

A SECOND AND THIRD SEASON OF RENEWED EXCAVATION BY THE UNIVERSITY OF SYDNEY AT TULAYLĀT AL-GHASSŪL (1995-1997) ¹

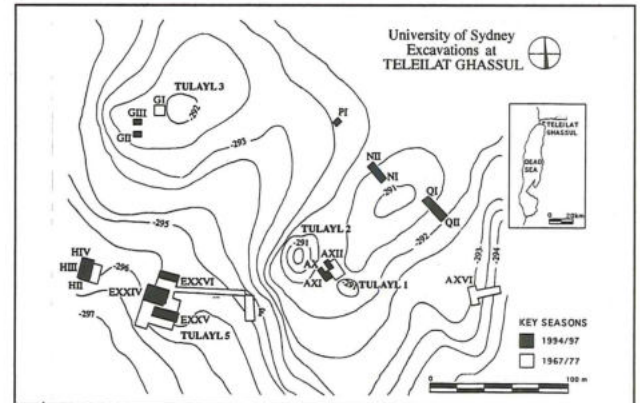
by

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General Introduction (SJB)

Sydney University renewed excavations at Tulaylāt al-Ghassūl in 1994 after a seventeen year hiatus, with the first five week season exploring four areas (A, E, G and H) with small probes (Bourke *et al.* 1995: 31-63). The second six week season of renewed excavations took place between 14 January and 3 March 1995. Six distinct areas were explored during this season, the four begun in 1994 and two (N and P) newly instituted in 1995. The third five week season took place between 4 January and 8 February 1997. Again, six excavation areas were explored, five (A, E, G, H, N) previously worked, and one (Q) newly instituted (Fig. 1).²

The main aim of the second season was to complete the small sondages begun in the first. A modest expansion in the second season saw new probes into the northeastern



1. Plan of Excavation Areas 1994-1997.

(P) and north central (N) regions commenced, and a number of specific issues concerning the duration and extent of occupation investigated. Work in the third season saw continued emphasis on the recovery of stratigraphic/environmental profiles, expanded to include new probes in the far eastern (Q) region. This was coupled with in-

1. The 1995/7 field seasons were directed by Dr. Stephen Bourke (ARC Research Fellow in Archaeology, University of Sydney). Major funding bodies were the Australian Research Council and the University of Sydney. We would like to thank Dr. Ghazi Bisheh, then Director-General of the Department of Antiquities, and Mr Saad Hadidi, Dept. of Antiquities Representative in 1995 and 1997, for their considerable interest and support. Equally appreciated was the interest and assistance provided by H. E. Mr. J. Shepherd, Australian Ambassador to Jordan in 1995, and H.E. Ms. Mertry Wicks, Ambassador in 1997, and Embassy staff. We thank Ms. Alison McQuitty, then Director of the BIAAH, and Institute staff for much logistical support and equipment hire.
2. Core staff members for the 1995 season were Stephen Bourke (Director), Saad Hadidi (DoA representative), Tim Adams (G II), Jaimie Lovell (A XI), Peta Seaton (A X and E XXV), Rachael Sparks (E XXIV and Finds Registrar), Bruce McLaren (H II), Kathryn Swan (P I), Ruth Ward (N I), Karen Hendrix (N II and Flotation Supervisor), Franz Reidel (Surveyor and Photographer),

Jo Atkinson (Conservator), Ian Edwards (Draftsman and Ceramic Technologist), Lachlan Mairs (Archaeozoologist), Chantelle Hoppé (Archaeobotanist), Foad Hourani (Soil Micromorphologist), Steven McPhillips (Flotation Assistant), Abū Issa (Foreman), Abū Sami (Chief Cook), and a local workforce of thirty. Core staff members for the 1997 season were Stephen Bourke (Director), Saad Hadidi (DoA representative), Tim Adams (G II), Ruth Ward (N I), Phil Habgood (A XI), Steven Hart (A XII), Peta Seaton (E XXV), Kathryn Swan (H IV), Samantha Gibbons (E XXVI), Kirstie Drummond (G III), Peter Woodley (H III), Penny Middleton (Q I), Phil Karsgaard (Q II), Karen Hendrix (Finds Registrar), Jaimie Lovell (Ceramics Registrar), Lisa Jackson (Photographer), Ian Edwards (Draftsman and Ceramic Technologist), George Findlater (Surveyor), Lachlan Mairs (Archaeozoologist), John Meadows (Flotation Supervisor and Archaeobotanist), Angus Browne (Draftsman and Flotation Assistant), Abū Issa (Foreman), Abū Sami (Chief Cook), Aladdin Madi (Cooks' Assistant) and a local workforce of thirty.

tensified investigation of the final phases of occupation at the site.

This report combines a stratigraphic/architectural summary with discrete reports on the ceramics, small finds, zoological, botanical and radiometric data.³

1. STRATIGRAPHIC SUMMARY (SJB)

AREA A

The two small probes opened immediately to the north (A X), and within the eastern half (A XI) of Hennessy's trench A I in 1994 were both taken down to sterile layers in 1995. Trench A X (2 x 1 m) was excavated through over 6 m of deposit before reaching sterile sands. Trench A XI (originally 2 x 1 m, but in 1995 doubled to 2 x 2 m) was taken through slightly more than 3 m of deposit before sterile sands were encountered. In 1997, trench A XI was expanded into a 5 x 5 m exposure to explore Middle Chalcolithic levels, and a new 5 x 5 m trench A XII opened on the top of Tulayl 2 to explore Latest Chalcolithic levels. Both removed approximately 1m of Middle and Late Chalcolithic deposits respectively by the end of the 1997 season.

Trench A X 1995

Six further building phases were added to the four discovered in 1994 (Bourke *et al.* 1995, 36-37). Excavations ceased in 1994 with Phase 4 levels (2.56-64) partially exposed. Here follows description of the six building phases excavated in 1995, making ten in all before sterile sands were reached (Fig. 2).

Summary

Phase 4 consists of Wall 2, Bench Wall 3,

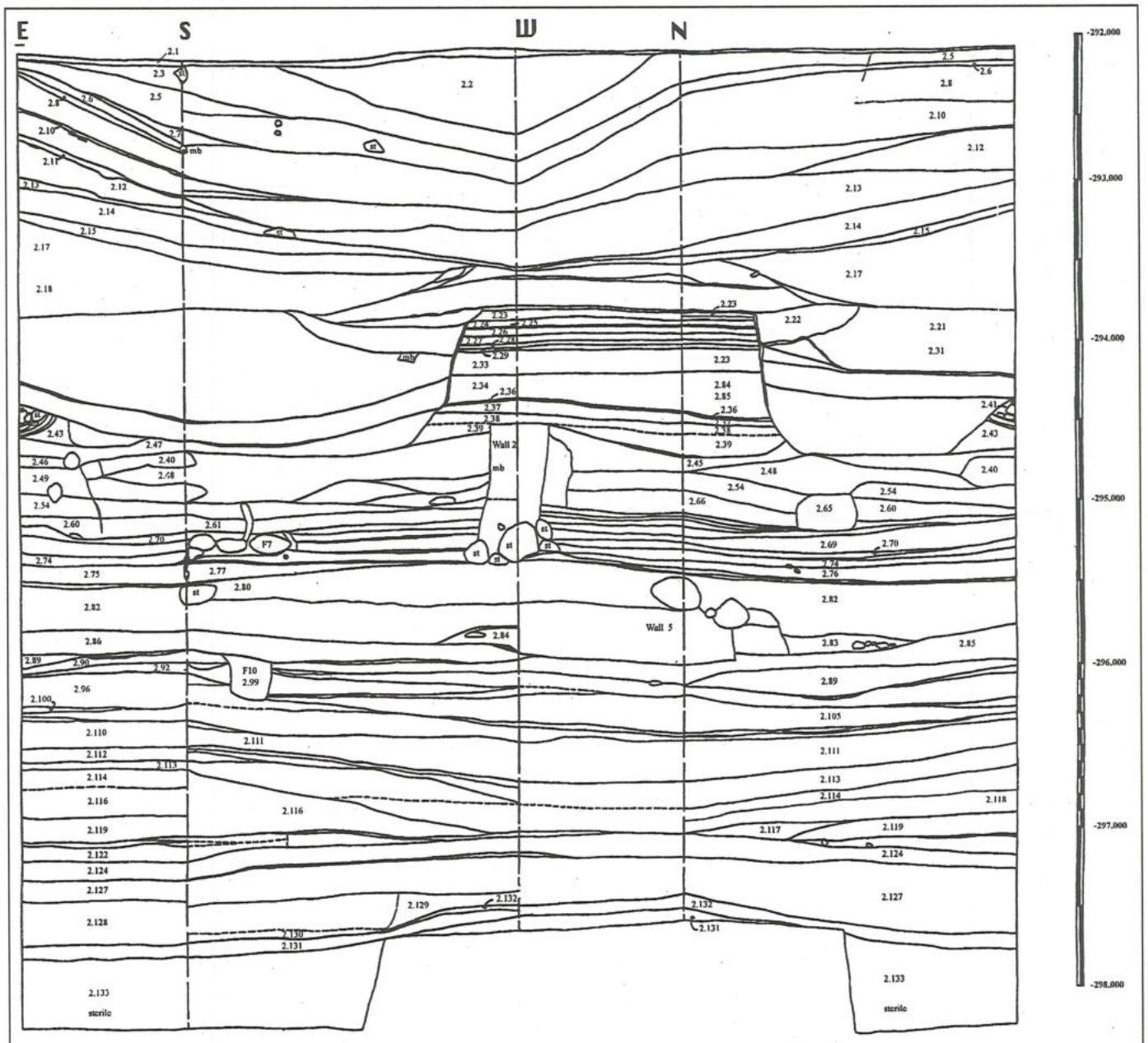
3. In this report, Bourke was responsible for trench descriptions and phasing, notes on the stamp seal and macehead, and the short report on carbon dates. Lovell contributed a report on ceramics, Sparks another on small finds, Seaton a third on the wall painting fragment, Mairs a fourth on archaeozoology and Meadows a fifth on pa-

