, discovery of a complete arch support allowed calculation of the ceiling height at just over 4 m.

Other early eighth-century *quṣūr* in this region were built on imported Roman-Byzantine *castellum* designs—square or rectangular with a perimeter curtain wall of towers and internal arrangements based on a repeating *bayt* module, for example Jabal SAYS and aṭ-Ṭuba (Creswell 1989: 144-46). The plan of the al-Ḥumayma *qaṣr* is dissimilar in its recessed entry and the absence of both perimeter towers and *bayt* arrangement. The al-Ḥumayma *qaṣr*, located further south than any other Early Islamic *qaṣr*, may either reflect an enduring, pre-Graeco-Roman building tradition for Southern Jordan, or perhaps all of Jordan, or it may indicate building traditions of the Arabian Peninsula brought with the Abbasids during their resettlement.

The "Fresco Room"

Painstaking excavation in the "Fresco Room" (Room 02, originally Probe 02) over the last three campaigns has allowed recovery of thousands of fragments of both collapsed wall fresco and ivory veneer panels, plus charred woods, iron nails and fasteners, fine glassware, carved steatite, and an ostrich eggshell vessel painted in red tendril motifs (Foote and Oleson 1996; Foote 1999). All come from the deepest deposit (Locus 13), a destruction stratum caused by fire. The

entire room, measuring 6.43 m north/south x 5.5 m east/west, has been excavated, except for the east/west baulk (W 0.75 m) (Fig. 19), which will be removed in 2000.

Many more geometric and floral motifs were identified among the new fresco fragments, along with three new colors—blue, gold and green. The basic design, however, still appears to have been amorphous rosettes and geometric patterns surrounded by beaded frames deployed in a diaper pattern (see Oleson *et al.* 1995: 346, Fig. 27; Foote 1999), and no evidence has appeared for the presence of human or animal figures. A complete set of pigment samples recovered between 1993-96 was sent for analysis at the Canadian Conservation Institute in Ottawa. We are still assembling comparative material, but one discovery is that the yellow pigment is of the lead-ellestadite group, a unique instance in Jordan (Corbeil *et al.* 1996).

In addition to the nearly complete ivory panel displaying a standing warrior (Oleson *et al.* 1995: 347, Fig. 28), three other fragmentary warrior panels have been recovered, along with a facing male (?) with bouffant hair holding some sort of cartouche, and several other animal and plant motifs: leaves, tendrils, grape clusters, birds, lions (Fig. 20; cf. Foote 1999). Varied concentrations of charred pine, ash and juniper were unearthed throughout the room (identification of the latter two was carried out at the Wiener Laboratory, Cornell). While the palm fronds and juniper were most likely part of the superstructure, the ash (*Fraxinus*) was found along with the ivory and iron handles, hinges and nails. This context and the fact that the ivory was rendered in thin sheets (0.003-0.005 m thick) with drill holes, suggests the panels were affixed as decorative veneer to a



19. F103: Fresco Room, to north.



20. F103: ivory panel found in Fresco Room.

wooden object or objects. The discovery of two iron hinges in association with the large warrior panel found in 1998 (the mirror image of the warrior panel found in 1993) suggest that the panels decorated the doors to a small cabinet. The provenance of these imported luxury objects is as yet not clear, al-

though there are stylistic affinities with Persian, Central Asian, Indian and Coptic art. The doorway threshold between the Fresco Room and *qaṣr* courtyard proved also to be highly crafted—two stone slabs plastered and inlaid with wood (charred in the fire). Nails and hinges from the door were found among its charred remains on the floor.

In view of its nearly axial relationship to the *qaṣr* entry across the courtyard, the decorative wall fresco, and the luxury furniture within it, the Fresco Room can be tentatively identified as the ceremonial audience hall of the Abbasids at al-Ḥumayma. The decorations and furnishing demonstrate the sumptuous material culture available to the Abbasid family in the decades before their revolution, and the inter-regional character of their affiliations even before they came to power. Despite al-Ḥumayma's apparently remote position today, it was located along the *Via Nova Traiana*, a route still well-traveled during the Early Islamic period, connecting the Umayyad heartlands around Damascus with the Arabian Peninsula. Furthermore, communication with points east, especially important for the Abbasids after the 730s because of their popular power bases in Khurasan (in northeast Iran) and al-Kufa (Iraq), would have been possible across the North Arabian desert along the well-established route via Dumat al-Jandal (al-Jawf).

