THE DHĪBĀN EXCAVATION AND DEVELOPMENT PROJECT'S 2005 SEASON

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Introduction

The Dhībān Excavation and Development Project (DEDP hereafter) seeks to develop strategies for ensuring the long term sustainability of archaeological research and archaeological landscapes in Jordan by integrating traditional research questions with site development. These two activities converge at Dhībān on the question of local connections to place, in the face of long term and apparently radical changes in the modes and intensity of dwelling, land use and collective identification. Even when apparently abandoned, Dhībān has remained a place of significant human activity. This long term pattern of attachment to place manifest through widely divergent intensities and modes of settlement is a central characteristic of Jordanian history and one of the distinct intellectual insights to be gained from its archaeological record. What follows is a report of the 2005 season undertaken between 24 July and 8 September 2005.

Context and Previous Investigations

Tall Dhībān is located approximately seventy kilometers south of 'Ammān. While devoid of modern settlement, the mound is immediately adjacent to the modern community of Dhībān (**Fig. 1**). The site is well known, both from the discovery of the Mesha Inscription in 1868 and for the pioneering excavations of the American Schools of Oriental Research from 1950 to 1953 and, again, in 1955 and 1956. Fred Winnett, William Reed and Douglas Tushingham concentrated their soundings in the south-east corner of the site, exposing an Iron Age fortification system, Nabataean temple, Byzantine church, and Early and Middle Islamic dwellings (Winnett and Reed 1965; Tushingham 1972). William Morton conducted an additional three seasons in 1955, 1956 and 1965, concentrating on Dhībān's acropolis (Field L) and north side (Field H) (Morton 1989). Archaeological excavations at Tall Dhībān ceased for nearly 35 years until Jordan's Department of Antiquities initiated an excavation and restoration program in 2002 (al-Mahameed 2003). In 2004, the DEDP conducted a pilot project to measure Dhībān's potential for new archaeological investigation (Porter *et al*. 2005).

Together, this work suggests Tall Dhībān was settled intermittently from the end of the Early Bronze 1b period (*ca*. 3100BC) until some point late in the Mamluk or early Ottoman era (late fifteenth or early sixteenth century AD).[1] Particularly prominent in these excavations were the later Iron Age (900-600BC), the Nabataean period (140BC-106AD), the Byzantine and Early Islamic Periods (*ca*. 400-800AD), and the Middle Islamic Period (*ca*. 1250-1600AD). This work also showed that architectural elements from these periods were well preserved and accessible by limited excavation. However,

1. Tall Dhībān viewed from the north (Photo: J. Porter).

1. For a recent synthesis of Dhībān's settlement history, see Porter *et al*. 2007.

the architecture visible on the surface of the site is in relatively poor condition owing to both G. Lancaster-Harding's removal of a significant number of above ground walls and arches in 1949 (Winnett 1964: 11) and to the lack of post-excavation conservation on the part of earlier excavators.

The primary goals of the 2005 season of the Dhībān Excavation and Development Project were to continue the exploration and documentation of the site's ancient remains while pursuing the research objectives developed in the 2004 season (Porter *et al*. 2005: 201, 203).[2] These included the production of a current topographic map of the site and the documentation of architectural remains on or near the surface, conducting a ground penetrating radar survey of select areas, trial excavations in Field L on the site's acropolis, and assessing the viability of developing Dhībān as a sustainable tourist destination for domestic and international visitors. During the 2005 season, as this report will describe, we sought to complete these goals, concentrating our work on four objectives.

1. Completion of the topographic map and architectural survey of the site, concentrating on the western slope where several buildings are still preserved on the surface.
2. Collect additional data relevant to the drafting of a site development plan.
3. Expansion of excavations in Field L on the site's acropolis and investigation of the construction and post-construction occupational phases of the Middle / Late Islamic building complex.
4. Gather additional data to link project results with earlier excavations at Dhībān, especially William Morton's excavations in Field L.

All objectives were met during this season and are described in greater detail in the following sections.

Topographic Map

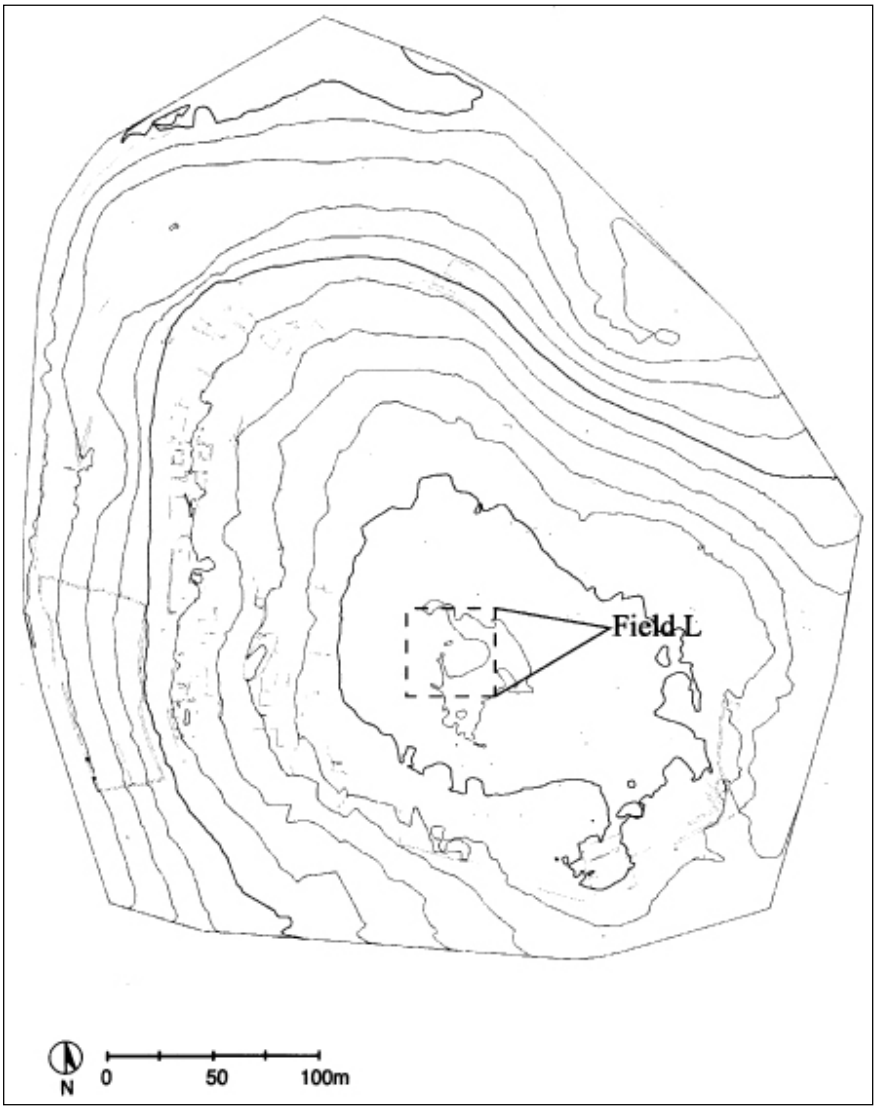
A topographic map of the site of Dhībān, initiated during the 2004 season, was completed by Benjamin Porter and William Zimmerle (**Fig. 2**). This mapping was conducted with a TopCon total station, with the data points uploaded into a CAD program, Vectorworks. This effort has produced a digital map of the site for use with the GIS database began last year using incomplete topographic data. Particular emphasis was placed on recording architectural remains visible on the surface of the site, especially on the western side of the tall, which has thus far been ignored by archaeologists. Our mapping project has made clear that at *ca* twelve hectares, Tall Dhībān is considerably larger than the 2.4 hectare ("five acres") figure cited by earlier surveys as the area of the summit only (e.g. Winnett and Reed 1964: 5). Much of this 'extra' area is accounted for by the lower terraces on the northwest side of the site, where surface investigations and aerial photographs (e.g. Kennedy 2004: Fig. 7.2) show extensive architectural remains. One priority of future field seasons will be to investigate this neglected portion of the tall.

Ground Penetrating Radar Survey Results

Ground penetrating radar (GPR hereafter) is a non-invasive technique useful for imaging features in materials, especially sediments. It operates by transmitting a series of high frequency electromagnetic pulses into the ground using an aerial. The time taken for reception of the reflected signal from subsurface stratigraphy and buried features is measured. The amplitude and polarity of the recorded signal is displayed versus the two way travel time of the signal. Usually the vertical axis is expressed either in the travel time in nanoseconds and the horizontal axis is the distance along the survey line. The vertical axis can be converted to a depth if the radar velocity of the penetrated material is determined or assumed.

In 2004, John Hakes and Bruce Routledge supervised a GPR survey on a portion of Dhībān's acropolis in order to test the viability of using this method to map subsurface architecture at

2. Participants included: Bruce Routledge (U Liverpool), Benjamin Porter (U California, Berkeley), Danielle Steen (Knox College), Zuhair al-Zou'bi (Department of Antiquities), Magda Sibley (U Liverpool), Zakariya Na'imat (Mutah U), Jack Green (Oxford U), Akemi Hori (Badé Institute) and five U of Liverpool students: Gemma Fine, Bianca Goh, Alex Huener, John Rowan and Annabel Rowbotham. Essential assistance in Dhībān was provided by Firas al-Kawamlah (now of the Ministry of Social Development in Dhībān) and twenty residents of the Dhībān area were hired to work at the site.



2. Tall Dhībān topographic map detailing Field L on the site's acropolis. Architectural elements visible on the surface are also shown here. Note the abundant surface architecture on the western slope.

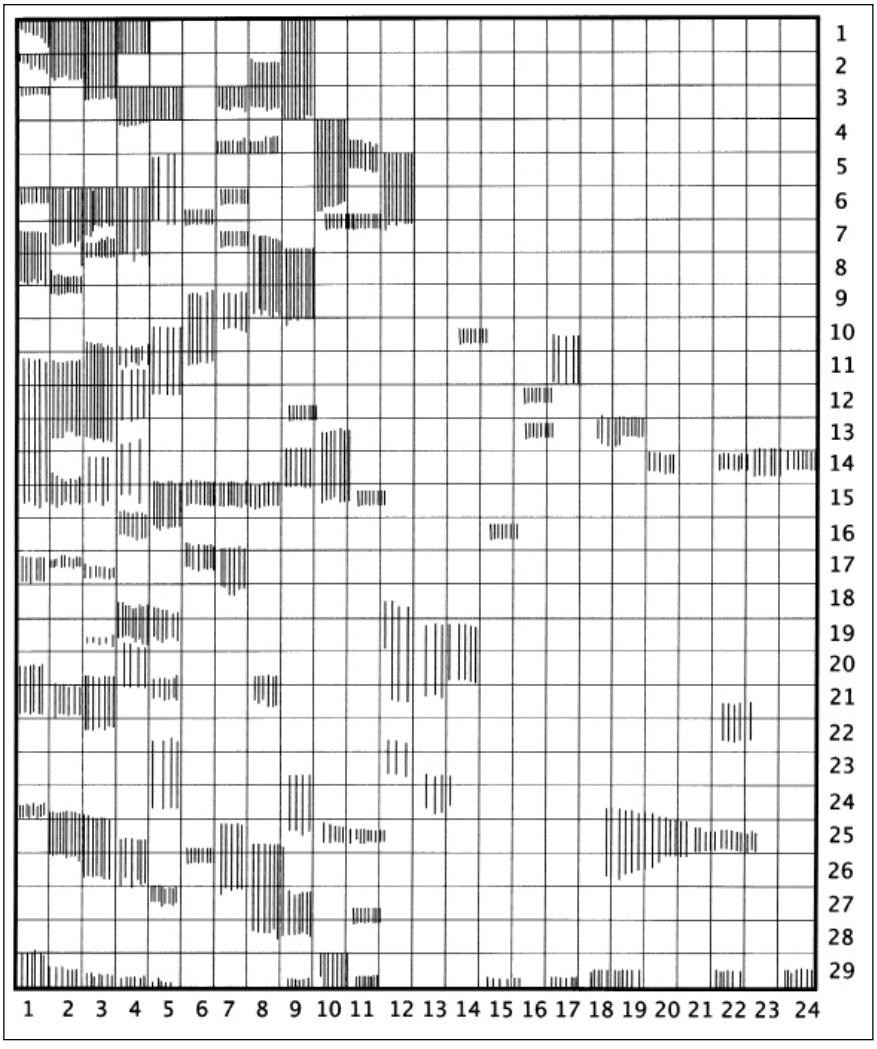
the site (**Fig. 3**). In order to examine a sufficient subsurface area, the GPR survey was designed using a grid system, with a traverse line separation of one meter for both of the areas we surveyed. The survey was carried out using two types of GPR equipment: a Noggin 500 MHz system and a Pulse EKKO 100 system fitted with 200 MHz antennas. The Noggin 500 is connected via a data cable to a laptop computer. Data logging software on the computer allows the operator to start and stop recording data, to add comment lines at features of interest and to set the type of ground media in which the survey is being conducted. The Noggin unit is placed on the ground and pulled along the traverse line at a constant speed while the data is logged onto the computer. Distance measured along the traverse is called out to the operator of the computer who