associated constructional surfaces 2.75-78, and occupational layers 2.56-64. Phase 5 consists of Wall 5, associated construction surfaces 2.85-93, and occupation surfaces 2.80-84. Phase 6 consists of a greenish-buff plaster-lined channel and pit structure (Features 9 and 10), associated constructional surfaces 2.89/92, and occupational debris/fill layers 2.88/99. This 'channel and pit' structure is similar to one discovered by North at the base of his excavations in trench E 1 (North 1961:16), approximately 20 m southwest of A X (Blackham 1999:32). Phases 7 and 8 consist of mudbrick debris and occupation/debris layers 2.98-109 (Phase 7) and 2.110-112 (Phase 8), but no coherent architecture. Phases 9 and 10 may well prove to be three sequential elements in a single horizon, but remain separated at present. The earliest greenish-buff sandy levels (2.125-133) contain very little material, and probably represent debris from the first occupation of the area. This is likely to be represented by the semi-subterranean round-house architectural phases detected several m to the south in trench A XI. The first floor (2.124), occupational/debris layers (2.119/123), second floors (2.120/122) and final occupational/debris layers (2.113-118) make up a meter and a half of earliest occupation on the northern slope of Tulayl 2.

Trench A XI 1995 (Fig. 3)

Two building phases (Levels 1.1-4.2) had been completely excavated by the end of the first season, and a third partially exposed (Bourke *et al.* 1995: 37). Four further phases of material were excavated during the first half of the 1995 field season (Levels 5.1-10.23), making seven in all. The complete (94/95) Sondage sequence was then du-

laeobotany. Responsibility for line art was shared between Ian Edwards, Franz Reidel, Cameron Petrie, Lisa Mullins, Rachel Jackson and Angus Browne. Photographs were taken by Franz Reidel and Lisa Jackson, and prints developed by Russel Workman. Bourke edited the report.



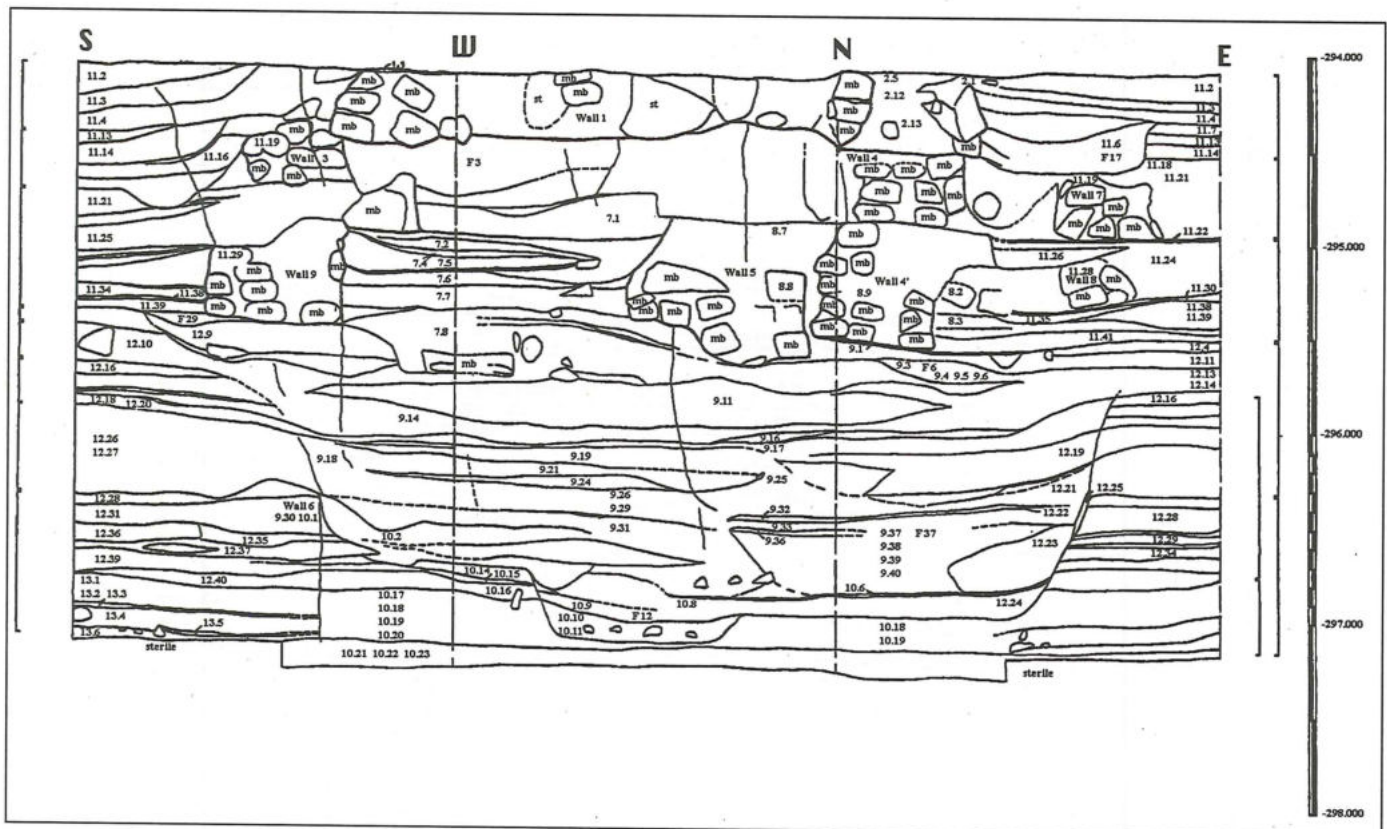
2. Trench A X. Sections 1994-95.

plicated when A XI was extended a meter to the east (Levels 11.1-13.7) later in the field season. Extension levels 11.1-20 (1995) are equivalent to Sondage levels 1.1-4.2 (1994). Sondage levels 5.1-10.23 (1995) are equivalent to Extension levels 11.21-13.8 (1995).

Summary

Phase 3 consists of Walls 3 and 4, Bench Wall 7, occupational debris layers 4.4-6, 5.1-2, 6.1, 8.1 and 11.7-21, built on foundational layers 7.1/11.22. Phase 4 consists of Wall 4 (Lower), and Wall 5, Bench Wall 8, built sometime (11.30-41) after the main

walls, occupational layers 7.2-7, 8.4-8, and 11.25-27, all built on foundation layers 9.1/11.41. Phase 5 consists of a series of pits, postholes and surfaces, but no coherent architecture, although the presence of bricky debris layers makes it clear that some form of mudbrick construction existed close-by. Pit features F. 6-7 (Sondage) and F. 28-34 (Extension), and occupational debris layers 9.3-10/12.4-11, all founded on a series of wash/debris levels 9.11-17/12.13-20. Phase 6 is the first of two distinct phases of semi-subterranean roundhouse architecture, cut into a series of sandy yellow-brown fill



cilitate rapid excavation. With the completion of the sondages in 1995, a more standard (5 x 5 m) excavational unit was laid out in the eastern half of Hennessy's original trench A I in 1997. The trench was aligned so that the original A XI sondage made up the northeastern quadrant of the larger trench. The expanded excavation area allowed a more rigorous exploration of problematic features within the sondage stratigraphy, whilst facilitating the sampling of a wider range of depositional contexts across the site.

Initial cleaning of irregular sloping debris layers in 1997 (Levels 50.1-4) revealed a series of 'stepped' deposits, sloping down to the east. The eastern two thirds of the trench had been left within foundational make-up layers below Hennessy Phase D structures, removed in 1975. The western third of the new trench was perhaps half a meter higher than the eastern deposits (approximating Hennessy C), and the north west corner contained a 1.5 m² 'column' of stratigraphy (approximating Hennessy B), that had remained unexcavated since 1975. This 'column' was excavated first (Levels 51.1-55.6), recovering a number of very well preserved botanical and zoological samples from at least four distinct surfaces and numerous associated occupational debris layers. The western 'step' deposits were then removed. They proved to consist of two distinct sequences, Levels 55.7-16/58.1-2 and 55.12-14 and 19/58.3-9/60.4-5, approximating to Hennessy Phase C and D deposits. Whilst the Phase C materials consisted of floor surfaces and associated occupational deposits only, the Phase D materials included a number of well constructed mudplaster-lined fire-pits (Features 50 and 55-56), and a series of white plaster-lined storage pits (Features 57 and 62-63), which should be related to the architecture removed in 1975.