Functions of Other Rooms

Since most early occupation deposits outside of the Fresco Room were cleared out during the Ottoman phases, there are few remaining traces of the original furnishings or installations that might indicate the functions of the *qaṣr* rooms in Phases I-III. The only room with a plastered floor—other than the Fresco Room—was located adjacent to the Fresco Room to the south (Square 29) and connected with it by a door. It contains, however, no traces of similarly elaborate ornamentation or furnishings, and

its function remains unknown. The function of a room south of the courtyard (Square 75) also remains unclear. Its southwest corner contained a small, rectangular, plaster-covered stone platform (1.60 x 0.93 m, 0.13 m H) belonging to Phase I. This platform may have been used as a stand for water vessels or some other furnishings. Finally, the function of one room is clear; a bakery with several large *ṭābūns* was installed in the northwest corner of the *qaṣr* (Squares 01A, 02A) in Phase III.

Several phases of rebuilding have been distinguished in every room except the Fresco Room, and the late Phases IV-VI, of the Ottoman period, involved extensive spatial reorganization, including subdivision of the *qaṣr's* central courtyard. Fortunately, the Fresco Room was not affected by the Ottoman renovation and has provided us with a remarkable picture of the beginnings of Abbasid culture. The compactness and depth of the collapse locus 13 (ca. 0.30-0.50 m) apparently led the later inhabitants of the *qaṣr* to cover the deposit with a layer of sand (Locus 05) to even the surface, instead of attempting to clear the room to its original floor level.

The later installations suggest some potential functions for the Ottoman Phase rooms. Three rectangular bins were discovered within the room revealed in Square 75. Constructed along its east wall after the southeast entry to the room was blocked up, the bins were laid on top of a layer of ash 0.06 m thick which covered the original beaten earth floor. Given the size of the room and the bins, and the presence of ash, they were probably intended for animal feed. In Square 24 a semicircular bin abutted the north pier; the fill of this installation contained Ottoman ceramics but no indication of function. Two of the bronze artifacts found in Square 42—a *kohl* stick and tweezers—suggest a connection with female toiletry. Square 19 produced two Ottoman phases of use: first the blocking of the door

and construction of an upper pavement and bench (*maṣṭaba*); and later the laying of a beaten earth floor and construction of two contiguous bins against its south wall. Refinements to the ceramic chronology within the four-hundred year period of Ottoman rule would greatly enhance our ability to date these later phases more precisely. Mosque 02 is also tentatively attributed to the Ottoman period, given the widespread attention to remodeling inside the *qaṣr* at that time.

Conservation of Small Finds (J. Logan)

Priorities for conservation in the 1995-96 and 1998 seasons were cleaning, consolidating, sorting, and packing fresco and ivory fragments from F103, and cleaning coins to the point that they could be read. Other materials that required attention included plaster with graffiti found in the Roman fort, iron and copper artifacts, some ceramic and glass items, and carbonized wood from F103.

Since the soil of al-Ḥumayma is slightly alkaline (Oleson 1997: 177-78), preservation of calcareous material such as bone, ivory, plaster, and mortar is favoured. The combination of dissolved calcium magnesium, and chloride-containing salts (e.g. sodium chloride) in the soil has resulted in a variety of states of preservation for other materials such as metals, ceramics and glass. The condition of artifacts is often an indication of micro-environments (past and present), history of use, or nature of loss or destruction. Due to the fragmentary and fragile condition of some of the artifacts, conservation began in the field with the packing of friable objects on padded supports for transport to the lab.