3. John Hakes and Bruce Routledge conducting the ground penetrating radar survey in 2004 (Photo: J. Porter).

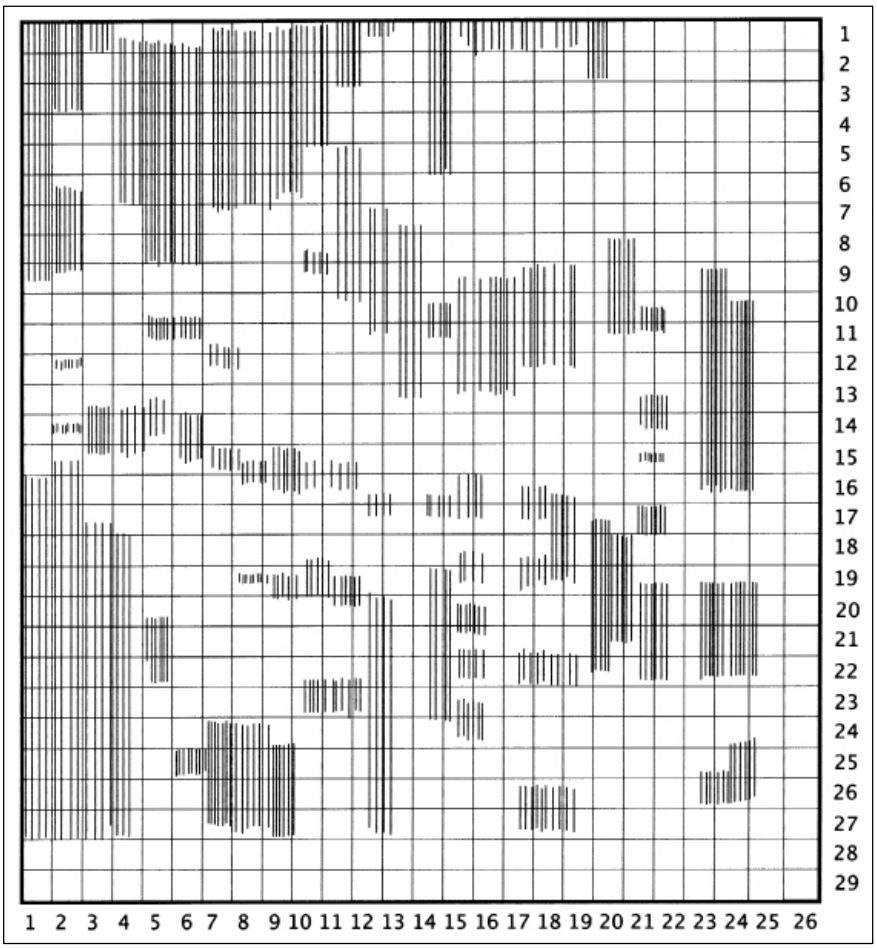
enters the distance covered as a comment in the dataset. It is important to try to keep the traverse speed constant from traverse to traverse to allow correct interpretation of the relationship between features in between adjacent lines.

The Pulse EKKO 100 system consists of separate Transmit (TX) and Receive (RX) units connected by fiber optic cables to a control unit and computer. The separation of the TX and RX units can be changed, as can the distance moved by the units for each reading. In this survey, the separation was 0.5 meters and the movement was 0.1 meters between readings. As the survey proceeds a profile is built up on the computer screen and stored on the computer's hard disk when the end of the line is reached.

In 2004, two areas were surveyed: J1 with a total of twenty-four lines, varying in length from twenty-eight meters to sixteen meters owing to the topography, and J2, a more uniform area where a grid of twenty-four lines twenty-six meters long could be surveyed, although only twenty-three lines were surveyed as the data for line twenty-two was lost. In general, every fourth line was also surveyed with the Pulse EKKO 100 system. This would enable a comparison to be made between the data collected by two systems. Each Noggin traverse line is shown in **Figs. 4 and 5**, and depicts a vertical profile down to a maximum depth of 1.6 meters. Each profile illustrates typical behavior expected when the emitted and received signal is influenced by small scale topography such as stones and uneven ground. Despite this added 'noise', the signals from buried topography should be visible if they are present, depending upon the depth of penetration and attenuation of the signal by the ground. Signal penetration at



4. Ground penetrating radar results for the J1 grid. Vertical black lines indicate the presence of possible non-soil features.



5. Ground penetrating radar results for the J2 grid. Vertical black lines indicate the presence of possible non-soil features.

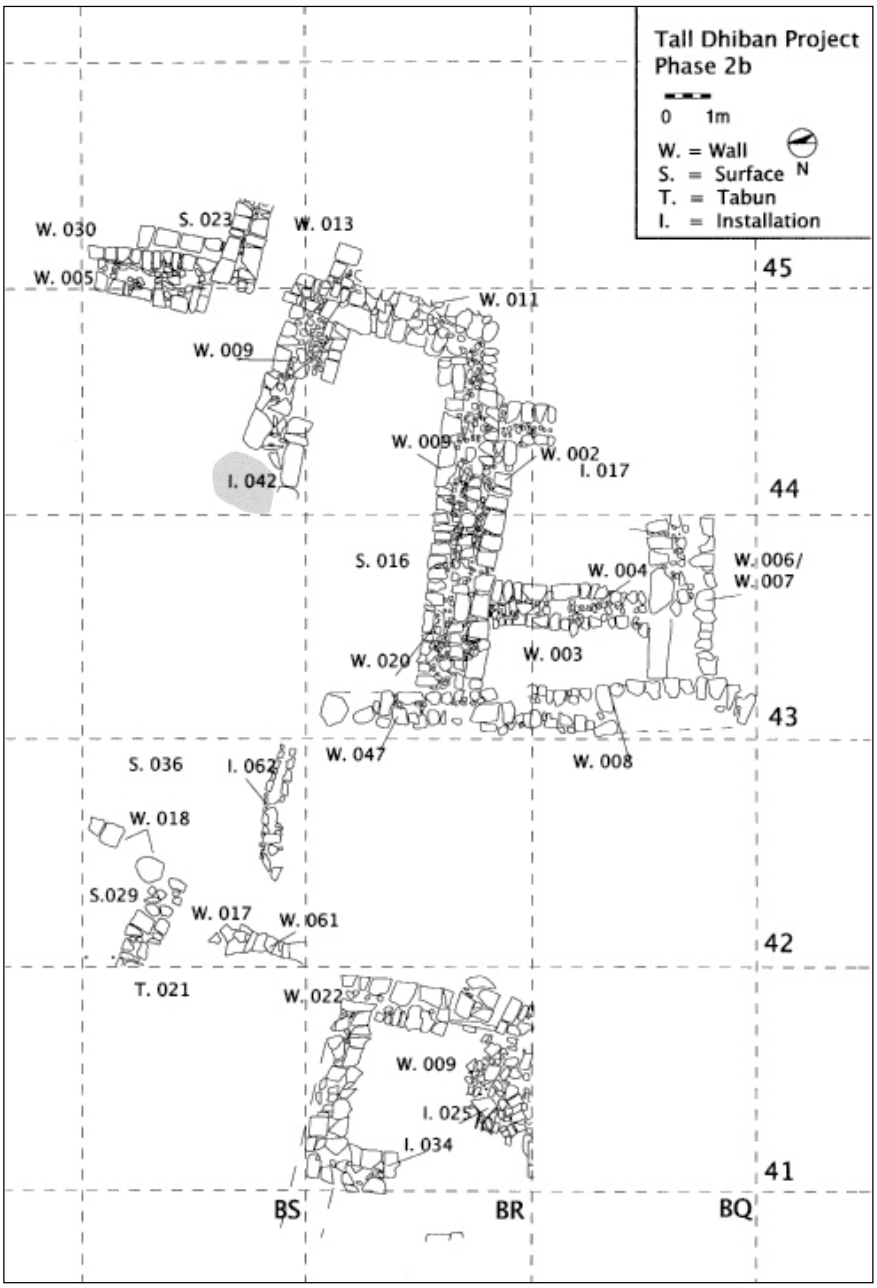
the chosen frequencies was somewhat low with imaging to less than one meter below the surface. A demonstration of this is in Area J1 - Line 9, where a cistern likely exists. The radar returns from the mouth are evident, but there are no returns from any deeper structure. This was probably due to the material being surveyed having high attenuation and low transmissivity at the frequencies used and the transmitter power. Lower frequencies of fifty or one hundred MHz could have been used, had the aerials and time been available. This would have given greater penetration but less resolution of any target.

The raw data returns suggest some features are apparent, mainly as what appear to be piles of large stones. The occurrences of these are plotted on J1, lines 1-17 and 18-24, and J2 lines 1-18 and 19-26. The spaces between these areas gave very little data, except some signs of depositional structures in the material.

The use of GPR, along with other geophysical surface surveying techniques (e.g. magnetic gradiometer and resistance tomography), has strong potential for imaging archaeological features in three dimensions, especially when a combination of techniques is used prior to excavation. Further surveys should investigate the use of lower frequencies and higher transmitter powers to overcome the high attenuation and low transmissivity of local materials to obtain deeper penetration, as well as a Common Mid-Point (CMP) survey to establish the velocities of the material.

Excavations on the Field L Acropolis

In 2005 the project shifted to an open-field excavation strategy, where the alternation of excavated and unexcavated squares provides sections that can be drawn in lieu of balks and then excavated through when bringing adjacent squares into a single phase. The original 6 x 6 meter grid, inclusive of balks, was transformed into a 5 x 5 meter grid with no balks. A comparison of **Fig. 6** in this report with **Fig. 7** in the



6. Map of the Field L acropolis's Phase 2b architecture.

2004 season's report (Porter *et al*. 2005: 206) demonstrates how the grid has been shifted relative to the architecture in order to accommodate this change in strategy.

Excavation activity in 2005 continued in the four squares opened in 2004 (BS42, BS44, BR43, BR41), as well as in two new units (BR44 and BQ43). Excavation and sample collection methods remained those detailed in the project's 2004 report (Porter *et al*. 2005: 204). To summarize preliminary results, two seasons of excavation in Field L suggest that we are investigating clusters of structures on the east and west sides of the field that are oriented towards an open central courtyard or street, containing cisterns and a drain. Parts of at least two structures have been exposed on the west side of the open central area, while portions of perhaps three structures have been exposed on the east. Whatever the configuration at the time of construction, it is clear that this area underwent several alterations over the course of its occupation, before rockfall and colluvial deposits filled in the structures. These alterations, which include pitting,

7. Field L acropolis's Walls BR41.009 and BR41.022 and Surface BR41.025, looking east.

ephemeral *ṭābūn* and surface formations, as well as wall damage and make-shift repairs, are all expedient and piecemeal in nature. This suggests significant shifts in occupational strategies at Dhībān, perhaps indicating an extended period of economic stress and residential instability prior to the abandonment of the Mamluk-era village. Given the importance of site abandonment to our understanding of the Late Mamluk and Ottoman periods in Jordan, as well as the uncertainty surrounding both the relative and absolute archaeological chronologies of these periods, careful attention to stratigraphic detail in the so-called "post-occupation" or "squatter" phases is absolutely essential for any progress to be made on the basis of archaeological evidence. We have, therefore, prioritized these layers in both our fieldwork and analysis.