With the trench levelled down to a bricky debris layer (Level 64.1) across the entire trench, excavations proceeded across all

three of the remaining unexcavated quadrants of the trench. Two complexes of architecture were exposed, one in the northwest and the other in the southeast of the trench. The northwestern complex consists of Walls 12 and 13, defining the southeast corner of an orange mudbrick room. Associated exterior surfaces (Levels 70.2-5) were exposed towards the end of season, with the interior remaining unexcavated. A later sub-phase in this northwestern area consisted of a large stone and plaster-lined pit (Feature 68), cut into interior mudbrick collapse layer (Level 72.1), and exterior windbreak postholes (Feature 67a-e) and associated firepit (Feature 64), cut through exterior mudbrick collapse layer (Level 70.4). Mudbrick collapse layers 70.4/72.1 seal the Wall 12/13 complex. The southeastern complex also consists of a room corner, with Walls 11 and 14 defining the northeast corner of a white mudbrick structure. A later sub-phase in the southeast consisted of exterior mudbrick collapse layer 64.2, grinding stones and associated windbreak postholes (Features 58 and 60-61), interior debris layer 73.1 and firepit Feature 69, all of which overlay the main Wall 11/14 architectural phase. This phase was in the process of being defined when excavations ceased in 1997.

The preservation of three phases (Hennessy B-D) of Late Chalcolithic material in the western third of the expanded trench A XI was unexpected, and delayed excavations in the main body of the trench. However, this preservation enabled the recovery of a series of well stratified botanical and zoological samples. This was particularly fortuitous as these Late Chalcolithic levels had been removed by modern disturbance in trench A X, where they had originally been sought. After the later three levels (A XI Main Phase 1-3) had been removed, a fourth phase consisting of fragments of two mudbrick rooms and associated exterior features were uncovered. Both structures had later less-substantial perhaps semi-permanent

constructions erected over their collapse layers. These later ephemeral structures were in turn sealed by a thick bricky debris layer, which had a series of fine windblown sand lens on top of it. This may suggest a short abandonment phase separating Main Phase 4 from Main Phase 3 deposits, equivalent to a break between Hennessy E and D. This corresponds to the earlier of two stratigraphic breaks evident in the A X (1994/95) sequence in the north. The 1994/95 A XI Sondage sequence begins with A XI Main Phase 4, as Main Phase 4 Wall 11 (1997) is equivalent to Sondage Phase 1 Wall 1 (1994).

A XI Locus 100 1997

As part of the excavation strategy in Area A, many of Hennessy's original trench baulks have been cleaned and cut back to facilitate checking and the exact placement of new trenches. One such exercise saw the now irregular north baulk of Hennessy's trench A III cut back and straightened. This resulted in the isolation of a 5 x 1 m 'bench' of unexcavated material at the base of the A III sequence. Approximately 1 m of these 'bench' deposits, largely equivalent to A XI Sondage Phase 6 (Hennessy H), was excavated as A XI Levels 100.1-16, to supplement early period zoological and botanical samples. Two large plaster-lined pits (Features 65-66) were isolated and sampled, along with a series of laminated floor surfaces and occupational debris layers. At the end of the season, several deposits approximating A XI Sondage Phase 7 layers (Levels 100.18-21) were excavated and sampled.

Trench A XII 1997

The well preserved botanical and zoological materials recovered from the A XI 'column' sample (A XI 51.1-55.6), coupled with the disturbed stratigraphy of the upper two meter in trench A X (Bourke *et al.* 1995, 35-36), prompted the decision to lay

out a second 5 x 5 m trench (A XII), 1 m north of Hennessy trench A III and 1 m west of Hennessy trench A VIII.

Excavations in trench A XII aimed to explore a broad area of the latest deposits in Area A, equivalent to the well preserved architecture and occupational debris discovered in Hennessy trench A VIII in 1967, a meter further to the east. Approximately a meter of deposits were excavated in 1997, but the recovery of coherent architectural units was frustrated by extensive modern pitting in the central and northwestern areas of the trench. Two phases of small mudbrick rooms and associated patches of mudplaster flooring were preserved in the east and southwest trench. The first architectural phase (A XII Phase A) was very heavily eroded and much cut about by modern pitting. The uppermost architecture consisted of two fragments of a N/S wall (Features 1 and 7), and an even more fragmentary E/W wall (Feature 2). Doorway (Feature 6) interrupted the N/S wall in mid-course, and plaster-lined jar stand (Feature 3), and plaster-lined postholes (Features 10-11) suggest the southern edge of the northwest room (locus 4) contained a roofed storage area. Levels within the northwest room consisted of debris layers 4.4/6-7, sealing occupational debris 4.2-4 and surface 4.5. Eastern (locus 6) levels consisted of two distinct phases, an upper surface 6.3/9 and associated debris layers 6.1-2, and a lower floor 6.11/13, and associated debris 6.4-8/10.

The second architectural phase (A XII Phase B) was better preserved, although still much disturbed by modern pitting. It consisted of fragments of five walls (Walls 1-5) probably defining fragments of four small approximately square rooms. In the southern half of the northwest room, a line of three small plaster-lined square postholes (Features 14-15 and 18), a round plaster-lined jar stand (Feature 16) and a stone-paved food preparation area (Feature 17), probably defined a roofed storage and/or food prepara-

tion area in the southern margins of this room. Levels associated with the southeast (9.1-5/8.1-6), northeast (7.1-6), and northwest (4.8-11) rooms are fairly clear, with good floors 4.8/7.4/8.4/9.4 separating upper debris layers (7.1-3/8.1-3/9.1-2) from lower debris layers 4.10-11/7.5-6/8.5-6/9.5. Lower floors and primary foundation layers had not been reached when excavations ceased.

Area A: Summary of Excavations (Fig. 4)

Together the three-trench (A X-XII) sequence provide a complete stratigraphic profile through the entire six m of occupational debris that is Tulayl 2. A reliable stratigraphic equivalence between our three-trench phasing (A XII Phase A-B = Hennessy A-A+; A X Phase 1-10 = Hennessy Phase C-I; A XI Main Phase 1-4 = Hennessy B-E; A XI Sondage Phase 1-7 = Hennessy E-I; A XI Bench Locus 100 = Hennessy H-I) and Hennessy's ten-phase sequence has now been established, and extensive zoological, botanical and radiometric samples taken from horizons that can be directly related to Hennessy's master sequence. All other excavation fields currently being explored can be related through the current Area A master sequence to Hennessy's original formulation, making a site-wide master sequence possible for the first time (Bourke 1997: 405-407).

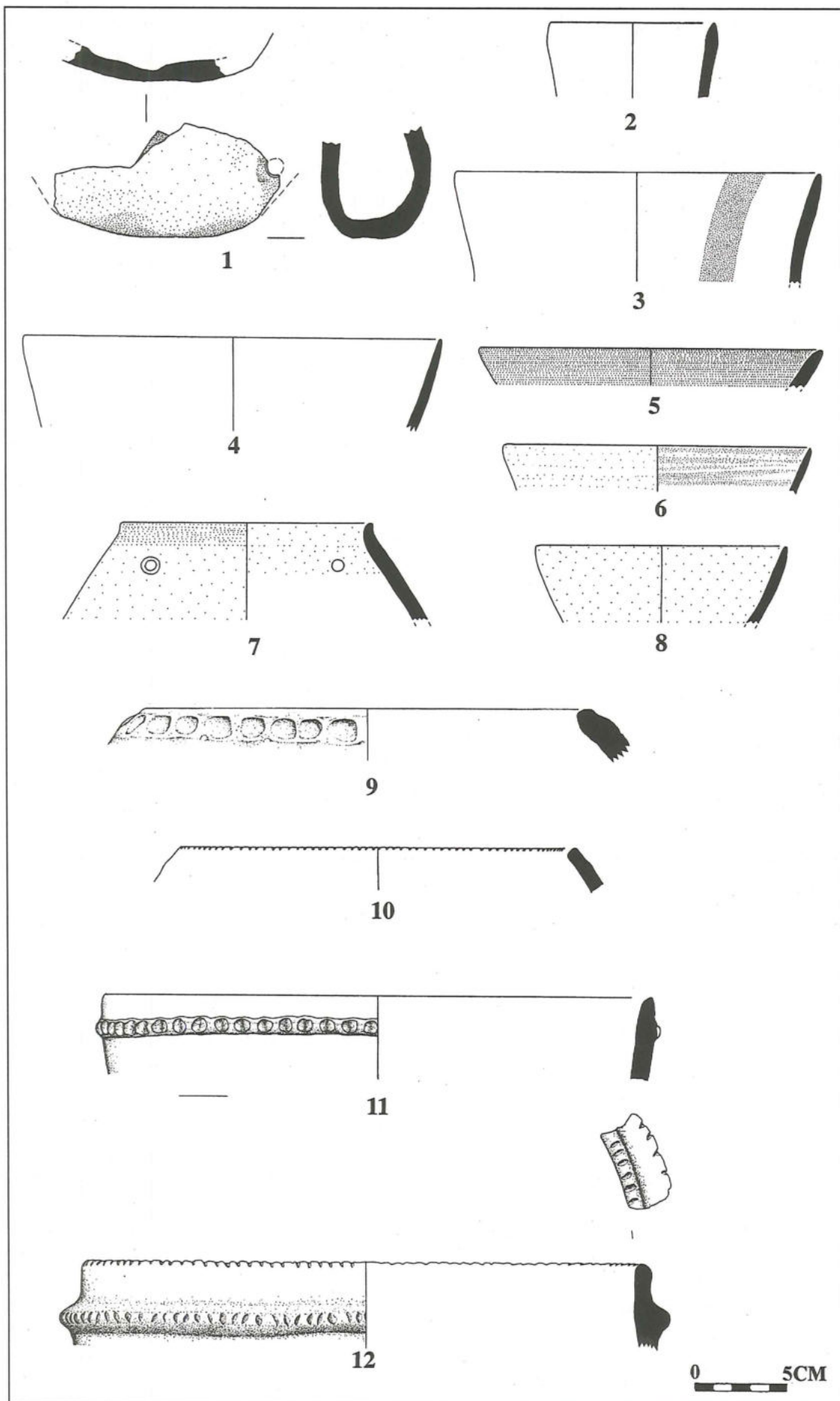
AREA E

The 2 x 4 m trench E XXIV, opened west of Hennessy trench E XXIII in 1994 (Bourke *et al.* 1995: 44-45), was expanded in stages by 18 m to the west and 11 m to the north in 1995, totalling 20 x 15 m in extent by the end of the 1995 season. Excavations concentrated on the very latest strata both within and north of the Temenos wall, rarely penetrating more than 25 cm below topsoil layers. E XXIV was not worked in 1997. A new 10 x 7 m trench E XXV was opened in the courtyard area between Sanctuaries A and B in 1995. In 1997, the trench

was expanded 5 m to the west, making a 10 x 12 m exposure overall. In both seasons of excavation in E XXV, work concentrated on the latest half meter of deposits within the courtyard. In 1997, another new 10 x 5 m trench E XXVI was opened immediately north of Hennessy's North Field trenches (E XX-XXII). Here also, excavations concentrated on the latest strata, rarely penetrating below the uppermost half meter of deposits.