Fresco

The fresco found in F103 was in extremely poor condition. During the destruction of the room in the mid-eighth century, the painted lime plaster was subjected

to smoke, heat and flames from the fire, then crushed by the collapsing roof and walls. The heat made the plaster very friable and affected the adhesion of the pigments, leaving the paint layer powdery. The heat also affected the colour of the pigments.

Although al-Ḥumayma is an arid site, freshly excavated fresco was damp and very difficult to handle. Conservation began by allowing the exposed fragments to dry completely *in situ*. They were then placed one-by-one on padded supports and secured by stretchy gauze for the trip from the site to the conservation lab. Cleaning involved blowing off the loose dirt and then gently tamping and brushing the more adherent soil using soft brushes. Once cleaned, the fragments were placed painted side up on aluminum foil and consolidated with a 12-13% aqueous solution (vol/vol) of Acrysol WS-24™. The consolidant was poured onto the foil and wicked into the plaster from the unpainted surface. Once dry, the fragments were robust enough to be sorted and packed. Samples of an unconsolidated fresco were taken for pigment identification at the Canadian Conservation Institute (Corbeil *et al.* 1996).

The same consolidant solution was applied to the surface of plaster with *graffiti* found in E116. The *graffiti* had probably been drawn using charcoal, and the quality of the plaster surface supporting the images varied from very sound to extremely friable. On many pieces, two to four thin layers of white-wash or plaster could be discerned over the hard, smooth plaster that had formed the primary finish of the wall. These layers tended to delaminate, necessitating surface consolidation. This was done by brushing dilute Acrysol directly on the image layer, taking care not to drag the solution over the design. Consolidation of the total thickness of the plaster was not necessary. The painted plaster from E116 and E125 was robust enough that consolidation was not required. The fragments were

brushed and, where necessary, lightly washed with tap water.

Ivory

Thousands of burned and crushed fragments of carved ivory panels were recovered from the Fresco Room in F103. The colour of the ivory varied from tan to black, dark grey, bluish-grey, to white. The variations in colour indicate differing degrees of temperature during burning, tan being the result of lower temperatures than black, and white indicating very high temperature (Shipman *et al.* 1984). During heating, the organic component of ivory (collagen) is destroyed and the mineral component (hydroxyapatite) undergoes changes in crystal structure. This process results in variations in conditions such as porosity and fragility, as well as colour.

In order to transfer the ivory from the cultural deposit to the laboratory in some form of order, pieces found together were placed on padded Coroplast™ supports, and secured with more padding, which was tied down with stretchy gauze.

The ivory was cleaned either by brushing with a dry brush, using bristles of varied stiffness, or by brushing with water. For wet-cleaning, fragments were placed on folded paper towels and the soil and water were brushed off the surface and onto the absorbent toweling. This procedure worked particularly well for black ivory to which a film of clay adhered, but if blind cracks were present, they tended to split open, resulting in tiny and difficult repairs. Most of the grey, white, and tan pieces were very fragile and were consolidated with dilute (3%-5% wt/vol.) B72 in acetone. This was applied by brushing on the surface and allowing the ivory to absorb the solution. The black fragments would not absorb the consolidant.

Fragments from each day's excavation were sorted according to motif. When joins were found, the fragments were adhered

with UHU (polyvinyl acetate adhesive) diluted with acetone. Some curved pieces were backed with fine Japanese tissue adhered with B72 dissolved in acetone. The procedure effectively maintained the curvature and protected joined edges. For shipping and storage the pieces were placed face-up on file cards. Applicator sticks were used to form frames to keep the fragments on the cards, then each tray was padded with nylon-covered polyester quilt batting held under tension by elastic bandages.

Iron and Copper

Due to the calcareous nature of the soil, copper and iron form hard, stable corrosion crusts. The presence of dissolved chloride containing salt, however, results in the slow yet continuous corrosion of both metals. The iron is particularly affected and most of the objects are heavily mineralized with very thick, cracked corrosion layers over a brittle core. The shape of the objects is retained in the corrosion, however, due to distortion, cracking, and in some cases the formation of fresh corrosion on remaining metal surfaces, metal objects can be quite fragile.