The results of our excavations in 2005 generally support the stratigraphic phasing suggested after the 2004 season (Phases 1, 2a, and 2b) (Porter *et al*. 2005: 204). However, the imposition of uniform phasing across units and structures is an artificial convention maintained primarily for the purpose of exposition, as Field L is characterized by intensive and highly variable post-construction alterations. It is particularly important to note that we have not, as yet, established firm stratigraphic links between either excavation or architectural units. Hence, at present, there is only a probable, but not a necessary, equivalence in relative or absolute date between the same phase in two different excavation units.

In general, rockfall — the one consistent deposit across the entire field — has been used to divide Phase 1 (rockfall and above) from Phase 2 (below rockfall to construction of visible structures). So far, Phase 2 has been divided into Sub-phases 2a and 2b, with 2b representing the first prepared surfaces encountered below rockfall and 2a representing deposits positioned stratigraphically between Phases 2b and 1. As detailed below, Phase 2a activity varies from unit to unit, ranging from the accumulation of debris compatible with post-occupation midden deposits, through active pitting and makeshift wall repair, to the construction and use of installations (e.g. *ṭābūn*, ephemeral surfaces, stone-lined bin or channel). While probable Phase 2b surfaces were reached in four of the six squares excavated in 2005, these floors were not extensively penetrated, meaning that there is still little to be said about the foundation and initial use of the buildings first uncovered in 2004. In at least one case (BR41), it is clear that one or more phases of prepared surfaces exist beneath Phase 2b, meaning that we can expect to find at least a Phase 2c in some units in future seasons.

Phase 1

Much as noted in our previous report, (Porter *et al*. 2005: 207), wherever we commenced excavation, we encountered thick deposits of jumbled rockfall and fill containing artifacts of mixed date, up to the twentieth century AD.

Phase 2 Architecture

In our report on the 2004 season we described a series of walls associated with Late Mamluk occupation layers, suggesting in several places how these might resolve themselves into as yet incompletely exposed architectural units (Porter *et al*. 2005: 205). Work in 2005 has both expanded and complicated this picture.

Beginning with unit BR41, on the far western side of Field L, further excavation of this square has revealed a clear architectural unit (**Fig. 7**). This building is defined by walls BR41.022 on the north, BR41.033 (= BR41.009) and BR41.032 on the east, and wall BR41.013 exposed in the western balk of 2004. The building was entered from the east via a doorway with a paved threshold (BR41.029). The roof of this building was supported by a least one arch spanning the width of the room from north to south, as attested by BR41.034, a springer bonded to wall BR41.022. A possible opposing springer may be visible in the southern section of BR41,

although this will not be clear until unit BQ41 is excavated. This use of a sprung arch seems to contrast with neighboring buildings, where continuously vaulted roofs appear to have been created without the use of arches by simply corbelling stones on the tops of walls. At the same time, excavations by William Morton in 1955 and 1956 immediately east of our Field L also uncovered a building vaulted with sprung arches. Beyond the limits of the revised grid of 2005, the collapse of a portion of the western balk of 2004 revealed that wall BR41.009 was probably part of a doorway leading west. If we are correct in our interpretation of features visible in the section, then excavations in BR41 have thus far exposed one vaulted room, very close to 5 x 5 meters in area, within a multi-room structure.

Further excavation in BS42 revealed only one additional wall (BS42.061) beyond those uncovered in 2004, a short stub in the southwest corner of the square, badly damaged by a Phase 2a pit. A drain and exterior surface also discovered in this unit will be discussed under Phase 2b below.

In units BR43 and BQ43, excavation exposed wall BR43.020 (= BR43.047 = BQ43.008), which ends at an opening or doorway in the extreme north-west corner of BR43. This wall forms the western limit of the barrel vaulted architectural units in the eastern half of Field L. On the southern side of BQ43, east-west wall BQ43.007 essentially runs parallel to walls BR43.009 / 002 and appears to be constructed in a similar manner, namely as two mutually supporting parallel walls arching in opposite directions and joined by a rubble core. BQ43.007 appears to bond with wall BQ43.008 (= BR43.047 = BR43.020), although this relationship requires further investigation. In contrast, the north-south internal cross-wall BQ43.004 (= BR43.003) clearly abuts walls BQ43.007 and BR43.002 at each end.

In unit BR44, the dual wall BR43.009 / 002 (= BR44.009) was exposed for a further five meters east (**Fig. 8**). The south-arching portion of this wall, BR43.002, appears to end to the east at a bonded corner formed with a largely unexcavated north - south wall (BR44.016). The north-arching portion of this wall (BR43.009) continues east on its own for another two meters, before ending in a corner formed with the north

8. Field L acropolis's Walls BR44.009, BR44.011 and BS44.009 looking east.

- south wall BR44.011. Wall BR44.011 runs parallel to, and is embedded in, BR44's eastern section. Excavations on the north side of the square made it clear that BR44.011 formed a corner with wall BS44.009, exposed in 2004, which abuts BR44.011 on the west. The south face of BS44.009 arches south, having once formed a barrel-arch with wall BR43.009 (=BR44.009) on the south. However, BS44.009 only continues for *ca*. 1.20 meters west of this corner before it is clearly interrupted by an episode of destruction and irregular rebuilding. On the north side, BS44.009 is continued by BS44.058, which is a rather poor secondary rebuild that ends abruptly at cistern BS44.0042 (**Fig. 9**). On the south side, BR44.013 designates an area that was seriously compromised and is now barely coherent and difficult to designate as a wall. Further excavation is required in order to understand this sequence of events with any confidence. We can note that this episode of destruction and piecemeal rebuilding predates the rockfall and may

9. Field L acropolis's Walls BS44.009 and BR44.009, looking south.

be associated with the construction or modification of cistern BS44.042. While this cistern remains to be fully investigated, this preliminary evidence suggests that the cistern may have been inserted during one of the latest use phases of this area. The truncation of the arching wall BS44.009 and the poor, even incoherent, construction of BS44.058 and BR44.013 would certainly have affected the integrity of the northern side of the northernmost barrel vaulted building in units BR43 and BR44. Indeed, this room may have been exposed, or very poorly enclosed, on its northern side in the last phase of occupation prior to the rockfall.

Phase 2a and 2b

Unit BS41 illustrates the problem of depositional variability across buildings in Field L, as here the remains of a paved and plastered floor below Phase 1 rockfall and a bone-rich layer of fill (BR41.012 / 019) was encountered. In the 2004 report (Porter *et al*. 2005: 207), this floor (BR41.012 / 016) was assigned to Phase 2a. However, on exposing more of this room in 2005, the discovery of a portion of a substantial cobble pavement (BR41.025) and well-built threshold (BR41.029) showed that, while poorly preserved in parts of the unit, BR41.025 (=BR41.012 / 016) was the first prepared living surface for this building and hence should be assigned to Phase 2b (**Fig. 7**). Unfortunately, while well preserved in the southern half of the square, the cobbled surface (BR41.025) was poorly preserved and disrupted by rockfall in the northern half (represented by locus BR41.027), which had been exposed in 2004. The remains of a *ṭābūn* (BR41.026) associated with this surface were found built against the eastern side of the springer (BR41.034) bonded to the northern wall of this room (BR41.022). Most of the superstructure of this *ṭābūn* had been destroyed by rockfall, leaving a small deposit of ash, a foundation of supporting stones and some fragments of *ṭābūn* fabric. Along the western edge of the 2005 excavation unit, a narrow probe *ca*. 0.50m in width was started in order to see if the disturbed northern portion of the square (BR41.027) penetrated, or was contemporary with, the cobbled pavement (BR41.025) preserved in the southern portion. This probe would also provide a means of controlling the exposure of deposits beneath the cobbled pavement. Almost immediately, a layer (BR41.028) was discovered running underneath both BR41.027 and BR41.025. At the interface of BR41.027 and BR41.028, beneath a stone that may have been a surviving floor cobble, a hoard of thirty copper coins was discovered (see numismatic section below). The stratigraphic context of this hoard suggests that they were originally placed beneath a portion of the cobbled floor subsequently disrupted by rockfall. Excavation in this probe did not continue further in 2005, but it is clear that relatively uniform, post-construction deposits covering the entire exposed room remain to be excavated beneath cobbled surface BR41.025.

In summary, Phase 2b in BR41 was represented by a *ṭābūn* and a plaster and cobble surface, immediately beneath which was discovered a hoard of copper coins. Phase 2a was represented primarily by a fill layer, rich in animal bones, deposited in between the Phase 2b surface and rockfall.

During 2005, excavation in BS42 was concentrated in the southern half of the square, which had been left unexcavated in 2004. In 2004, excavation ceased with the exposure of one corner of a room (formed by BS42.017 and BS.42.018) whose interior had been largely cut by a pit (BS42.020 / 031). To the east of this room, excavation had stopped on top of what appeared to be an exterior surface (BS42.036), prepared with a lime wash. The room, its surviving interior surface (BS42.029) and the exterior surface (BS42.036) were assigned to Sub-phase 2b, while the pit was assigned to Sub-phase 2a. Excavation in 2005 ceased at the same prepared surface (BS42.058 = BS42.036), bringing the entire square into phase. As noted above, only one wall fragment (BS42.061), cut by a pit (BS42.056), was uncovered in the south-east corner of the square. The absence of any other walls in the southern half of BS42 makes it likely that BS42.058 / 036 were an exterior surface. Embedded in BS42.058 / 036 was a stone-built drain (BS42.062) running east to west along the southern edge of the square, turning and running directly into the southern section *ca*. 2 meters from the western edge of the square. This drain is embedded directly into the lime-wash floor (BS42.58), which seals against the stones that

line this drain. In several places flat capstones survive. The drain itself remains unexcavated, having been discovered on the second to last day of excavation. The drain runs downslope from east to west and measures *ca*. 3 meters in length and *ca*. 0.42 meters in width, with a central channel that ranges from *ca*. 0.18 - 0.22 meters in width. The drain turns south towards the unexcavated square BR42 precisely at the point where a surface depression indicates the probable existence of a cistern.

In summary, Phase 2b in BS42 is represented by the corner of a structure with an interior plastered surface, as well as an exterior prepared surface in which a stone-lined drain has been embedded. Phase 2a is represented by pits cutting into these 2b features, as well as the poorly defined secondary surfaces from which these pits were cut.

During 2005, we focused our excavations in BR43 to the north of wall BR43.009 / 002. In our previous report (Porter *et al*. 2005: 205) we suggested that BR43.016 might be a Phase 2b surface. This did not prove to be the case, as excavations in 2005 showed that this layer (BR43.016 = BR43.034) consisted of further rockfall. In this light, it is uncertain whether BR43.015, deposited over BR43.016 and assigned to Phase 2a as an ephemeral surface (Porter *et al*. 2005: 207), is anything more than a pocket of fill in a very thick deposit of rockfall. Beneath BR43.016 we exposed a stone built installation (BR43.040). This installation consisted of two parallel rows of field stones 0.50 meters apart, irregularly built in one or two courses to a height of *ca*. 0.30 meters and laid on a bed of flat lying stones. The installation runs south to north, perpendicular to and abutting wall BR43.009. It is preserved for 1.20 meters in length and destroyed on its northern end by rockfall. If not for the fact that it abuts directly against wall BR43.009, we would be inclined to interpret this installation as a stone-lined drain, much as was discovered in square BS42. The construction of installation BR43.040 was associated with layers rich in ash and charcoal (BR43.038 / 0.39) to the west, even though these do not appear to be a prepared surface of any sort. Beneath these ash layers, and quite clearly beneath the foundation level of installation BR43.040, was a layer of flat lying stones (including a boulder mortar, worn through from use) and fill (BR43.044). Excavation stopped when the removal of BR43.044 revealed a compact layer that appears to be a good candidate for a prepared surface (BR43.046).

In summary, we would suggest rather tentatively that our excavations ended on what could be designated a Phase 2b surface, with installation BR43.040 and associated layers constituting Phase 2a activity in the northern portion of square BR43. All of this requires further stratigraphic confirmation.