E XXIV Locus 1 Sondage 1995 (Fig.5)

In 1994, the initial 2 x 4 m probe into the stratigraphy between Sanctuary B and the North Temenos wall isolated four phases of occupation either later than (Phase 1) or associated with (Phases 2 to 4) the Sanctuary constructions (Bourke *et al.* 1995: 44-45). Further, exploration in the base of Hennessy's trench E XXIII immediately east of E XXIV in 1994 detected another two phases of occupation below the limit of 1994 excavations in E XXIV (Bourke *et al.* 1995, 45). In 1995 this sequence was confirmed, with excavations in E XXIV Locus 1 continuing through to sterile. First excavations in 1995 involved the removal of deposits against the south face of the temenos wall (1.37-41). These represent the destroyed mudbrick superstructure (Feature 5) of the rebuilt Stone Temenos Wall 1 (1.37-38), and occupational debris below (1.39-41), on top a good floor (1.43) linking Walls 1 and 3. Then, earlier phased material against the north face of Sanctuary B, representing the collapse of early North Wall 4 (Feature 6 - 1.44), and destruction debris (1.45/1.51) below it were removed. Further excavation confirmed that earliest occupational strata associated with Sanctuary B were earlier than the Stone Temenos phase (Wall 2), and associated with a dark brown Mudbrick Temenos wall (Wall 7), running parallel to and immediately north of Stone Temenos Wall 2. Wall 4 destruction layers 1.46/48/52 lie on occupational debris layers 1.47/49/53,



4. Area A. Pottery.
 1. CN 349: A XI 4.3; 2. CN 362: A XI 11.7; 3. CN 633: A XI 12.19; 4. CN 411: A X 2.128; 5. CN 648: A XI 55.3; 6. CN 565: A XI 51.1; 7. CN 686: A XII 6.9; 8. CN 716: A XII 4.9; 9. CN 297: A XI 11.41; 10. CN 388: A X 2.114; 11. CN 317: A XI 7.4; 12. CN 396: A X 2.107.



5. Trench E XXIV 1995. Sondage Locus 1 and Locus 3 to left.

which in turn lie on thick black primary surface 1.54/55. This floor, and construction of Sanctuary Wall 4 and Mudbrick Temenos Wall 7 were bedded on a thick brown clayey makeup layer 1.56. Below all these layers associated with the Sanctuary complex, a series of banded ash and silt levels (1.57-61) define pre-Sanctuary deposits, Hennessy's 'corky layers'. These alternating layers of ash, silt, sand and clay are virtually sterile. They slope down to the south, and are split by several subsidence cracks, due to compression caused by the weight of later sanctuary constructions.

The revised E XXIV Locus 1 master sequence consists of five phases:

1. A post-Sanctuary phase of fire-pits and ephemeral surfaces 1.3-9 (1994).
2. A final constructional phase consisting of a poorly executed rebuild of the Stone Temenos North, as Wall 1, and surfaces associated with the last phase of Sanctuary B rebuild Wall 3, 1.10 and 1.19-21 (1994).
3. Primary construction of Sanctuary B North rebuild Wall 3, and Stone Temenos North Wall 2, and associated deposits, 1.16-17 and 1.25-28 (1994), and 1.37-43 (1995).
4. Primary construction of Sanctuary B initial North Wall 4, Mudbrick Temenos Wall 7, and associated deposits 1.29-36 (1994) and 1.44-56 (1995).

5. A pre-Sanctuary phase of banded near sterile 'corky layers', small pits and ephemeral surfaces 1.57-61 (1995).

E XXIV Area Excavations (1995)

In the greatly expanded area of excavations in E XXIV in 1995, work within the Temenos between Sanctuary B and the West Temenos Wall (Locus 3-4, 7 and 9) may be separated from excavations to the north of the Temenos (Locus 2, 5-6, 8 and 10). In the area outside the temenos, after the removal of topsoil deposits two fire-pits (Features 8 and 13) were isolated in the eastern area. Two mudbrick walls (Walls 5 and 6), forming the southwest corner of a small mudbrick room, were isolated below topsoil deposits. Immediately below topsoil (6.1-2), two phases of interior white plaster surfaces (6.4 and 6.8), and a number of occupational debris layers (6.3 and 6.6-7), were associated with the two walls. All were built upon a thick grey foundational layer (6.9). A small plaster-lined pit (Feature 19) was associated with the earlier floor. To the south between the temenos and the room corner, below topsoil layers (2.3/4), Temenos Wall 2 collapse (Feature 9 - 2.1) is associated with a small pit (Feature 15) and debris/surface layers (2.8-11). Below topsoil to the west (5.1), deposits consist of fill/debris layers 5.2-3 and 5.5, and surface 5.4/5.6, built upon makeup layer 5.8. A very large pit (Feature 16 - 5.7) was exposed beneath fill layer 5.2. It contains structural debris from an extensive destruction. Further to the west, below topsoil (8.1), the removal of fill layer 8.2 exposed another very large pit (Feature 17). The pit was half-sectioned (8.3-8.18), and proved to be between 2.4 and 2.9 m wide, and over 1.8 m deep. It also contained extensive structural debris from a major destruction. Fragments of surfaces and associated debris layers (8.6, 8.9-10) were traced below fill layer 8.2. In the far western area of the exposure, topsoil layers (10.1) were removed to expose fill/debris layers (10.2) before work ceased.

Within the temenos, deposits immediately west of the Locus 1 sounding are made up of Locus 3-4 and below these Locus 7 deposits. Below topsoil cleaning levels 3.1-2, destruction debris (3.3/3.6), occupational debris (3.4), a patch of a very late white plaster floor (3.5) associated with a very late phase of Sanctuary B (a rebuild above Wall 3 ?), are all based on makeup/debris layers (3.7-8), which in turn shelve north over a series of extensive collapsed white mudbrick deposits. These relate to the collapse of North Temenos Wall 2 and Sanctuary B rebuild Wall 3 (3.9-10). Further west, below topsoil (4.1), a first deposit of white mudbrick collapse off Temenos rebuild Wall 1 (4.2-5) mingled with that from Sanctuary B West Wall rebuild (Wall 8), which both lay on a brown occupational layer (4.7), on top of earlier brown bricky debris layers (4.8-9). Beneath these mudbrick collapse layers (3.10/4.9), a series of fill and occupational debris layers (7.1-5) were associated with Sanctuary B North Wall 4 and West Wall 9, and the Mudbrick Temenos Wall 7. The final area explored within the temenos lay in the northwest corner. Here, below topsoil (9.1-2), quite extensive bricky debris layers (9.3-9.7) lay upon patches of occupational fill layers (9.8-9). Clearance of these debris layers immediately inside the temenos wall line revealed traces of a badly decayed mudbrick and stone gatehouse. This shallow gatehouse consists of fragments of the east pillar (Feature 20), and traces of a less well preserved west pillar (9.10), much disturbed by inward collapse of the Stone Temenos walls at this point. The gatehouse area was paved with small flat cobbles (Feature 21). Traces of a collapsed inner lintel were found across the gateway, which was much disturbed by modern pitting. This gateway collapse probably relates to the final destruction of the Sanctuary area.

Summary

Deposits from expanded excavations in E

XXIV relate to the Locus 1 master stratigraphy in the following way:

Phase 1: Topsoil deposits 2.3-4/3.1-2/4.1/5.1/6.1-2/8.1/9.1-2/10.1; firepits F. 8 and 13.

Phase 2: Walls 5 and 6, pits F.16 and 19, associated exterior deposits 2.6-11/5.2-6/6.3-8/8.2. Inside the temenos, debris and occupation 3.3-7/4.2-7/9.3-10 relate to the final occupation within the Sanctuary.

Phase 3: Extramural deposits 5.8/6.9/8.6 and 8; large structural debris pits F. 17-18, along with intramural debris layers 3.8-10/4.8-9. All relate to the major destruction of the Phase 3 Sanctuary. Earlier fill/debris layers 7.1-5 relate to Phase 3 Sanctuary occupation.