Most of the iron from the site appeared to be completely mineralized. Conservation was limited to light surface cleaning to remove loose sand and concretions. Repairs were carried out with Araldite 5-minute epoxy. In cases where further consolidation was necessary, Lepage's Regular epoxy was used.

Iron objects, mainly nails and fasteners, associated with the ivory from F103 were not cleaned. Most have wood or charcoal adhering to the corrosion, and should be radiographed prior to removal of any of the accretions. In addition, burning has had a stabilizing effect on the objects, some of which preserve relatively distinct surfaces. The high degree of mineralization of iron from al-Ḥumayma has left most of the objects in a "stable" condition, meaning that

fresh corrosion should not be a problem, since metallic iron appears to be absent (Watkinson 1983).

The nature of the corrosion layers on copper varied widely across the site, from lightly-corroded, compact surfaces to thick, calcareous layers which completely obscured detail. Mechanical removal of corrosion to a stable oxide layer is the preferred method of revealing surface detail (Jedrzejewska 1976), and this was the procedure followed for most of the objects. Coins were an exception, since the corrosion layers were usually very much harder than the underlying metal and mechanical cleaning flattens detail. Instead, a chemical method developed by Dr Pierre Bikai of ACOR (Bikai, personal communication) was used to dissolve the corrosion on silver and bronze coins with a heavy corrosion layer. All these coins were cleaned by immersion in 3% vol/vol nitric acid in distilled water followed by rinses with distilled water. They were then wrapped with aluminum foil and soaked in 2% wt/vol sodium carbonate in distilled water to neutralize any remaining acid. After soaking in distilled water, the coins were de-watered with ethanol and placed in a 3% wt/vol benzotriazole (BTA) solution in ethanol under a slight vacuum (approximately 15mm Hg). After BTA treatment, they were rinsed with ethanol, dried and lacquered with dilute (3%-5% wt/vol) B72 in acetone. Examination of al-Ḥumayma coins cleaned in this manner and stored in a hot, humid museum storeroom for four years revealed no signs of renewed corrosion.

Ceramics

Ceramics were generally recovered in good condition. Many were covered by a thin layer of calcareous deposit that was removed by soaking in a dilute acetic acid solution (10% vol/vol in water). Some objects exhibited cracking apparently caused by the formation of what is probably calcium or

magnesium sulphates, salts that are not readily soluble in water and therefore are difficult to remove by washing. Very few pieces were crumbling due to the presence of readily soluble salts. These were treated by soaking in baths of tap water followed by final soaks in distilled water. To monitor the removal of salt, dissolved solid content of the wash water was measured using a conductivity metre (Hanna Instruments Dist 10P3).

Glass

The alkalinity of the soil, in conjunction with the composition of soda-lime glass, leads to generally poor preservation of glass at al-Ḥumayma. One exception was a restorable bowl found at E116. Although slightly degraded and badly stained, the glass appeared to have a sound surface and it was possible to adhere the pieces for drawing purposes. UHU was the adhesive used; the object was dismantled and the adhesive removed prior to packing it for storage.

Charcoal and Basketry

Several fragments of what appears to be basketry or a woven mat were found in association with one cluster of ivory from F103. These were saved as a sample. Charcoal and unburned wood from the same area were saved with the intention of submitting them as a sample for dendrochronology and species identification. The carbonized wood was in such fragmentary and poor condition that consolidation with synthetic resins (e.g. Acryloid B72 dissolved in ethanol or acetone) was not practical. Pieces that were saved were packed in padded boxes for shipping and storage.

Materials Used

- 1) UHU: a solvent-based polyvinyl acetate adhesive, soluble in acetone.
- 2) LePages Regular Epoxy and Araldite 5-Minute Epoxy: epoxy resin, soluble in

methylene chloride.