Square BR44 was opened in 2005 in order to expose the eastern half of the long, barrel vaulted room excavated in BR43. Excavations in this square did not proceed far beyond the clearing of rockfall and the articulation of walls. Excavation ended on a firmer, ashy, deposit (BR44.014) with pockets of charcoal and flat lying pottery, which would seem to represent Phase 2a activity in this square. BR44.014 may also be contemporary with BR43.038 / 039 and installation BR43.04 in the adjacent square BR43, although time prevented further investigation. As noted above in our discussion of architecture, it is clear that wall BS44.009 on the north side of BR44 was truncated and that the jumble represented by BR44.013 was deposited prior to the Phase 1 rockfall. However, the precise phasing of these events (e.g. Phase 2a or 2b) requires further investigation.

Square BQ43 was opened in 2005 to the south of BR43 in order to investigate rooms adjacent to wall BR43.002. As in BR44, work in BQ43 did not progress much beyond the removal of rockfall and articulation of walls, with Phase 2a represented primarily by deep fill layers at present. However, excavations at the interface between units BQ43 and BR43 did clarify an ambiguous feature of wall BR43.003, which had appeared to rest on layer BR43.010 on its west side, but extended much deeper on its east side. It is now clear that part of the western row of this double rowed wall was robbed out along with part of the eastern row of the parallel wall BQ43.008 (=BR43.020 / 047). Wall BR43.003 was then given a makeshift repair, with both the robbing and wall repair occurring in Phase 2a.

Square BS44 was affected by the shifting of our site grid, to the extent that it was extended one meter to the west, while a meter-wide strip

along the eastern balk became part of square BS45. Extending BS44 to the west meant that it now incorporated a cistern (BS44.042), whose opening has always been visible from the surface. In this area, excavation stopped just above the roof of this cistern after removing rockfall and a layer of fill (BS44.045). Sweeping on the last day of fieldwork revealed that the cistern's roof was intentionally constructed with large stone slabs. On the south side of BS44 it became clear that wall BS44.009, uncovered in 2004, was cleanly truncated. BS44.009 runs along the section line between units BS44 and BR44. As noted above, in BR44 the line of the southernmost row of BS44.009 ends in a jumble of stones. In BS44, however, the northernmost row of BS44.009 is continued by a single row wall (BS44.058) that clearly abuts BS44.009 and is constructed in a more haphazard manner. This wall (BS44.058), which we interpret as a rebuild, continues west to the opening of cistern BS44.042. The exact stratigraphic relationship between BS44.058 and BS44.042 is not entirely clear as it appears that BS44.042 remained in use until the recent past, potentially disturbing BS44.058 at the point were the two features meet. At present, we are suggesting that cistern BS44.042 was either excavated or extensively modified during Phase 2a, which also resulted in the truncation of wall BS44.009 and the construction of rebuilt wall BS44.058. This will need to be explored via further excavation next season.

Surface BS44.035 (=BS45.049) and *ṭābūn* BS44.032 (=BS45.047), located just east of threshold BS44.027 were both designated as Phase 2a constructions in our previous report (Porter *et al*. 2005: 207). However, excavations in 2005 indicated that these were the latest in a series of laminated floors in this doorway. *ʿåbøn* BS44.032 (BS45.047) was cut into an earlier thin plastered surface (BS45.057) and constructed as a semi-circle of cobbles (BS45.055) embedded in clay, on which the *ṭābūn* superstructure was constructed. Surface BS44.035 (BS45.049) was laid over surface BS45.058 and seals against the base of *ṭābūn* BS44.032 (BS45.047). Although this last phase of flooring represents a clear change with the addition of a *ṭābūn*, it appears to be earlier than the modifications associated with cistern BS44.042. We therefore now designate surface BS44.035 (BS45.049) and *ṭābūn* BS44.032 (BS45.047) as Phase 2b constructions. As in square BR41, it seems evident that future excavations will confirm the existence of Phase 2c surfaces on the interior of the doorway exposed in BS44 / 45.

Objects

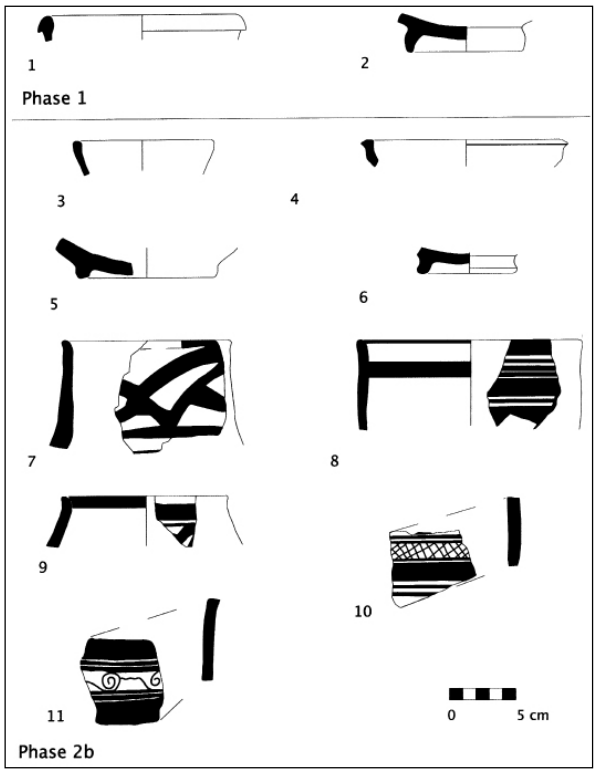
As in 2004, objects and samples were recovered from Phases 1 and 2 and assigned unique identification numbers. All faunal evidence and a soil sample from each locus were collected for future analysis. Stone, ceramic, glass and metal objects were abundant in all phases. Because this evidence is similar to that which was excavated in 2004 (Porter *et al*. 2005: 207, 211, Figs. 8-9, Tables 1-2), this report will only focus on ceramic vessels and glass bracelets excavated in 2005.

Ceramic Vessel Evidence

Ceramic vessels are the most common excavated artifact type and a selection is presented here. Almost all loci contained a mixture of vessels dating from the Iron Age, Nabataean, Roman, Byzantine, and Early, Middle and Late Islamic periods. Because they overlap in form and style, the latest ceramic evidence from Phases 1 and 2b are briefly discussed together below, but are separated in the accompanying illustration.[3]

Diagnostic ceramic vessels spanning the Middle to Late Islamic period transition (for periodization, see Whitcomb 1992: 386) represent the latest materials (i.e. *terminus post quem*) found on or above excavated living surfaces (**Fig. 10, Table 1**).[4] Solid monochrome (green and yellow) lead-glazed bowls with simple (**Fig. 10.3**), triangular (**Fig. 10. 4**), and folded rims (**Fig. 10.1**) were found. Also, various types of

3. See Porter 2005: Figs 8.1-5 for Phase 2a ceramic vessel evidence.
4. Unfortunately, there is no space here for a discussion of vessel characteristics. For parallels from other well stratified and published contexts, see Karak Castle (Brown 1989; Milwright 2008), the Karak Plateau Survey (Brown 1991), Tilāl Abū Qa'dān and Abū Sarbūṭ (Franken and Kalsbeek 1975), Khirbat Fāris (Johns *et al*. 1989; McQuitty and Falkner 1993), al-Burj al-Aḥmar (Pringle 1986), al-Ḥimma (Poulsen 1957), Ḥisbān (Sauer 1973 and 1994), and Pella (Walmsley and Smith 1992).



10. Ceramic vessels from Field L acropolis's Phases 2b and 1 (See Table 1 for descriptions).

bases from open vessels bearing green and yellow lead glazes were found (**Fig. 10.2, 5 and 6**). Finally, jars (**Fig. 10.7-9**) and body sherds (**Fig. 10.10-11**) bearing the geometric painted designs indicative of the Middle and Late Islamic period were present. Each of the examples shown here are different from each other in terms of fabric and design, and may reflect a diversity of vessel workshops producing in central Jordan.

Glass Bracelets

The glass materials recovered in the 2005 season in Dhībān include thirty-six bracelet fragments and numerous fragments of windowpane and other objects. The present study focuses on the bracelets, which were first classified typologically to investigate the manufacturing techniques, dating and provenance.[5] Furthermore, twenty-nine selected fragments were subjected to further microscopic and chemical analyses to identify compositional groups, providing additional information about the dates and areas of production of the raw glass used to manufacture the bracelets. The compositional groups were set against the typological groups and compared

Table 1: List of ceramic vessels illustrated in **Fig. 10** detailing form, provenance, fabric and surface color, manufacture and treatment.

No.	Type	Unit	Locus	Pail	Number	Dm (cm)	Fabric Color			Surface Color		Production	Treatment		
							Exterior	Core	Interior	Exterior	Interior		Type	Color	Ex/In
1	bowl	BQ43	15	121	7	14	7.5YR8/3 (pink)			7.5YR8/3 (pink)	7.5YR8/3 (pink)	wheel	glaze	green	ex/in
2	base	BQ43	15	121	15	unknown	10YR8/3 (very pale brown)	5YR8/4 (pink)	(very pale brown)	10YR8/3 (very pale brown		wheel	glaze	green	ex/in
3	bowl	BS42	57	128	46	10	2.5YR4/4 (reddish brown)			unknown		wheel	glaze	yellow	ex/in
4	bowl	BS42	57	128	43	14	5YR8/4 (pink)			unknown		wheel	glaze	yellow	ex/in
5	base	BS44	45	123	4	unknown	2.5YR7/6 (light red)			2.5YR7/6 (light red)		wheel	glaze slip	yellow/ green brown	in ex
6	base	BS42	57	128	37	unknown	10YR8/4 (very pale brown)			10YR8/4 (very pale brown)		wheel	slip	green	ex/in
7	jar	BR43	45	145	1	12	10YR5/1 (gray)			unknown		hand	slip paint	white red	ex/in ex
8	jar	BS43	38	130	2	16	5YR7/6 (reddish yellow)			5YR7/6 (reddish yellow)		hand	paint	black	ex/in
9	jar	BS45	47	144	7	12	5YR7/6 (reddish yellow)	7.5YR7/1 (light gray)	5YR7/6 (reddish yellow)	unknown	7.5YR6/3 (light brown)	hand	slip paint	white black	ex/in ex
10	sherd	BR41	23	116	22	unknown	5Y4/1 (dark grey)			5YR7/6 (reddish yellow)		hand	paint	red	ex
11	sherd	BS44	45	123	15	unknown	5Y8/3 (pale yellow)			2.5Y8/1 (white)		hand	paint	black	ex

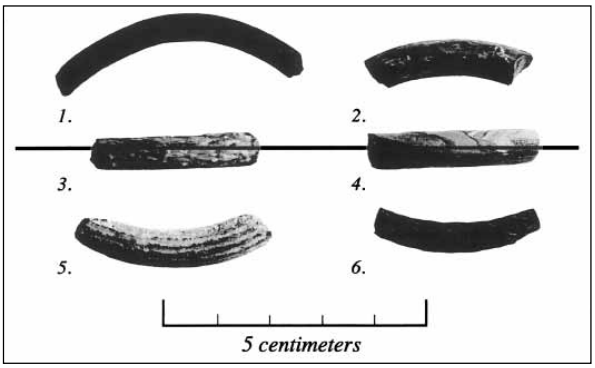
5. This analysis is based on Johanna Salvant's MSc thesis entitled "Glass bracelets excavated from Dhiban, Jordan". This research was performed at the Wolfson Archaeological Science Laboratories at the Institute of Archaeology, University College London under the supervision of Marcos Martinón-Torres and Thilo Rehren. It was funded by the European Union under a Marie Curie Host Fellowship for Early Stage Researchers Training (MEST-CT-2004-514509).

to publish data on relevant bracelets or glass compositions.

The bracelet fragments are segments of circles with lengths and cross-sections ranging from 1.2 to 7.2 centimetres and from 0.3 to 0.9 centimetres respectively. None of them present a seam in the preserved fragment. They were grouped according to the classification suggested by Spaer (1988, 1992), which is based on the bracelet cross-sections and decorations (**Table 2**), and consists of four main types: monochrome plain (Type A) or decorated by moulding / tooling (Type B), spirally twisted (Type C), or bracelets decorated with coloured glass (Type D).