E XXV 1995

A new 10x4 m trench (E XXV) was opened to the south of Sanctuary B, to investigate the possibility that a cultic installation might exist in a central raised position noted in the 1994 survey. Exploration confirmed the existence of two phases of a semi-circular walled structure, paved within the semi-circle. In the centre of the semi-circle a raised altar stone was positioned, and a stone-paved pathway ran from the stone to the entrance of Hennessy's Sanctuary A. The pathway and a series of thick greenish-buff plaster floors associate the early phase of the Courtyard installation with Sanctuaries A and B, and the later phase of the Courtyard installation with the rebuilt Sanctuary B. Finds include a complete cornet cup, a near complete kernos, figurine arm fragments, at least eight shattered fenestrated stands, as well as a series of small pestles. All major occupation dates to the Late Chalcolithic period.

Early Phase Courtyard (Fig. 6)

The Courtyard Installation features Semi-Circular Wall 1, made up of two rows of



6. Trench E XXV 1995. Courtyard Installation and Paved Avenue.

large river stones. At the north end of the arc two large roughly dressed stones were positioned to present a flattish face, and are thickly plastered. A rough paving of more irregular flat stones filled much of the semi-circular interior (Feature 21). A triple row of flat paving stones (Feature 5) was laid from the centre of the semicircle towards the entrance of Sanctuary A. These flat but unworked fieldstones formed a paved avenue around 75 cm wide. In the centre of the semicircle, roughly aligned with the paved avenue, is a single large roughly circular field stone, approximately 70cm in diameter (Feature 4). It is made of unworked sandstone, slightly weathered and naturally smoothed. The stone seals a shallow roughly circular stone-lined pit (7.20). On the top southern edge of the stone are two pronounced and one shallow parallel grinding depressions. A fine greyish mud plastery surface (2.14-16/4.23/7.9) ran up to inner and outer faces of Wall 1, and traces of a thick greenish buff mud plaster facing sealed the lower course of the inner face of the wall.

This phase is contemporary with the original South Wall of Sanctuary B (Wall 4), as surfaces (4.21-23/9.4) link the two structures. Above these, a series of later surfaces (4.16-17/9.3) continue the association. This phase was sealed by a significant destruction horizon involving burning and ash deposits,

probably connected with the main destruction inside Sanctuary B (Hennessy 1978). A layer of dark brown fine ashy debris (2.12-13/4.13/7.8) spread west over much of the courtyard, covering the paved avenue, before thinning to the east of Sanctuary B and within the inner arch of Wall 1. This brought the first phase in the courtyard to an end.

Late Phase Courtyard

After the debris horizon Wall 1 was rebuilt. The original two stone width of the wall was increased by an additional stone course laid against its outer face (Wall 2), perhaps to raise the height or to strengthen the wall. This repair was less solidly built than the original. Contemporary with this, a further modification to the southern exterior of Wall 1 took place. Three concentric rows of river pebble paving were laid around the base of the southern exterior edge of Wall 2 (Feature 2), set into a thick greenish buff surface. The first of two phases of green buff plaster floors (2.9/4.15/7.2-5/8.6/9.2) were laid in association with the rebuild. Occupational buildup (2.8/4.9/4.12-14) over time, saw the laying of a second greenish buff floor (4.8/5.3/6.3/9.1). The second reconstruction phase was sealed by thin layers of small pebbles (2.6-7/4.1-4) mixed with decomposed mud brick debris (2.2/3.2/4.5/5.1/8.1/6.2), and large amounts of animal bone. This deposit shelved away 4 m to the west, and lay immediately below topsoil levels (1.1/2.1/3.1/6.1). Present evidence suggests that the upper reconstruction phase in the courtyard was abandoned, rather than suffering any specific destruction.

This reconstruction phase is contemporary with the major rebuild of Sanctuary B, with original south wall (Wall 4) rebuilt as the less substantial Wall 3. It is likely that this rebuild is associated with the construction of stone paving (Feature 20) against the southern face of Sanctuary B, although clear stratigraphic linkage has been

lost to erosion. This paving outside Sanctuary B consists of a single layer of well laid small paving stones. The leading southern edge of the paving had in addition a foundational row of stones acting as a footing. This outer edge was thickly plastered.

E XXV 1997 (Fig. 7)

In 1997 E XXV was extended 3 m to the west (Locus 20) and 1m to the north (Locus 23) to establish clear stratigraphic relationships between the Courtyard Installation and both Sanctuary buildings. As well, exploratory strip trenches to the east (Locus 21) and south (Locus 22) sought evidence for the south and east Temenos walls, without success. Finally, a deep sounding against the east wall of Sanctuary A (Locus 20.6-15), sampled 1.4 m of pre-Installation deposits in the Courtyard.

In the West Courtyard (Locus 20), the pathway (F.5) uncovered in 1995 was found to lead directly up to the steps of Sanctuary A, confirming the relationship. A series of thin grey organic (20.2) and thicker yellowish bricky debris layers (20.3) sealed both the Paved Avenue and a thick greenish buff plaster floor (20.6) flanking it, which was traced for approximately 2 m east of Sanc-

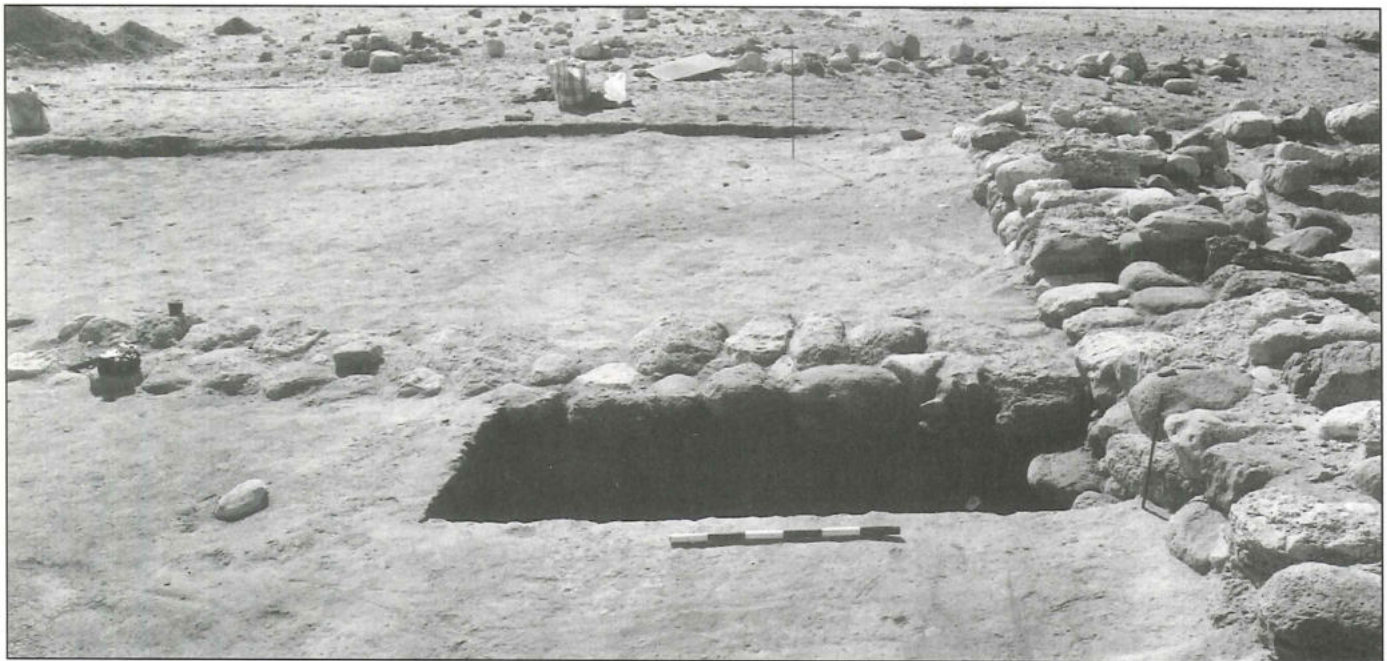
tuary A before eroding away. The plaster surface established a reliable link between the Paved Avenue and Sanctuary A. Further exploration of this relationship came through a small (2 x 1 m) sounding, positioned in the angle between the Paved Avenue and the East Wall of Sanctuary A. Sub-plaster floor packing (20.7), occupational debris (20.8) and an earlier thick greenish plaster floor (20.9). Removing a layer of mudbrick debris (or packing) and grey occupation (20.10), exposed an ash pit (Feature 19 - 20.13). This lays above a series of decayed bricky debris layers (20.11-12), which seal grey occupation (20.14), and a probable bricky floor deposit (20.15). Excavations ceased at this point.

Summary

Deposits excavated in trench E XXV are to be related to the E XXIV master sequence in the following way:

Phase 1 (Post-Sanctuary): Levels 21.1 and firepit F.12 (1997). Levels 22.1-5 (1997).

Phase 2 (Late Installation): Levels 2.1-9, 3.1-2, 4.1-15, 5.1-3, 6.1-3, 7.1-5, 8.1-6, 9.1-2, and Wall 2 (Courtyard), Features 2 (Exterior In-



7. Trench E XXV 1997. Paved Avenue continuation and Sondage.

stallation Paving) and 4 (Altar) (1995). Levels 21.2-7 and F.14 (1997). Level 23.1, Wall 3 (Sanctuary B) and F.20 (Sanctuary B Pavement).

Phase 3 (Early Installation): Levels 2.10-16, 4.16-23, 7.6-9 and 20, 9.3-5, Wall 1 (Courtyard), Wall 4 (Sanctuary B), and Features 4 (Altar), 5 (Paved Avenue) and 21 (Installation Paving) (1995). Levels 20.1-3 (1997). Levels 23.2-7 (1997).