- 3) Acrysol WS-24: an acrylic emulsion, pH = 7.0 (approximately), the dry film is soluble in acetone. A 12-13% vol/vol aqueous solution contains approximately 4% solids. Manufacturer is Rohm & Haas ("Primal" is the Rohm & Haas trade name for their acrylic emulsions/dispersions in Europe). These are available from conservation supply companies. Water used to dilute the acrysol was tap water from the school at al-Mureighah.
- 4) Acryloid B-72: solid acrylic resin, soluble in acetone, toluene and ethanol. Manufacturer is Rohm & Haas. Available from conservation supply companies.
- 5) Coroplast: corrugated plastic board, copolymer of polyethylene and polypropylene. Available from plastic supply companies.
- 6) Stretchy gauze: "Super Crinx"; cotton/nylon bandage available from medical supply firms.
- 7) Nitric acid, acetone, ethanol, benzotriazole: available from chemical supply companies.

Architectural Consolidation (J.P. Oleson)

The problems of preserving and presenting architectural remains are among the most difficult faced by archaeologists and conservators. In order to repair damage caused by weathering of the structures at al-Ḥumayma that were excavated years ago, to stabilize and protect the structures excavated recently, and to provide a more coherent image to the growing number of visitors to the site, we have carried out a programme of architectural consolidation every season since 1995. Consolidation of the Roman Bath (E077) and the Church in C101 is now complete. Portions of the two mosques in F103 have been consolidated, and the major walls of the *Principia* building in E116.

In consolidating walls, the loose, old mortar was removed, the joints and blocks cleaned and wetted, and the mortar replaced with a mixture of lime and local sand, coloured immediately afterwards with dirt. Ancient blocks were added where necessary to repair or top walls. In contrast with Portland cement, this lime mortar does not contain sulphates and salts which can migrate to the adjacent stone, causing efflorescence and spalling. It is relatively soft, allowing easy maintenance, and it fits in well visually and physically with the ancient mortar and stones. Loose stucco was reattached to its backing wall by injecting a solution of Primal AC33™ by means of small holes drilled through the plaster, using a syringe, then edged with the lime and sand mixture. The buildings restored in this manner in 1995 and examined in 1999 have stood up well to the weather and to human and animal traffic, and there has been very little of the separation of mortar and wall materials frequently seen with Portland cement repair of ancient walls. We estimate that this sort of consolidation should last at least ten years. As part of the development of the site, we have also removed all current excavation dumps and nearly all the older dumps.

John Peter Oleson
Dept. of Greek and Roman Studies
University of Victoria
Victoria B.C. V8W 3P4 Canada

Khairieh 'Amr
Department of Antiquities
POB 88
Amman

Rebecca Foote
Department of Art History
Harvard University
Cambridge MA 02138 U.S.A.

Judy Logan
Canadian Conservation Institute
1030 Innes Road
Ottawa ON K1A 0M5 Canada

Barbara Reeves
Department of Classics
SUNY-Buffalo
Buffalo NY 14260-4650

Robert Schick
Albright Institute
POB 19096
Jerusalem

Bibliography

- Alt, A.
1936 Der südliche Endabschnitt der römischen Straße von Bostra nach Aila. *ZDPV* 59: 92-111
- Amiran, D.H.K., Arieh, E. and Turcotte, T.
1994 Earthquakes in Israel and Adjacent Areas: Macroseismic Observations Since 100 B.C.E. *IEJ* 44: 260-305.
- al-Bakri, A.- U.
1945-51 *Mu'jam mā Ista'jam min 'Asmā' al-Buldān wā al-Mawāq'*. Mustafa al-Saqa (ed.), Cairo.
- Bignasca, A. *et al.*
1996 *Petra—ez Zantur*, I. Mainz: von Zabern.
- Bishop, M.C. and Coulston, J.C.N.
1993 *Roman Military Equipment from the Punic Wars to the Fall of Rome*. London: Batsford.