Among the Type A fragments, twelve very similar fragments appear glossy opaque black and unweathered (A1 - A12) (**Fig. 11.1**), while four fragments appear matt black and corroded (A13 - A16) (**Fig. 11.2**). The remaining Type A fragments (A17 - A22) are of various colours (blue, green and brown). All the Type B fragments present some longitudinal ribbing (**Fig. 11.5**), while all the Type C fragments are monochrome (**Fig. 11.6**). The Type D bracelets show polychrome decorations (specks (D1) (**Fig. 11.3**) or patched patterns (D2 - D3) (**Fig. 11.4**).

Two techniques were used to produce glass bracelets. The seamed technique consists of producing a glass cane, bending it into a ring shape and closing it with a seam, while the seamless technique consists of piercing a mass of molten glass with a metal rod which is then shaped to become a ring by rotating it around the rod (Spaer 1988; Steiner 1995). The circular cross-section of the Type B and C fragments indicates that they were made by the seamed technique (Spaer 1988; Steiner 1995). Conversely, the cross-sections of all the Type A and D bracelets (except A19), together with the presence of longitudinal ribbings or cracks (most likely a by-product of the manufacturing technique rather than decoration), indicate the use of the seamless technique (Spaer 2001; Steiner 1995).



11. Sample of six different types of excavated glass bracelets: (1) Type A, (2) Type A, (3) Type D, (4) Type D, (5) Type B and (6) Type C (See Table 2 for descriptions).

The typology of the Type B fragments suggests they are most likely of pre-Islamic date, while the typologies of the fragments A18 - A22, C1 - C7 and D1 indicate that they probably date from the pre-Islamic period onwards. The cross-sections of the fragments A1 - A17 suggest that they could date from the Mamluk Period onwards, and the typologies of D2 - D3 indicate that they are probably Ottoman (Spaer 1992).

All the glass fragments were screened non-invasively using energy dispersive X-ray fluorescence (ED-XRF), providing qualitative information on the composition of the glass surfaces. Small samples of twenty-nine objects, including twenty-one bracelets, were mounted as polished cross-sections and further examined employing optical microscopy and electron probe microanalysis (EPMA). Three main compositional groups were identified among the bracelets from Dhībān, namely natron, plant ash and mixed alkali glasses.

1. Natron Glasses

Three Type A bracelets (A18 - A20) are soda-lime-silica glasses with low magnesia (<0.7%) and potash (<1.4%) concentrations, and can thus be identified as natron glasses (Sayre and Smith 1961). More precisely, they belong to the Levantine I glass group, suggesting a Byzantine date (Freestone *et al*. 2000), which is consistent with the period suggested by the typological study. They were probably manufactured at a number of Levantine glassworking sites, most probably in Palestine (Brill 1988; Fischer and McCray 1999; Freestone *et al*. 2000), using the seamless technique with glass made from Levantine coastal sand (Freestone *et al*. 2000) and Egyptian natron from the Wadi Natrun (Shortland *et al*. 2006). A19 is colored with a minor amount of iron oxide, probably present as an impurity in the raw materials, in the same way as four Levantine I non-bracelet glass fragments analysed. The two other bracelets are coloured respectively by an extraordinary high level of

Table 2: List of sampled glass bracelets detailing type, reference name, cross section, apparent color, real color and corrosion.

Type	Reference name	Cross section	Apparent color	Real color	Corrosion
Type A	**Opaque, black, unweathered appearance**				
	A1	evenly pointed	Glossy opaque black	T. purple	No
	A2	obliquely pointed		O. black?	
	A3				
	A4	evenly pointed		?	
	A5				
	A6				
	A7				
	A8				
	A9				
	A10				
	A11				
	A12	obliquely pointed?			
	Black corroded appearance				
	A13	evenly pointed	Matt opaque greyish black with iridescence	T. purple	Yes
	A14			T. purple pink	
	A15			T. pinkish brown purple	
	A16			T. brown red with light	
	Colors other than black				
	A17	obliquely pointed?	Pearly light blue	T. copper blue	Yes
	A18	semicircular flattened	Translucent blue		No
	A19	circular?	Translucent aqua		Some
	A20	semicircular flattened	Khaki with some black horizontal lines	Dark reddish brown	Some
	A21	semicircular	Dark blue?	T. lavender blue with red burgundies	Yes
	A22		Drab white/beige	T. emerald green	Yes
Type B	B1	circular	Blue with white weathering	T. yellowish brown	Yes
	B2		Greyish silver	T. purple pink	
	B3		Blusish stone grey	?	
	B4		Bluish light grey/white		

con. Table 2: List of sampled glass bracelets detailing type, reference name, cross section, apparent color, real color and corrosion.

Type	Reference name	Cross section	Apparent color	Real color	Corrosion
Type C	C1	circular	Black with few iridescence	T. emerald green with light	Some
	C2		Dark blue with some white/beige tones	Brownish black	Yes
	C3		Green irisdescent	T. peacock blue	
	C4		Black with iridescence	T. brownish purple-pink with light	
	C5		Black with some bluish grey stains	Brown purple with light	
	C6		Grey/black/ silver	?	
	C7		Dark grey with some parts silver grey		
Type D	D1	semicircular/ semicircular flattened?	Inside light blue/white (weathering) and outside black? Decorations appear beige/grey.	T. brown purple – O. white, yellow, green and red specks decorations	Yes
	D2	obliquely pointed?	Dark green or blue? Decorations yellow, red and white.	T. Peacock blue – patched pattern decorations: O. yellow, red and white	
	D3	semicircular	Dark blue? Decorations yellow, red and white.	T. bluish dark green – patched pattern decorations: O. yellow, red and white.	

iron oxide (A20, with 10.1% Fe_2O_3) or by copper oxide (A18).

2. Plant Ash Glasses

Fifteen bracelet fragments, including all the bracelets of Types B (**Fig. 11.5**), C (**Fig. 11.6**) and D (**Fig. 11.3-4**), and some bracelets of Type A (A13 - A15, A17, A21 - A22) (**Fig. 11.2**), are also soda-lime-silica glasses, but with higher magnesia (1.7 - 4.2%) and potash (1.6 - 3.5%) contents. These were manufactured using plant ashes as an alkali source (Sayre and

Smith 1961), suggesting these bracelets were produced in the eighth century AD at earliest (Brill 1988; Freestone et al. 2000; Henderson 1995: 997). This is consistent with the dates suggested by the typological study for the Type A, C and D bracelets altogether suggesting an Islamic date for the Type A and C plant ash bracelets and the fragment D1, whilst D2 and D3 are probably Ottoman. There is a contradiction with the Type B bracelets, between the Islamic date suggested by the composition and the Late Byzantine date indicated by the typology. However, little information is available concerning the seventh and eighth centuries AD, and very few bracelets are known from the ninth to thirteenth centuries AD (Spaer 2001), suggesting that some Type B bracelets could have remained in production during the Islamic period, perhaps on a small scale. Our knowledge of the chronology of the transition to plant ash in the Near East is still insufficiently detailed to reach any firm conclusions. Both seamless (Type A and D fragments) and seamed techniques (Type B and C fragments) were used.

The plant ash bracelets display a wide range of compositions. However, ten bracelets, together with two non-bracelet fragments, form a tighter compositional sub-group. Another subgroup, characterized by lower potash and magnesia contents than the other plant ash glasses, consists of three bracelet fragments of Type A (A13 - A15), which are very close compositionally and typologically. They are colored with manganese oxide, resulting in visually black colors that appear purple under the microscope. Bracelet A16, and four other bracelets recovered in the 2004 season, appear very similar to these and probably belong to the same sub-group. Finally, two remaining bracelet fragments (A17 and C2) show very distinctive compositions.

The main colorants encountered in the analysed plant ash bracelets are iron, manganese, copper and cobalt. Lead-tin yellow, tin oxide and copper-red were also used for the plant ash glass decorations of the Type D bracelets.

3. Mixed Alkali Glasses

Three plain, unweathered bracelet fragments (A1 - A3) (**Fig. 11.1**), appearing opaque black but translucent under the microscope, are mixed alkali glasses with the very high alumina (7.9 - 8.3%) and relatively low lime (4.9 - 5.2%) characteristic of Indian glass (Brill 1987). Therefore, these bracelets were probably imported from India. These were coloured by iron oxide and manufactured by the seamless technique. Nine additional bracelet fragments from the 2005 season (A4 - A12) and seven other bracelets from the previous season are very similar to these, suggesting that they also belong to this group.

The non-bracelet fragments compare well compositionally to both the natron and plant ash glass bracelets. This suggests that no distinction was made in the choice of raw glass to manufacture the glass bracelets and the other objects represented among the fragments studied. However, it seems the use of colorants was more common for the glass bracelets, since very little of the other glass appears to have been intentionally coloured.

The glass bracelets recovered at Dhībān seem to originate from three main sources: (a) bracelets made of mineral-natron glass produced in the Levant during the Byzantine Period, (b) bracelets made of plant ash-based glass, probably produced in the Levant from the Islamic period onwards, and (c) glasses of a mixed alkali composition, probably imported from India. The main colorants were copper, manganese, cobalt and iron, with minor occurrences of lead-tin yellow, tin oxide and copper-red. Both the seamed and the seamless manufacturing techniques are present.

Future analytical work should incorporate the bracelets and other glass objects recovered at Dhībān during previous seasons of fieldwork, in order to further investigate the manufacture and origins of the glass, its spatial distribution across the site, and the relative proportions of the different glasses present, while at the same time contributing additional chronological information. A remaining question is whether the glass was imported in bulk or as manufactured bracelets. The answer to this will require further comparative work with archaeological bracelets and glass compositions from the broader region. This will provide a solid foundation for future archaeological work, which should also explore the social and cultural implications of the relative abundance, and long chronological span, of the Dhībān bracelets.

Dating and Interpretation

In our 2004 report, we hypothesized that Dhībān was likely one of many fourteenth century villages that arose in central Jordan as a result of the Mamluks' desire to increase grain, wool and sugar production. Many of these villages later declined in the fifteenth century, when the region experienced an economic downturn and environmental degradation (Walker 2003, 2004). One goal of the 2005 season was, therefore, to determine whether or not the changes witnessed in the buildings of the Field L acropolis were linked to these broader regional changes documented in the historical record. Making these links between the historical and archaeological record is complicated, however, by the limited disciplinary knowledge of Middle Islamic material culture sequences, which prevents us from assigning precise dates to different architectural phases. As an alternative to ceramic seriation, numismatic evidence and radiocarbon assays — when used together — potentially help establish more secure dates.

Numismatic Evidence

Warren C. Schultz analyzed a portion of the numismatic material (n = 35) from the 2005 season during August and September 2007 at the Mādabā Archaeological Museum (**Table 3**). A coin hoard (Objects 118.1-30) was excavated in Unit BR41, at the interface of Loci BR41.027 and BR41.028, beneath a stone that was likely a surviving floor cobble (**Fig. 12**). Although not directly beneath the well preserved portion of the cobble floor (BR41.025) that represents the latest (Phase 2b) surface in the western most building of Field L (see above), this hoard should still provide a *terminus post quem* for this latest phase of the building's use.

These thirty copper coins have the fabric and size consistent with the copper coins (*fils*; pl. *fulūs*) minted in areas of Egypt and greater Syria in the Ayyubid (567 – 648AH/ 1171 – 1250AD) and Mamluk (648 - 923AH / 1250 - 1517AD) periods.[6] They are not well preserved and identifications, when possible, are made on the basis of trace writing and design. To date, only four definitive identifications have been made, and

12. A coin hoard (Objects 118.1-30) was excavated in Unit BR41, at the interface of Loci BR41.027 and BR41.028, beneath a stone that was likely a surviving floor cobble. This hoard provides a terminus post quem *for the building's latest use.*

all are Ayyubid. Of those Ayyubid coins, three date from the copper issues without mint name of al-Malik al-Kamil Muhammad (615 - 635AH / 1218 – 1237AD) (118.001 (**Fig. 13.1**), 118.020 (**Fig. 13.2**) and 118.026 (**Fig. 13.5**), with one coin struck in Damascus from the reign of al-Malik al-'Aziz 'Uthman (118.005, **Fig. 13.3**)[7] (589 - 595AH / 1193 – 1198AD). In terms of tentative identifications, one coin (118.027, **Fig. 13.6**) may possibly be from the Zangid dynasty of Syria. Only one of the coins seems to be Mamluk (118.023, **Fig. 13.4**), but has as yet not been identified with a known Mamluk type. The stylistic trace on which this Mamluk identity is based is a six-petalled rosette, which was used on the Syrian coppers of several Mamluk sultans. The earliest appearance of this design on several coin types is during the third reign of al-Nasir Muhammad (709 - 741AH / 1310 – 1341AD). The fabric of these coins does not match the contemporary figural copper coins of northern Syria and the Jazira so those coins are eliminated from consideration. Thus on the basis of this sparse evidence, we are looking at a probable terminal date for the hoard in the era of al-Nasir Muhammad's third reign.