Phase 4 (Pre Installation): Sondage Levels 20.7-15 (1997).

Phase 5 (Pre-Sanctuary): Sondage Levels 21.8-10 (1997).

E XXVI 1997

A new 10 x 5 m trench (E XXVI) was opened 20 m to the north of the Sanctuary B, to investigate the concentration of storage jar sherds and stone lined pits clearly visible on the surface in this area. Hennessy had already excavated three trenches (E XX-XXII) in the vicinity in 1977, exposing fragments of two rooms containing storage vessels (Hennessy 1977: 15). Our excavations exposed a series of storage facilities in the western half of the trench, and an earlier domestic complex in the eastern half. A third (probably domestic) building phase had just been detected when excavations ceased.

West Trench

Immediately below topsoil layers (4.1-6), fragments of two mudbrick walls (Walls 1 and 2) were uncovered in the southwestern corner of the trench. These enclosed a large and very solidly constructed stone silo (Feature 2) (Fig. 8). This silo was thickly plaster-lined, making it likely that it served a grain storage purpose (4.7-9). Beside the silo, mud-plaster lined emplacements for two large ceramic storage vessels were uncovered, as were considerable fragments of the vessel bases (4.10). However, erosion and modern disturbance had much disturbed



8. Trench E XXVI 1997. Silo Feature 2.

the area. The storage complex in the southwest of the trench (Walls 1 and 2, silo F.2 and ceramic jars) were associated with a series of good occupational debris layers 4.15/5.33, resting on a black surface 6.1. Traces of an earlier phase of storage and perhaps food preparation pits lay below the 'stone-silo' phase. Two large storage pits (Features 11-12), and a small plaster-lined pit (Feature 6), along with a series of occupational debris layers (6.9, 6.12-13), sat upon a thick black ashy surface (6.15), which seals the mud-bricky debris from a substantial earlier mud-brick structure (Walls 3-4).

East Trench

Below deep sandy topsoil layers (Levels 5.3-14), five irregular fire pits (Features 4, 7, 9, 10 and 16), two small round plaster-lined pits (Features 5 and 8), a large stone-lined storage pit (Feature 15) and two small post-holes (Features 17-18) were detected in loose association with a fragmentary greenish-white plaster floor (Feature 19). This area of the trench was very heavily disturbed by modern erosion and root damage, complicating associations. The fire pits are very similar to the 'post-Sanctuary' fire pits in E XXIV, and likely to be related. The large stone-lined silo (F.15) in the southeast of the trench contained a particularly fine basalt bowl. A series of shallow occupational debris layers (Levels 5.23, 5.27-29 and 5.31-32) lay on top of the thick greenish buff

plaster floor (F.19), and are likely to be associated with pits (F.5 and 8), silo (F.15) and postholes (F.17-18). This complex is possibly the fragmented remains of a roofed outdoor work and storage area. All deposits associated with this complex rest upon the bricky debris from an earlier mudbrick structure (Walls 3 and 4).

Summary

The EXXVI deposits are not connected stratigraphically with the E XXIV master sequence. Hennessy's records suggest that all North Field constructions are to be related to Phase 2-3 horizons in the Sanctuary sequence. Our comparative ceramic analysis is broadly in agreement and suggests the following tentative relationship:

Phase 1 (Post-Sanctuary): Fire pit Features 4, 7, 9, 10 and 16 and Levels 1.1-4.6 and 5.1-18.

Phase 2 (Late Storage): West Trench Walls 1 and 2, Stone Silo F.2, Ceramic Jars (Plobs 1-2), Levels 4.7-18 and 5.19-22, 24-26, 30 and 33 and 6.1-8.

Phase 3 (Early Storage): West Trench pits F.6, 11 and 12 and Levels 6.9-15. East Trench pits F.5 and 8, stone-lined pit F.15, postholes F.17-18, greenish-white plaster floor F.19 and Levels 5. 23, 27-29 and 31-32.

Phase 4 (Pre-Storage): Walls 3 and 4.

Area E: Summary of Excavations (Fig. 9)

Excavations in Area E sampled a broad area of latest archaeological deposits across virtually all areas of Tulayl 5 still available. Excavations within the temenos have recovered a five-phase sequence of occupation which seems to hold good for all intramural deposits. Several distinct building phases for Sanctuary B have been isolated, and related to a series of temenos constructions (E XXIV). Within the courtyard, two distinct phases of a hitherto unsuspected Semi-Circular Installation were uncovered, along

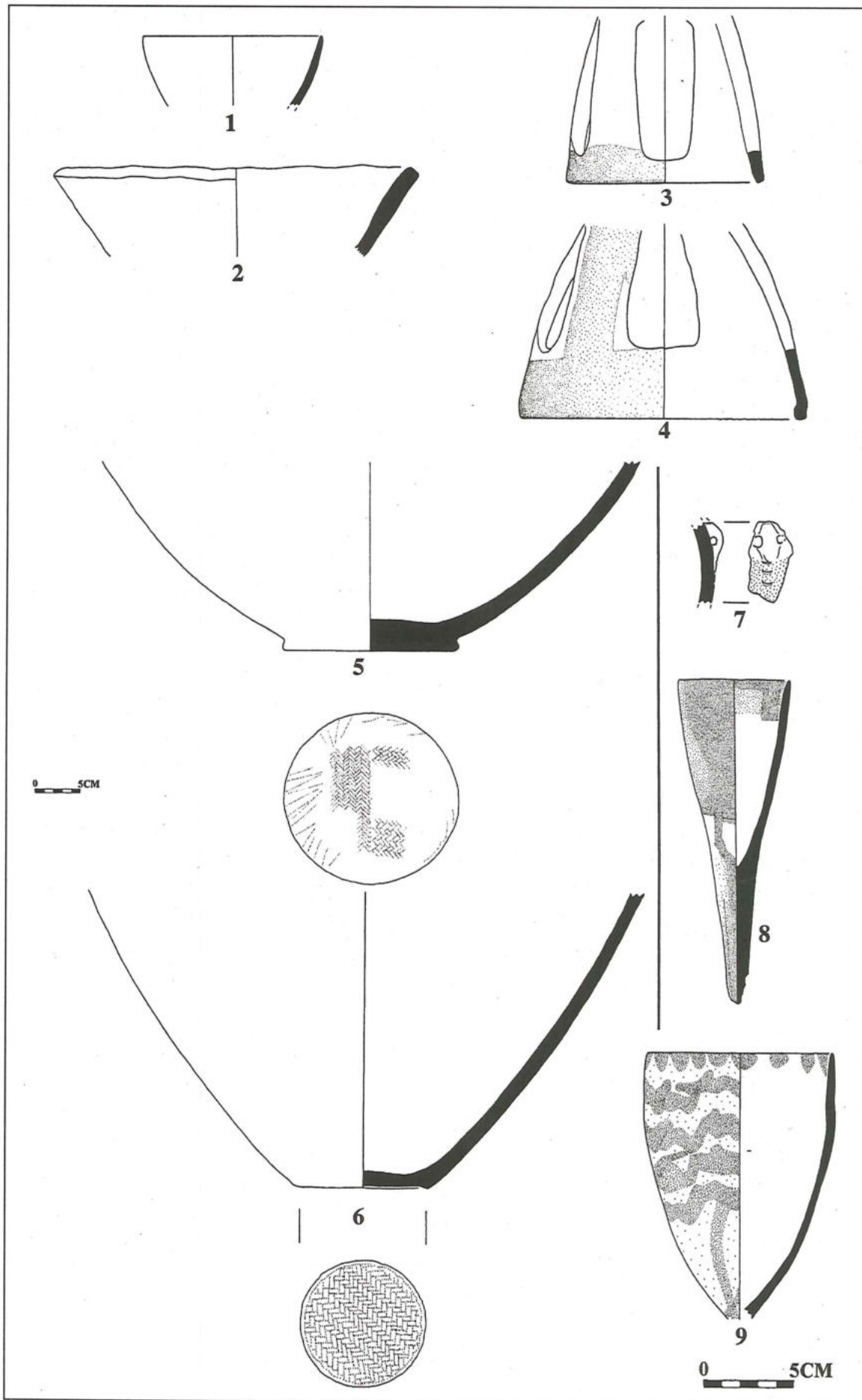
with a Paved Avenue associating the Installation and Sanctuary A structurally. A series of distinct greenish buff surfaces allowed a close association between the Installation and Sanctuary B building phases, and confirmed that all structures within the temenos had multiple and linked building phases (E XXV).

Excavations to the north of the temenos confirmed the existence of a series of buildings on the northern edge of what seems best interpreted as a large open 'plaza'. A pathway leading north from a small gate set in the northwestern corner of the temenos ran by an elaborate storage and food preparation area, perhaps intended to service the Sanctuary Complex (Hennessy 1977: 15).

Post-Sanctuary deposits are very difficult to date, but present indications suggest an early modern date. The three main Sanctuary phases fall within Hennessy's Late Chalcolithic (A-D) period. The very sparse assemblage collected from pre-Sanctuary deposits is difficult to integrate within the main sequence. It seems likely to be quite early, and perhaps associated with Hennessy's Late Neolithic (H-I) assemblages (Hennessy 1977, 15), although a slightly later Early Chalcolithic (Phase G) date cannot be ruled out.