- Bloom, J. and Parker, S.T.
 1987 The Fortlet of Rujm Beni Yasser. Pp. 447-56 in S.T. Parker (ed.), *The Roman Frontier in Jordan*. Oxford: BAR.
- Broome, M.
 1985 *A Handbook of Islamic Coins*. London: Seaby.
- Clark, V.A. and Parker, S.T.
 1987 The Late Roman Observation and Signaling System. Pp. 165-81 in S.T. Parker (ed.), *The Roman Frontier in Jordan*. Oxford: BAR.
- Corbeil, M.-C., Oleson, J.P. and Foote, R.
 1996 Characterization of Pigments Used on Roman and Abbasid Frescoes in Jordan. Pp. 423-29 in *ICOM Committee for Conservation, 11th Triennial Meeting, Edinburgh, Scotland, Preprints*. London: James & James.
- Creswell, K.A.C.
 1989 *A Short Account of Muslim Architecture*. Revised and expanded by J.W. Allen. Cairo: American University.
- al-Duri, A. and al-Mutallabi, A. (eds)
 1971 *Akhbār ad-Dawla al-'Abbāsiyya*. Beirut.
- Finkelstein, I.
 1995 *Living on the Fringe*. Sheffield: Sheffield Academic Press.
- Foote, R.
 1999 Frescoes and Carved Ivory from the Abbasid Family Homestead at Humeima (Jordan). *JRA* 12 (in press).
- Foote, R. and Oleson, J.P.
 1996 Humeima Excavation Project, 1995-96. *Fondation Max van Berchem Bulletin* 10 (December): 1-4.
- Frösén, J., Zbigniew, F., Mika, L. and Katri, K.
 1999 The 1998 Finnish Jabal Hārūn Project: A Preliminary Report. *ADAJ* 43: see Gerber, Y. *The Pottery from Jabal Hārūn*.
- Gatier, P.-L.
 1986 *Inscriptions de la Jordanie, 2: Région centrale*. Paris: Paul Geuthner.
- Graf, D.F.
 1979 A Preliminary Report on a Survey of Nabataean-Roman Military Sites in Southern Jordan. *ADAJ* 23: 121-27.
 1989 Zenobia and the Arabs. Pp. 143-67 in D. French, C.S. Lightfoot (eds), *The Eastern Frontier of the Roman Empire*. Oxford: BAR.
- Griffiths, W. B.
 1989 The sling and its place in the Roman Imperial Army. Pp. 255-79 in C. van Driel-Murray (ed.), *Roman Military Equipment: The Sources of Evidence*. Oxford: BAR.
- Jedrzejewska, H.
 1976 A Corroded Egyptian Bronze: Cleaning and Discoveries. *Studies in Conservation* 21: 101-14.
- Jobling, W.J.
 1983 The 1982 Archaeological and Epigraphic Survey of the 'Aqaba-Ma'an Area of Southern Jordan. *ADAJ* 27: 185-96.
 1984 The Fifth Season of the 'Aqaba-Ma'an Survey, 1984. *ADAJ* 28: 191-202.
- Johnson, S.
 1983 *Late Roman Fortifications*. London: Batsford.