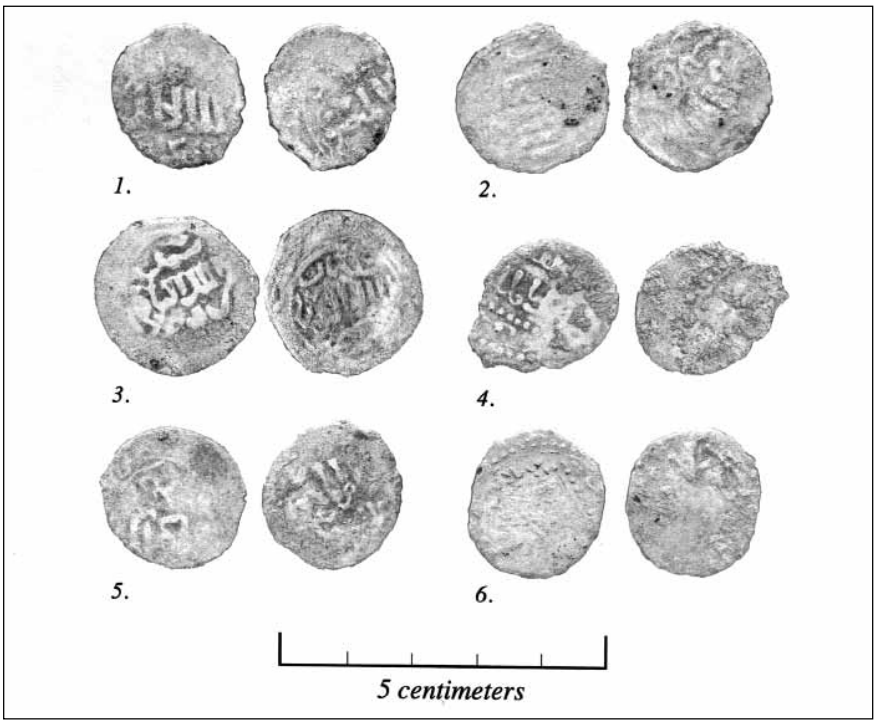
An additional five coins were excavated separately in different units. Of these coins, only BS44.85.001 (*fils*, 1.70gm.) is of similar fabric to the coins found in the hoard described above. Also, BR44.63.001, weighing 10.82gm., is possibly lead (Pb), and appears to be completely

6. The standard work on Ayyubid coins is Balog 1980; for Mamluk coins, see Balog 1964.

7. Warren Schultz would like to thank Mr Hasan al-Zuod of the National Bank of Jordan Numismatics Museum for his help in identifying this coin.

Table 3: List of numismatic evidence detailing provenance, object number and weight.

Unit	Object No.	Weight (gm)	Comments
BR41	118.001	3.84	Ayyubid, al-Malik al-Kamil, Balog *Ayyubids*, p. 160, type #418, no mint
	118.002	5.42	Illegible
	118.003	3.99	Illegible, trace of Isma'il?
	118.004	4.44	Possibly Ayyubid. Note "al-Imam" on bottom line of obverse
	118.005	4.18	Ayyubid, al-Malik al-'Aziz 'Uthman, Balog *Ayyubids*, p. 113, type #223, struck at Damascus, year 595 AH.
	118.006	5.39	Probable Ayyubid. al-Malik al-`Adil is clearly visible. Does not match calligraphic style in Balog, Ayyubids plates. Note the kufic "dal" of 'Adil, followed by the rectangular "lam." Reverse is effaced.
	118.007	2.64	Possibly Ayyubid, but match not yet found. Note the square-in-circle design on obverse.
	118.008	4.06	Unidentified
	118.009	2.98	Possibly Ayyubid, but match not yet found. Note the two-line inscription of "al-Imam" and (possibly) al-Malik.
	118.010	3.52	Mamluk fabric, but only trace writing legible
	118.011	3.96	Unidentified, trace legends only
	118.012	3.51	Illegible
	118.013	3.03	Illegible. Traces of dotted circular border
	118.014	3.29	Trace design; "la" on reverse
	118.015	5.77	Illegible
	118.016	3.18	Trace border on reverse. Overstrike?
	118.017	4.42	Illegible traces only
	118.018	4.68	Illegible
	118.019	3.17	Unidentified
	118.020	4.13	Ayyubid, al-Malik al-Kamil, Balog Ayyubids type 418? Reverse is extremely difficult to decipher
	118.021	4.11	Unidentified. Al-Malik on bottom line of obverse. Reverse is illegible.
	118.022	4.27	Unidentified. Traces of "sultan" on obverse
	118.023	2.99	likely the latter, but upside down. The traces of the rosette on the reverse are the reasons for the Mamluk attribution. Probable overstrike.
	118.024	2.40	Unidentified
	118.025	4.30	Unidentified
	118.026	4.22	Ayyubid. Al-Malik al-Kamil, Balog *Ayyubids*, p. 159, type 417, no mint
	118.027	3.75	Unidentified, possible Zengid type? Obverse has linear square in linear circle, with both square and circle surrounded by line of dots. Possible "thala(th) on obverse.
	118.028	4.25	Unidentified
	118.029	4.77	Unidentified
	118.030	4.16	Unidentified
	33.001	n/a	copper, not Islamic
BR43	107.001	n/a	*Fals*, Islamic, but pre Ayyubid
BR44	63.001	10.82	possibly lead
	85.001	1.70	copper, Mamluk
	86.001	n/a	Low grade silver *dirham*, pierced. Not Mamluk
LII-III	164.001	n/a	probably pre-Islamic



13. Sample of excavated numismatic evidence: (1) 118.001, (2) 118.020, (3) 118.005, (4) 118.023, (5) 118.026 and (6) 118.027 (See Table 3 for descriptions).

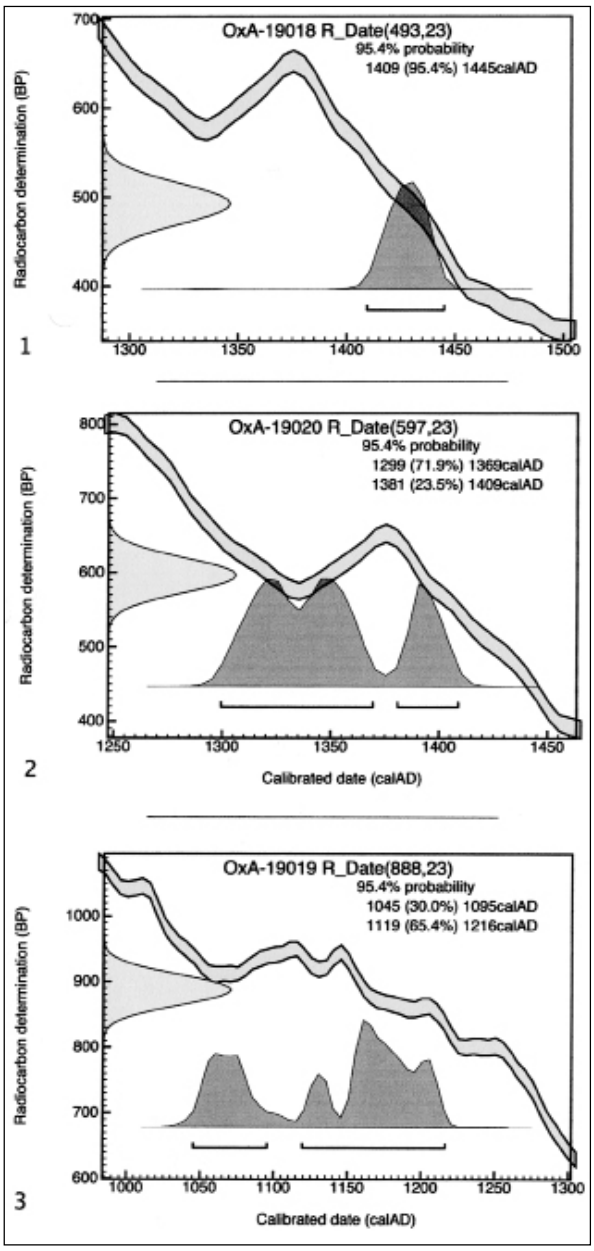
effaced and thus not identifiable. This is unfortunate since there are a group of lead coin-like objects known from the reign of Sultan al-Zahir Barquq (e.g., Balog 1964: type 550, pp. 253-54). The final four coins (BR41.33.001, BS44.86.001, BR43.107.001, L II-III.164.001) appear to date earlier than the Ayyubid or Mamluk periods and require further analysis.

Radiocarbon Assays

Three radiocarbon dates were acquired from charcoal samples excavated from the Middle Islamic layers in Field L (**Fig. 14**).[8] The latest date obtained is from BR43.044, a fill layer that appears to be 'sandwiched' between a Phase 2b surface and Phase 2a ash layers associated with installation BR43.040 (**Fig. 14.1**). This sample had a very tight calibrated date range of 1409 – 1445AD, with a 95.45% probability. A charcoal sample from the make-up of probable Phase 2b surface BS44.035 (BS45.049) gives a more divided, but clearly earlier, date range of 1299 – 1369AD at 71.9% probability and 1381 – 1409AD at 23.5% probability (**Fig. 14.2**). The third sample, taken from *ṭābūn* BR41.026 (Phase 2b) is both the earliest and most dispersed, with date ranges of 1045 – 1095AD at 30% probability and 1119 – 1216AD at 65.4% (**Fig. 14.3**). This dispersed date range is a by-product of the relatively 'flat' shape of the calibration curve for the eleventh and twelfth centuries AD. An early thirteenth century date would overlap with the latest positively identified coins (reign of al-Malik al-Kamil Muhammad 615 – 635AH / 1218 – 1237AD) from the adjacent hoard (BR41.028.118). However, the possible presence of badly worn fourteenth century AD coins in this same hoard, as well as the lack of any marked difference between the material culture from unit BR41 and units BR43 and BS44 / 45 leads us to credit the early radiocarbon date to the presence of old carbon in locus BR41.026.

Together, the numismatic evidence and radiocarbon assays strengthen our conjecture that the occupational deposits excavated thus far in Field L date to the fourteenth and early fifteenth centuries AD. Extrapolating from these results, we would postulate that the secondary room uses of Phase 2a date primarily to the fifteenth century, as would final abandonment of the Phase 2

8. Radicarbon assays were run by the Research Laboratory for Archaeology and the History of Art, Oxford University, using an AMS. Calibrations to calendar years were generated using Oxcal (v.4.05) based on the 'INTCAL04' datatset.