AREA G

In 1994, a 15 x 5 m step trench was laid out straddling the north face of the PBI Tulayl 3 excavation area, and two small (2 x 1 m) sondages excavated to sample the stratigraphy of the upper two phases exposed during cleaning of the larger stepped area (Bourke *et al.* 1995: 48-49). In 1995, the southern 5 x 5 m area cleaned in 1994 was more fully investigated. Work in this trench (G II) began by clearing and planning an architectural complex first exposed at the end of the 1938 season of PBI excavations in this area (Lee 1973: 21-24). In the second half of the 1995 season a 1.5 x 1.5 m sondage was positioned within the eastern third



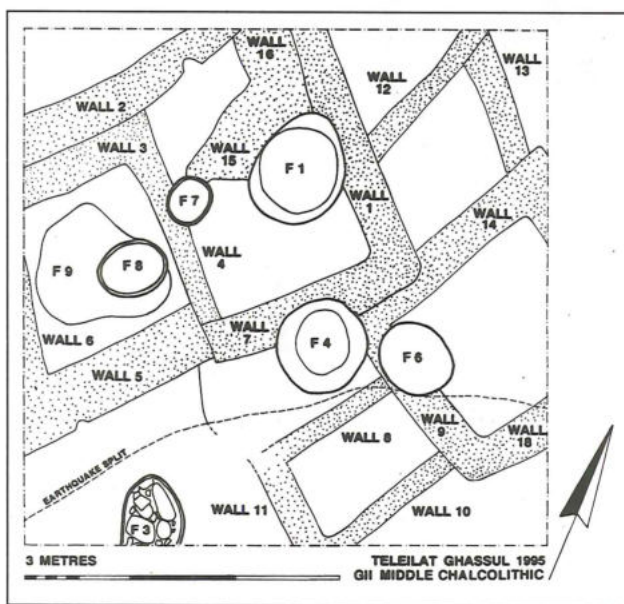
9. Area E. Pottery.
 1. CN 585: E
 XXV 20.3;
 2. CN 508: E
 XXIV 8.12;
 3. CN 274: E
 XXV 7.1;
 4. CN 270: E
 XXV 7.3;
 5. CN 761: E
 XXVI 4.10;
 6. CN 700: E
 XXVI 4.10;
 7. CN 676: E
 XXV 20.7;
 8. CN 249: E
 XXV 7.3;
 9. CN 124: P I
 2.3.

of the trench to sample earlier deposits. Two earlier architectural phases were exposed by the end of excavations.

In 1997, the G II sondage was carried through to natural soil, sampling another three depositional phases. At the very end of excavations, a 5 x 5 m expansion immediately west of G II, removed surface deposits and planned exposed architecture before excavations ceased. The northern third of the original step-trench, covering the last occupation in the Tulayl 3 area, was more fully explored as a 5 x 5 m trench (G III) in 1997. This phase was first sampled in a 2 x 1 m sondage in 1994 (Bourke *et al.* 1995: 49). Both depositional phases noted in the sondage were more thoroughly investigated over the course of the 1997 season.

Trench G II 1995 (Fig. 10)

The 5 x 5 m trench G II (the southern third of Area G laid out in 1994) was cleaned at the beginning of the 1995 season, and quickly revealed a complex of substantial mudbrick walled structures and more lightly built rectangular brick bins, through which a series of very deep pits had been cut. Parts of 18 mudbrick walls (Walls 1-18), and 11 pits of various sizes (Features 1-11) were revealed and sampled. Excavated



10. Trench GII 1995. Plan of Architecture and Pits.

portions of this multi-phase complex can be summarised as follows:

- Phase 1 (Post-Chalcolithic) Pits F.2, F.7 and F.10, Levels 50.2, 51.5 and 52.1-2.
- Phase 2: (Pits/Wells) Plaster-lined Pit/Well Features 1 and 4: F.1 (Levels 51.2-4 and 51.6-8) and F.4 (55.2-3 and 55.7-17).
- Phase 3: Walls 15 and 16, Pits F.3, F.6, F. 8/9 and F. 11, Levels 50.1 and 50.3-12; 51.1 and 51.9; 52.3-4; 53.1; 55.1, 55.4-6 and 55.18-19.
- Phase 4: (Sondage) Wall 1 and Bin Walls 12-13; Levels 56.1, 57.1-6, 58.1-9, 59.1-3 and 60.1-5. (Trench) Wall 9 and Bin Walls 8, 10-11; Level 56.1.
- Phase 5: (Sondage) Walls 1, 14 and 17, Levels 61.1-4.
- Phase 6: (Sondage) Wall 1, Levels 62.1-20.
- Phase 7: (Sondage) Walls 1 and 19, Levels 63.1-3.
- Phase 8: (Sondage) Wall 1, Levels 64.1-4; 65.1

Phase 1 deposits are post-Chalcolithic, and relate to the post-war erosion of PBI entrenchments. Phase 2 materials are dominated by the two very deep plastered well Features 1 and 4. They were over 7.5 m deep when excavated in 1995, probably more than 10 m deep when first used, when they were cut 2-4 m into sterile sands. They contain ceramics related to the Late Chalcolithic PBI Phase IVA-B assemblages excavated by Mallon, Koeppl and North (Lee 1973: 21-24). These relate to materials sampled in the G II Locus 1-3 excavations in 1994 (Bourke *et al.* 1995: 49), which were more fully explored in trench G III in 1997 (below). Phase 3 materials are the architectural scraps (Walls 15 and 16), pits (F. 3, 6, 8/9 and 11) and residual floor fragments (50.1) that make up the phase of architecture above the first coherent complex of material preserved in G II. They probably relate to a later subphase within PBI Phase III (North 1961: 3-4). The main architectural phase uncovered in trench G II

in 1995 (Phase 4), consists of large bearing walls and attached small squarish brick bin features, forming a well constructed storage complex for worked items (horn/beads), stored product (barley/flax) and animal pens (pig farrowing pens). This architecture and Phase 4-5 deposits probably should be associated with lower subphases of PBI Phase III (Lee 1973: 173-176). Four earlier depositional phases were recorded in the G II sondage in 1995. If the absolute heights (Lee 1973: plan following 176) are anything like a rough guide to stratigraphic attribution, then G II Sondage Phase 6-8 materials are to be related to PBI Phase II assemblages.

Trench G II 1997

In the 1.5 x 1.5 m sondage within trench G II, another five depositional phases were excavated in 1997 before sterile sands were reached. Towards the very end of the season, a new 5 x 5 m area (GII Locus 200) immediately west of the 1995 trench was cleaned and planned. Two phases of architecture (Area G Phases 3-4) were isolated but no further excavation took place in 1997. The G II depositional phases excavated in 1997 were:

Phase 9: Walls 1 and 20, Levels 64.5-8; 65.2.

Phase 10: Levels 66.1-25.

Phase 11: Posthole pit (F.12), Levels 66.26-43

Phase 12: Wall 21 and Posthole pits (F.13-17), Levels 66.44-55.

Phase 13: Posthole pits (F.18-22), Levels 67.1-16.

As previously observed, Phase 3 and 4 deposits, such as those in the G II Locus 200 extension, are likely to relate to PBI Phase III assemblages. G II Sondage Phase 9 deposits represent an earlier subphase of the Phase 8 complex, and are therefore best related to PBI Phase II assemblages. Although virtually nothing is known about PBI Phase I materials, it is probable that G II Sondage depositional Phases 10-13 are to be related to this assemblage.

Trench G III 1997

In 1997, the northern 5 x 5 m area of the original step trench was designated trench G III, and excavated to explore more thoroughly the upper phase of architecture in the area, sampled in a small 2 x 1 m sondage (G II Locus 1-3) in 1994 (Bourke *et al.* 1995: 49; Bourke 1997a: Fig. 5). Although stratigraphy in Trench G III was much complicated by a series of burials, and severe earthquake faulting, a four-phase sequence of deposits may be summarised as follows:

Phase 1 (Burials): Six single inhumation burials (Features 3-5, 7 and 11-12), Levels 1.1-3.

Phase 2 (Upper Architecture): Walls 1 and 2, Wall Feature 1, Brick Feature 9, Stone Paving Feature 6, Stone-Lined Bin Feature 8, Levels 2.1-3, 3.1-9.1.

Phase 3 (Bins): Bin Features 13 and 15, Stone Paving Feature 10, Levels 10.1-3 and 10.8-13; 11.1-9; 12.6 and 12.10.

Phase 4 (Lower Architecture): Walls 4 and 5, Levels 12.1-5, 12.8-9 and 12.12-15; 13.1-12.