- Kennedy, D. and Riley, D.
 1990 *Rome's Desert Frontier from the Air*. London: Batsford.
- Killick, A.C.
 1986 Udruh and the southern Frontier. Pp. 431-46 in P. Freeman and D. Kennedy (eds), *The Defence of the Roman and Byzantine East*. Oxford: BAR.
- Kindler, A.
 1983 *Coinage of Bostra*. Warminster: Aris and Phillips.
- Ling, R.
 1991 *Roman Painting*. Cambridge: Cambridge University Press.
- Mattingly, H. and Sydenham, E.A.
 1930 *Roman Imperial Coinage*, vol. 3: *Antoninus Pius to Commodus*. London: Spink.
- Meshorer, Y.
 1975 *Nabataean Coins*. Jerusalem: Hebrew University.
- Negev, A.
 1991 *Personal Names in the Nabataean Realm. Qedem 32*. Jerusalem: Hebrew University.
- Oleson, J. P.
 1988 The Humeima Hydraulic Survey: Preliminary Report of the 1987 Season. *ADAJ 32*: 157-69.
 1990 The Humeima Hydraulic Survey: Preliminary Report of the 1989 Season. *ADAJ 34*: 285-311.
 1995 The Origins and Design of Nabataean Water-Supply Systems. Pp. 707-19 in *SHAJ V*. Amman: Department of Antiquities.
 1997 Landscape and Cityscape in the Ḥisma: The Resources of Ancient al-Ḥumayma. Pp. 175-88 in *SHAJ VI*. Amman: Department of Antiquities.
 Forth-coming King, Emperor, Priest, and Caliph: Cultural Change at Ḥawar (ancient al-Ḥumayma) in the First Millennium A.C. *SHAJ VII*. Amman: Department of Antiquities.
- Oleson, J.P., 'Amr, K., Schick, R., Foote, R. and Somogyi-Csizmazia, J.
 1993 The Humeima Excavation Project: Preliminary Report of the 1991-92 Seasons. *ADAJ 37*: 461-502.
- Oleson, J.P., 'Amr, K., Foote, R. and Schick, R.
 1995 Preliminary Report of the Humeima Excavation Project, 1993. *ADAJ 39*: 317-54.
 1998 Excavations at Ḥawar (Ancient Humeima, Jordan), 1996. *American Journal of Archaeology 102*: 414.
- Oleson, J.P., 'Amr, K., Foote, R., Reeves, M.B. and Schick, R.
 Forth-coming Excavations at Ḥawar (Ancient Humeima, Jordan), 1998. *American Journal of Archaeology 103*.
- Piccirillo, M.
 1993 *The Mosaics of Jordan*. Amman: ACOR.
- Reeves, M.B.
 1996 *The Roman Bath-House at Humeima*. M.A. Thesis, University of Victoria.
- Reeves, M.B. and Oleson, J.P.
 1997 Baths of the Ḥisma Desert. *Balnearia 5.1*: 2-4.
- Rey-Coquais, J.-P.
 1967 *Inscriptions grecques et latines de la Syrie, VI: Baalbeck et Beqa'*. Paris: Geuthner.
- Rosen, S.A.
 1993 A Roman Period Pastoral Tent Camp in the Negev, Israel. *JFA 20*: 441-51.

- Sartre, M.
1982 *Inscriptions grecques et latines de la Syrie*, XIII.1: Bostra. Paris: Paul Geuthner.
- Schick, R.
1995 Christianity at Humeima, Jordan. *LA* 45: 319-42.
- Shahid, I.
1984 *Rome and the Arabs. A Prologomenon to the Study of Byzantium and the Arabs*. Washington D.C.: Dumbarton Oaks.
- Sharon, M., Avner, U. and Nahlieli, D.
1996 An Early Islamic Mosque Near Be'er Ora in the Southern Negev: Possible Evidence for an Early Qiblah? *'Atiqot* 30: 107-114.
- Shipman, P., Foster, G. and Schoeninger, M.
1984 Burnt Bones and Teeth: An Experimental Study of Color, Morphology, Crystal Structure and Shrinkage. *Journal of Archaeological Science* 11: 307-25.
- Sommer, C.
1984 *The Military Vici in Roman Britain*. Oxford: BAR.
- Speidel, M.P.
1977 The Roman Army in Arabia. *Aufstieg und Niedergang der römischen Welt* II.8: 687-730.
- al-Tabari, Abu Ja'far Muhammad bin Jarir.
1985 *History of Prophets and Kings, 27: The 'Abbasid Revolution*. Trans. J. Williams. Albany: SUNY Press.
- Walker, J.
1956 *A Catalogue of the Arab-Byzantine and Post-Reform Umayyad Coins*. London: British Museum.
- Watkinson, D.E.
1983 Degree of Mineralization: Its Significance for the Stability and Treatment of Excavated Ironwork. *Studies in Conservation* 28: 85-90.
- Whitcomb, D.
1989 Mahesh Ware: Evidence of Early Abbasid Occupation From Southern Jordan. *ADAJ* 33: 269-85.
- Zayadine, F.
1985 Recent Excavation and Restoration at Qasr El Bint of Petra. *ADAJ* 29: 239-49.