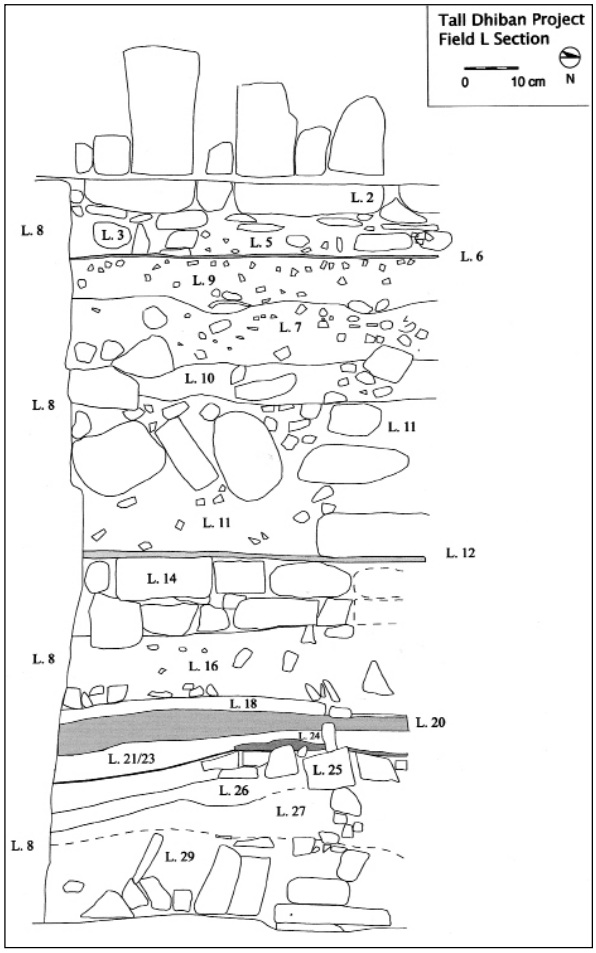


14. Results from three radiocarbon tests of organic materials (OxCal v.4.0.5 Bronk Ramsey (2007); r:5; IntCal04 atmospheric curve (Reimer et al. 2004)).

architecture. We plan to collect more data in future seasons to strengthen this observation. We also plan to gather data that will help establish a date for the construction of the acropolis buildings a date we suspect coincided with Mamluk initiatives to intensify production on the Dhībān Plateau.

Excavations of the Field LII-III Section

A portion of the eroded western section from William Morton's Field LII - III excavations (1955, 1956, 1965) was cleaned and *in situ* deposits excavated in a 1.25 x 1.25m sounding labeled "L-Section" (**Figs. 15 and 16**). This allowed us to excavate the entire stratigraphic sequence of Field L in a very small area without great difficulty, checking the accuracy of the earlier project and supplementing the few section drawings that have survived in the Morton excavation archive. Excavations began at the sub-floor levels of the large Mamluk residency excavated by Morton (1989: 244-245), and continued down for 2.70 meters before reaching sterile marl. A total of eighteen directly superimposed loci were excavated. Most of these were associated with a rather poorly built, but well preserved wall (Locus 8), that was founded on sterile marl. Despite very careful observation and excavation, no foundation trenches were identified on the excavated northern side of the wall. Indeed, the initial indications are that de-



15. Field LII - III west section.

16. Field LII - III west section (Photo: B. Routledge).

spite being constructed of stones embedded in chaff-tempered mud with no regular courses or rows, Wall Locus 8 was used from the ninth century BC through to the Byzantine era.

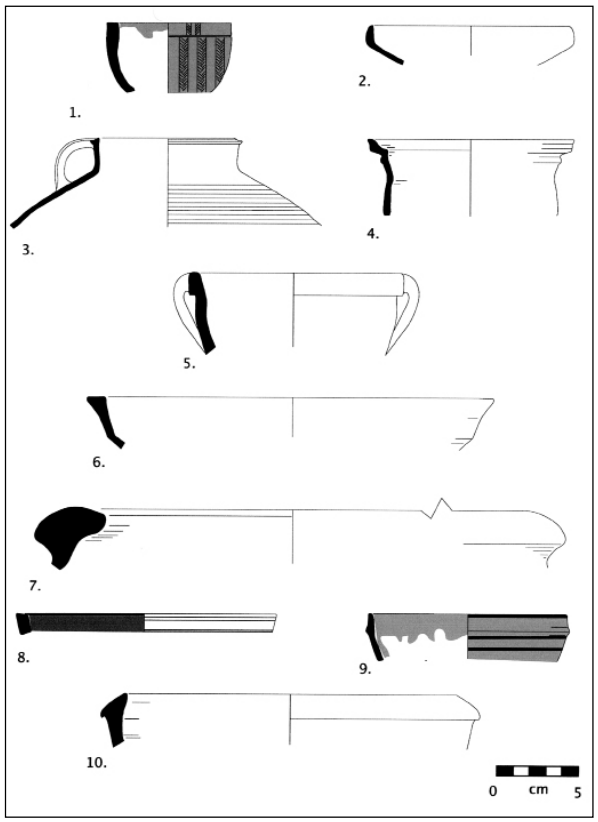
Beneath the flagstone floor (Locus 2) of the Mamluk residency is 0.15 meter of fill layers (Loci 3 and 5) and an earlier plaster floor (Locus 6) that appear to be associated with the lowest courses of the residency's walls. Diagnostic pottery sherds from these loci are very sparse but, on the basis of body sherds, it seems possible that the residency was originally built in the late Byzantine or Early Islamic period. Beneath Locus 6 there is an immediate transition to three consecutive Early Roman layers (Loci 7, 9 and 10) totaling *ca*. 0.50 - 0.55 meter in depth. All three loci are loose fill layers with a high density of pottery, including numerous restorable pieces. Beneath Locus 10, there is again a sharp transition to Iron Age deposits, which make up the remaining two meters of the Field L sequence.

This Iron Age sequence largely matches the five phases laid out for Field L by Routledge (2004: 161-173) on the basis of Morton's excavation archive, and hence appears to be associated with the life of the large public building uncovered by Morton. Locus 11 evidently represents post-occupational wall collapse that occurred within the Iron II period, as it consists of fill and large boulders and overlays a thick, well made plaster floor (Locus 12). This floor is interesting as it laid over a carefully prepared platform of flagstones two courses deep (Loci 13, 14 and 15). A thick fill layer (Locus 16) separates this prepared sub-floor from an earlier plaster floor (Locus 18), which in turn is separated by fill (Loci 20, 21 and 23) from an even earlier plaster floor (Locus 24), also laid over a prepared flagstone sub-floor. In other words, over a depth of *ca*. 0.85 meter we uncovered three successive plaster floors, two of which were laid on prepared flagstone sub-floors. Beneath the earliest flagstone sub-floor is a *ca*. 0.50 meter deposit (Loci 26, 27 and 29) of fill and rubble overlying sterile marl. These fill layers were apparently dumped against the foundations of Wall Locus 8 to support the wall in the absence of foundation trenches.

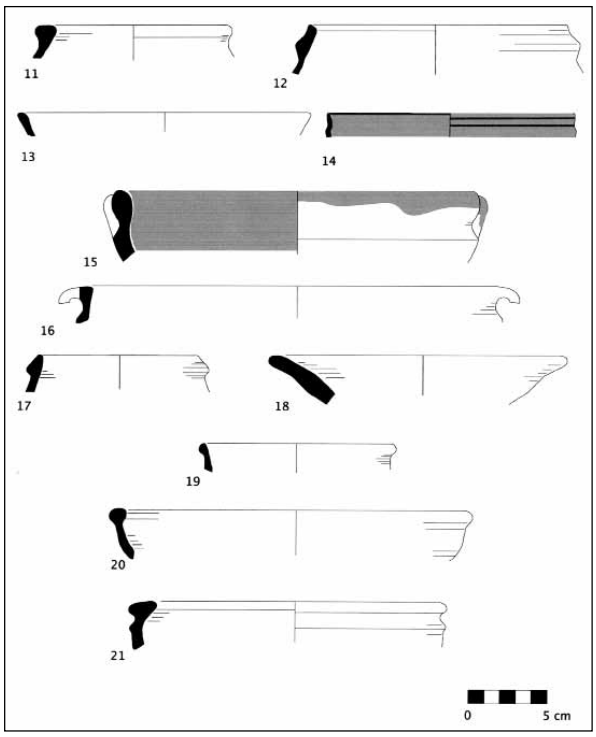
Objects

Ceramics and animal bones were the primary materials recovered from the excavation of the Field LII - III section. Selection of diagnostic sherds are presented in stratigraphic order in **Figs. 17.1 - 17.2**. While no Byzantine - Early Islamic rim sherds were discovered in Loci 3 - 6, an abundance of diagnostic Early Roman sherds were found in Loci 7, 9 and 10. Common forms include bowls with incurved rims (**Fig. 17.1.2**) and cooking pots with thin walls, high necks and triangular rims grooved on the exterior (**Fig. 17.1.3**). Less common forms include what might be a table amphora (**Fig. 17.1.4**) and an unusually shaped *sigillata* imitation with molded relief decoration (**Fig. 17.1.1**). These loci also included painted and unpainted body sherds of Nabataean "egg shell" ware and a molded lamp with radial rim decoration and mottled slip.

The excavated Iron Age loci all seem to date to the Iron IIB period, including the post-occupation deposit Locus 11 (**Fig. 17.1.5-6**). This suggests that Routledge's Iron IIC dating of the



17.1 Ceramic vessels from Field LII - III sounding (See Table 4 for descriptions).



17.2 Ceramic vessels from Field LII - III sounding (See Table 4 for descriptions).

post-occupational Phase 5 from Morton's Field L excavations should be re-examined (Routledge 2004: 164). Despite the presence of Early Bronze II - III and Iron Age I sherds in the loci excavated just above bedrock (Loci 27 and 29), the latest sherds from these loci are clearly Iron IIB in date (**Figs. 17.2.20-21**). This suggests that the earlier pottery was incorporated into fills dumped against Wall 8 to form 'built-up' foundations. Exactly when in the course of Iron IIB this building was constructed, renovated and abandoned is difficult to determine given the small size of our ceramic sample.

Among the outstanding features of the Iron IIB assemblage that we recovered in 2005 was the prominence and high quality of the fine ware sherds. Bowls with fine, well fired, clay bodies decorated with red slip and wheel burnishing are relatively common (**Fig. 17.1.9, 17.2.14-15**), as are bowls decorated with both slip and finely painted black and brown lines (**Fig. 17.1.8**).

Site Development Plan

Dr Magda Sibley and Bianca Goh of the University of Liverpool's School of Architecture collected data for use in the drafting of a site development plan for Dhībān. The site of Dhībān figures prominently both in discussions of Jordan's archaeological heritage and in standard guidebooks to the kingdom, largely owing to the discovery of the Mesha inscription at the site in 1868. Dhībān is also easily accessible by car and prominently located as the last major town on the north side of the Wādī al-Mūjib, hence it is both an important heritage resource for the people of Jordan and a potential destination for foreign visitors interested in this heritage. Furthermore, the neighboring sites of Mādabā, Umm ar-Raṣāṣ and al-Lāhūn, have all been the subject of site development projects, making this southern al-Balqā' a region with an expanding potential for tourism. However, Tall Dhībān itself presents very little in the way of visible archaeological remains that can be readily interpreted by visitors who are not intimately familiar with the archaeological investigations at the site. Hence, there is a pressing need to begin site development, interpretation and conservation planning, in tandem with renewed archaeological excavations at the site. This season, Dr Sibley spent ten days in Dhībān exploring and pho-

Table 4: List of ceramic vessels illustrated in **Figs. 17.1 and 17.2** detailing form, provenance, fabric and surface color, manufacture and treatment.

No.	Type	Unit	Locus	Pail	Number	Dm (cm)	Fabric Color			Surface Color		Production	Treatment		
							Exterior	Core	Interior	Exterior	Interior		Type	Color	Ex/In
1	?	L-Sect	9	28	67	6	10YR8/2 (very pale brown)	10YR5/1 (gray)	10YR8/2 (very pale brown)	10YR8/2 (very pale brown)	10YR8/2 (very pale brown)	mould	relief decor. slip	na. 2.5YR4/6 (red)	ex ex/in
2	bowl	L-Sect	7	36	41/56	12	5YR7/3 (pink)	5YR4/1 (dark gray)	5YR7/3 (pink)	(pinkish white)	5YR7/3 (pink)	wheel	none		
3	cooking pot	L-Sect	7	36	39,67,68 ,71,72,7 5,77,81	8	2.5YR4/4 (reddish brown)	2.5YR3/1 (dark reddish gray)	2.5YR4/4 (reddish brown)	2.5YR4/4 (reddish brown)	2.5YR4/4 (reddish brown)	wheel	none		
4	jar	L-Sect	7/10	36/42	44/76,78 ,79	12	2.5YR6/8 (light red)			2.5YR6/8 (light red)	2.5YR6/8 (light red)	wheel	none		
5	bowl	L-Sect	11	65	61	12	2.5Y8/1 (white)			2.5Y8/1 (white)	2.5Y8/1 (white)	wheel	none		
6	bowl	L-Sect	11	65	64	22	5YR5/4 (reddish brown)			5YR5/4 (reddish brown)	5YR5/4 (reddish brown)	wheel	none		
7	krater	L-Sect	16	99	17	37	10YR8/3 (very pale brown)			10YR8/3 (very pale brown)	10YR8/3 (very pale brown)	wheel	none		
8	bowl	L-Sect	20	139	4	16	7.5YR5/1 (gray)			5YR7/4 (pink)	5YR7/4 (pink)	wheel	slip paint	10R5/8 (red) 5Y2.5/1 (black)	ex/in ex/in
9	bowl	L-Sect	20	139	3, 8	12	7.5YR7/3 (pink)			unknown	5YR7/3 (pink)	wheel	slip wheel burnish	10R4/8 (red) n.a.	ex/in ex
10	bowl	L-Sect	21	149	158	20	10YR8/3 (very pale brown)			10YR8/3 (very pale brown)	10YR8/3 (very pale brown)	wheel	none		
11	jar	L-Sect	21	149	161	10	7.5YR7/3 (pink)			7.5YR7/3 (pink)	7.5YR7/3 (pink)	wheel	none		
12	cooking pot	L-Sect	21	149	162	16	2.5Y4/1 (dark gray)			10YR8/2 (very pale brown)	10R6/6 (light red)	wheel	none		
13	bowl	L-Sect	21	149	163	18	5Y4/1 (dark gray)			5YR7/4 (pink)	5YR7/4 (pink)	wheel	none		
14	bowl	L-Sect	21	149	164	16	7.5YR7/3 (pink)			unknown		wheel	slip wheel burnish	10R4/8 (red) n.a.	ex/in ex
15	bowl	L-Sect	23	165	53	22	2.5YR 6/4 (light reddish brown)	5YR5/1 (gray)	2.5YR 6/4 (light reddish brown)	2.5YR 6/4 (light reddish brown)	unknown	wheel	slip wheel burnish	10R4/8 (red) n.a.	ex/in in
16	krater	L-Sect	24	235	1	26	2.5Y8/2 (pale yellow)			2.5Y8/2 (pale yellow)	2.5Y8/2 (pale yellow)	wheel	none		
17	cooking pot	L-Sect	25	184	44	10	5Y2.5/1 (black)			5Y2.5/1 (black)	5YR4/2 (dark redlish brown)	wheel	none		
18	bowl	L-Sect	26	194	18	18	7.5YR7/3 (pink)			10YR8/2 (very pale brown)	10YR8/2 (very pale brown)	wheel	none		
19	bowl	L-Sect	26	194	53	12	2.5YR6/6 (light red)	5Y2.5/1 (black)	2.5YR6/6 (light red)	2.5YR6/6 (light red)	2.5YR6/6 (light red)	wheel	none		
20	bowl	L-Sect	27	206	34	22	2.5YR7/4 (light reddish brown)	10YR8/3 (very pale brown)	2.5YR7/4 (light reddish brown)	2.5YR7/4 (light reddish brown)	2.5YR8/3 (pink)	wheel	none		
21	bowl	L-Sect	29	226	3	18	7.5YR8/3 (pink)	7.5YR7/2 (pinksh gray)	7.5YR7/2 (pinksh gray)	7.5YR8/3 (pink)	7.5YR7/2 (pinksh gray)	wheel	none		

tographing the site, meeting with Department of Antiquities representatives in Mādabā and municipal government officials in Dhībān, as well as visiting other sites in the southern al-Balqā' (both 'developed' and 'undeveloped') in order to place Dhībān in its local contexts from the visitor's perspective. Particular attention was paid to road access, landscaping and pathways in relation to issues of site access and visibility, community impact and ongoing intentional (e.g. vandalism) and unintentional (e.g. animal grazing) damage to the site.

Conclusion

Much progress was made during the 2005 season. Indeed, Dhībān has revealed itself to be an exciting venue where the most pressing questions of Jordan's history can be investigated and hopefully answered. In upcoming seasons, our goals will not only include defining the settlement phase of the Mamluk-era community, but also exploring the Bronze and Iron Ages, as well as the Nabataean, Roman and Byzantine-era settlements.

Acknowledgements

The authors would like to thank the Hashemite Kingdom of Jordan and its Department of Antiquities for hosting the DEDP during its second season. In particular, they thank Dr Fawwaz al-Khraysheh, Ali al-Khayyat, Bassim al-Mahameed, and Zuhair al-Zou'bi for their assistance. The directors and staff of the Council for British Research in the Levant (CBRL) and the American Center of Oriental Research (ACOR) provided the team with much assistance. Excavations were supported by the sponsoring institutions of the University of Liverpool, the University of Pennsylvania and Stanford University, and a British Academy Grant (No. SG-40367). Radiocarbon assays were funded by Princeton University's Committee on Research in the Humanities and Social Sciences. Colleen Morgan (U California, Berkeley) prepared some images for publication. We would once again like to thank the entire Dhībān community, especially Firas al-Kawamleh, for their hospitality and assistance during our second season.

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Bibliography

Balog, P.
1964 *The Coinage of the Mamluk Sultans of Egypt and Syria*. New York: American Numismatic Society.
1980 *The Coinage of the Ayyubids*. London: Royal Numismatic Society.

Brill, R.H.
1987 Chemical Analysis of Some Early Indian Glasses. Pp. 1-26 in H.C. Bhardwaj (ed.), *Archaeometry of Glass: Proceedings of the Archaeometry Session of the XIV International Congress on Glass 1986 New Delhi, India*. Calcutta: Indian Ceramic Society.
1988 Scientific Investigations of the Jalame Glass and Related Finds. Pp. 257-295 in G. Weinberg (ed.), *Excavations at Jalame: Site of a Glass Factory in Late Roman Palestine,* Columbia: University of Missouri Press.

Bronk Ramsey, C.
2007 *The OxCal radiocarbon calibration software*. Vol. 4.05.

Brown, R.
1989 Excavations in the 14th Century A.D. Mamluk Palace at Kerak. *ADAJ* 33:287-304.
1991 Ceramics from the Kerak Plateau. Pp. 169-280 in J.M. Miller, (ed.), *Archaeological Survey of the Kerak Plateau*. Atlanta: Scholars Press.

Fisher, A. and McCray, W.P.
1999 Glass Production Activities as Practised at Sephoris, Israel (37 BC-AD 1516). *Journal of Archaeological Science* 26: 893-905.

Franken, H.J. and Kalsbeek, J.
1975 *Potters of a Medieval Village in the Jordan Valley: Excavations at Tell Deir 'Alla: A Medieval Tell, Tell Abu Gourdan, Jordan*. Amsterdam: North Holland Publishing.

Freestone, I. C., Gorin-Rosen, Y., Hughes, M.J.
2000 Primary Glass from Israel and the Production of Glass in Late Antiquity and the Early Islamic Period. Pp. 65-79 in M.-D. Nenna (ed.), *La Route du Verre. Ateliers Primaires et Secondaires du Second millénaire av. J.-C. au Moyen Age*. Travaux de la Maison de l'Orient Méditerranéen 33. Lyon: Maison de l'Orient Méditerranéen.

Henderson, J.
1995 An Investigation of Early Glass Production at Raqqa, Syria. *Materials Issues in Art and Archaeology IV*. Materials Research Society Symposium Proceedings 352: 433-443.
1997 Glass Production in Raqqa, Syria. *Annales du 13^{e} Congrès de l'Association Internationale pour l'Histoire du Verre*. Amsterdam: Pays-Bas 1995: 257-268.

Johns, J. *et al.*
1989 The Faris Project: Preliminary Report upon the 1986 and 1988 Seasons. *Levant* 21: 63-95.

McQuitty, A. and Falkner, R.
1993 The Faris Project: Preliminary Report on the 1989, 1990, and 1991 Seasons. *Levant* 25: 37-61.

Kennedy, D. and Bewley, R.
2004 *Ancient Jordan from the Air*. London: Council for British Research in the Levant.

al-Mahameed, B.
2003 Excavations at Tall Dhībān, 2002 Season (in Arabic). *ADAJ* 48: 71-76.

Milwright, M.
2008 *The Fortress of the Raven: Karak in the Middle Islamic Period (1100-1650)*. Leiden: Brill.

Morton, W.
1989 The 1954, 55, and 65 Excavations at Dhiban in Jordan. Pp. 239-246 in A. Dearman (ed.), *Studies in the Mesha Inscription and Moab*. Atlanta: Scholars Press.

Porter, B., Routledge, B., Steen, D., Parslow, C., DeJong, L. and Zimmerle, W.
2005 Tall Dhībān 2004 Pilot Season: Prospection, Preservation, and Planning. *ADAJ* 49: 201-216.

Porter, B., Routledge, B., Steen, D. and al-Kawamleh, F.
2007 The Power of Place: The Dhiban Community through the Ages. Pp. 315-322 in T. Levy, P. M. Daviau, R. Younker and M. Shaer, (eds.), *Crossing Jordan – North American Contributions to the Archaeology of Jordan*. London: Equinox.

Poulson, V.
1957 Les Poteries. Pp. 177-283 in P.J. Riis and V. Poulsen (eds.), *Hama Fouilles et Recherches 1931-1938 IV.2: Les Verrerries et Poteries Medievales*. Copenhagen: Carlsberg Foundation.

Pringle, D.
1986 *The Red Tower (al-Burj al-Ahmar): Settlement in the Plain of Sharon at the Time of the Crusaders and Mamluks, A.D. 1099-1516*. London: British School of Archaeology in Jerusalem.

Reimer, P. *et al.*
2004 INTCAL04 Terrestrial Radiocarbon Age Calibration, 0-26 cal kyr BP. *Radiocarbon* 46:3: 1029-1058.

Routledge, B.
2004 *Moab in the Iron Age: Hegemony, Polity, Archaeology*. Philadelphia: University of Pennsylvania Press.

Sauer, J.A.
1973 *Heshbon Pottery 1971: A Preliminary Report on*

the Pottery from the 1971 Excavations at Tell Heshban. Berrien Springs: Andrews University Press.

1994 The Pottery at Hesban and Its Relationships to the History of Jordan: An Interim Hesban Pottery Report, 1993. Pp. 225-282 in D. Merling and L. Geraty (eds.), *Hesban After 25 Years*. Berrien Springs: Andrews University.

Sayre, E.V. and Smith, R.W.

1961 Compositional Categories of Ancient Glass. *Science* 133: 1824-1826.

Shortland, A., Schachner, L., Freestone, I. and Tite, M.

2006 Natron as a Flux in the Early Vitreous Materials Industry: Sources, Beginnings and Reasons for Decline. *Journal of Archaeological Science* 33: 521-530.

Spaer, M.

1988 The Pre-Islamic Glass Bracelets of Palestine. *Journal of Glass Studies* 30: 51-61.

1992 The Islamic Bracelets of Palestine. *Journal of Glass Studies* 34: 44-62.

2001 *Ancient Glass in the Israel Museum: Beads and other Small Objects*. Jerusalem: The Israel Museum.

Steiner, M.L.

1995 Glass Bracelets From Tall Abu Sarbut. Pp. 537-539 in A. Hadidi (ed.) *SHAJ 5*. Amman: Department of Antiquities of Jordan.

Tushingham, A.D.

1972 *The Excavations at Dibon (Dhiban) in Moab: The Third Campaign, 1952-1953*. Cambridge: American Schools of Oriental Research.

Walmsley, A. and Smith, R.

1992 The Islamic Period: The Later Islamic Periods. Pp. 188-198 in A.W. McNicoll (ed.), *Pella In Jordan 2: The Second Interim Report of the Joint University of Sydney and College of Wooster Excavations at Pella 1982-1985*. Sydney: Mediterranean Archaeology.

Whitcomb, D.

1992 Reassessing the Archaeology of Jordan of the Abbasid Period. Pp. 385-390 in A. Hadidi (ed.), *SHAJ 3*. Amman: Department of Antiquities of Jordan.

Winnett, F. and Reed, W.

1964 *The Excavations at Dibon (Dhiban) in Moab: The First and Second Campaigns*. Baltimore: J.H. Furst.