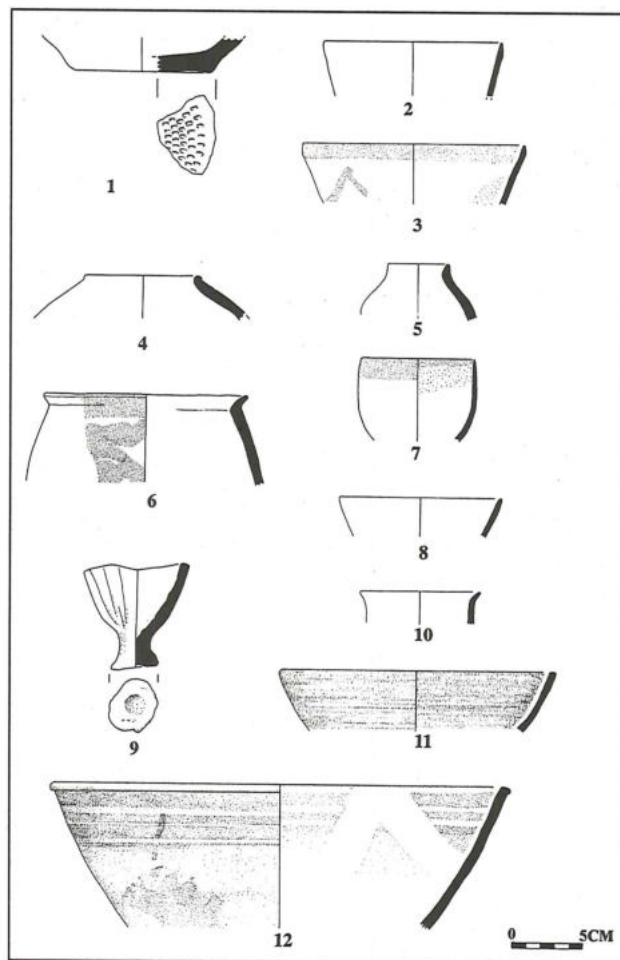
The Phase 1 burials are certainly post-Chalcolithic, and equivalent in type and date to North's A 1 'Flat Burials' (Blackham 1999: 37). The Phase 2 architecture consists of parts of four walls (Walls 1 and 2, Wall Features 1 and 9), one large stone-lined silo (Feature 8) and a Stone pavement patch (Feature 6). Parts of four rooms are delineated, with likely entranceways between Wall F.9 and Wall 1, and between Wall 2 and Wall F.1. The large area north of the Wall 1/WF.9 line is probably an external courtyard containing a large storage silo (F.8), whilst the area south of WF.1 probably includes a food preparation area (F.6). However, there are few reliable surfaces associated with this material, which is badly disturbed by burials, surface scoops and earthquake faulting. Phase 3 deposits consist of two large well-constructed mudbrick and

stone lined bins (Features 13 and 15), but no other architecture. Immediately below the 'Bin' phase, two lines of postholes (Features 16-21) suggest the existence of an earlier subphase within Phase 3 (10.9/11/13 and 12.1-4), although there is no defined break between multiple ashy deposits much disturbed by earthquake faulting. Phase 4 architecture was in the process of definition when excavations ceased. Plaster-lined Wall 4 and what presently appears to be an adjacent brick-paved floor (Feature 22) are relatively clear, but Wall 5 (largely within the east baulk) is less well defined, as is a bricky patch (Feature 23) in the southeast corner of the trench, and a large pit between Walls 4 and 5 (Feature 24). It seems probable that Walls 4 and 5 and F.23 define three sides of one large room. If the brick paving (F.22) is correctly interpreted, the room is likely to be of some elaboration.

Analysis of sections and comparative analysis both suggest that Trench G III Phase 2 is equivalent to 1994 G II Sondage late Phase 2 deposits (2.4-10). G III Wall F.1 is the same as G II Sondage Locus 1 Wall 1 (Bourke *et al.* 1995: 49; Bourke 1997a: Fig.5). It is probable that the G III Phase 3 deposits are equivalent to the G II Sondage early Phase 2 deposits (2.11-16). G III Phase 4 architecture is probably equivalent to the G II Sondage Phase 3 deposits (3.1-4 and 20.1-5), suggesting that the G III brick pavement (F. 22) and mudbrick wall (F. 23) features are in phase with G II Locus 20 Wall 1 (20.4) and the G II Locus 3 brick floor (3.4). All deposits excavated in Trench G III in 1997 are to be related to the later sub-phased elements within PBI Stratum IV and Hennessy's Late Chalcolithic (Phase A-B) assemblages.

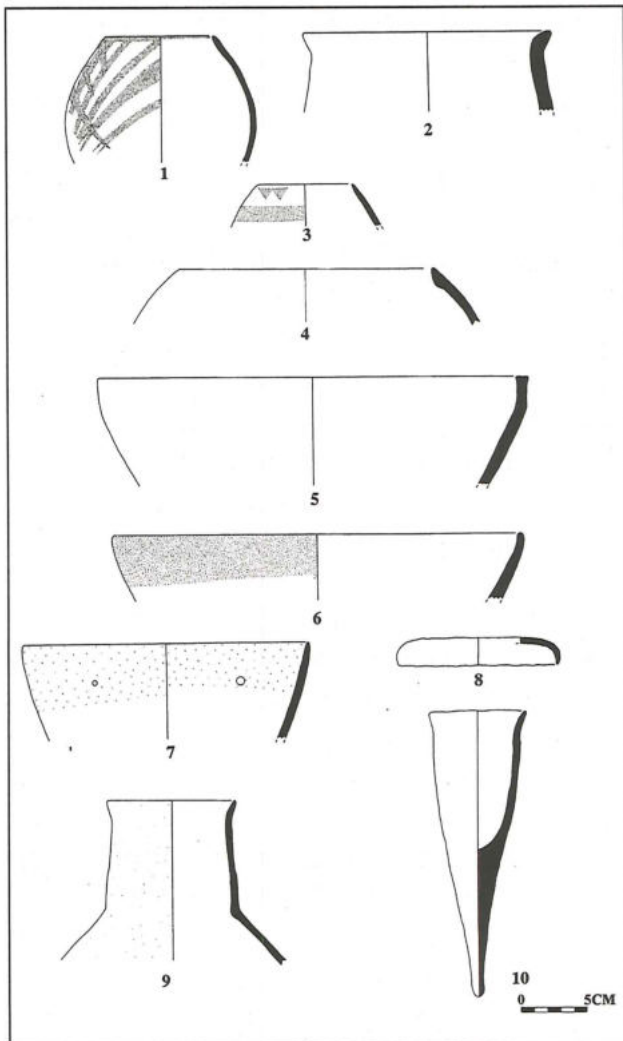
Area G: Summary of Excavations (Figs. 11-12)

Excavations in Area G had two main aims. The first was to establish a linked sequence of small stratigraphic probes through



11. Trench G II. Pottery. 1. CN 647: G II 66.17; 2. CN 571: G II 64.8; 3. CN 242: G II 62.4; 4. CN 198: G II 55.3; 5. CN 663: G II 66.24; 6. CN 174: G II 53.1; 7. CN 190: G II 55.3; 8. CN 246: G II 62.14; 9. CN 83: G II 51.1; 10. CN 247: G II 62.14; 11. CN 254: G II 55.2; 12. CN 251: G II 55.2.

Tulayl 3, obtaining palaeoenvironmental and radiometric samples from each discrete depositional phase. With the completion of the G II Locus 50 Sondage in 1997, this was established. The second aim was to expand horizontal sampling in each of the discrete architectural/depositional phases revealed in the sondages, to increase the contextual range in sampling, and to gain some idea of architectural layout over time. This second aim is proceeding well, with two architectural phases sampled over a wider area by the end of work in 1997. However, establishing a wide horizontal coverage over the nearly 6 m depth of deposit is the work of many seasons, and it is likely that wider



12. Trench G III. Pottery. 1. CN 730: G III 12.10; 2. CN 600: G III 2.1; 3. CN 643: G III 11.1; 4. CN 695: G III 12.4; 5. CN 602: G III 2.2; 6. CN 623: G III 10.1; 7. CN 642: G III 11.1; 8. CN 696: G III 12.4; 9. CN 601: G III 2.2; 10. CN 732: G III 13.5.

area excavations in Area G will concentrate on the earlier horizons (PBI Phases I-II).

Whilst Trench G III assemblages are familiar and Late Chalcolithic (Hennessy Phase A-B) in date, the G II Locus 50 Sondage assemblages are less well known. They sample the poorly defined PBI Phase I-II Early Chalcolithic horizons. Although ceramic and lithic analyses are still in a preliminary stage, it seems probable that the PBI Phase I-II assemblages do not include material relating to Hennessy's 'Neolithic' (Phase H-I) assemblages, and are to be related to Hennessy's Early Chalcolithic (Phase G-E) materials.

AREA H

Investigations in the region of Tulayl 6 continued during 1995. The 2 x 1 m sondage in the southwest corner of the 11 x 11 m scraped area reached sterile deposits approximately 3 m below topsoil deposits, exposing another five phases of occupational debris in so doing. The surface clearance and broad architectural planning instituted in 1994 was expanded 15 m to the north to form a 26 x 11 m exposure, and at least two phases (A and B) of intermingled architecture documented. Analysis of these plans suggested that the upper stone and mudbrick phase (Phase A), was largely confined to the area of the original 1994 exposure, and that the lower mudbrick phase (Phase B) formed a very large two room longhouse, best preserved in the 1995 exposure. To confirm this impression, two new 4 x 4 m trenches (H II Locus 50 and H II Locus 100) were opened towards the end of the 1995 season to explore both phases. In 1997, investigations concentrated on the area of the mudbrick longhouse. Trench H II Locus 100 (renamed trench H IV) was expanded 6 m to the east, forming a 10 x 4 m exposure over the northern room of this longhouse, and a new 10 x 13 m trench (H III) opened south of H IV, to explore the large southern courtyard of the longhouse.

Trench H II Sondage 1995

Excavations in the H II sondage in 1994 had isolated four depositional phases, and exposed a fifth when excavations ceased (Bourke *et al.* 1995: 53-54). In 1995, the fifth was fully excavated, and four earlier phases explored before sterile deposits were reached nearly 3 m below 1994 topsoil layers. The 1995 sequence can be summarised as follows:

Phase 5: Bricky debris layers (2.24-25), seal a much disturbed mudbrick Platform (Feature 6), small stakeholes (Feature 7), a series of thick black occupational layers (3.4-5, 7 and

9), and a good floor (3.10).

Phase 6: A bricky debris layer containing patches of sand (3.11) seals a small mudbrick wall (Feature 10), two plaster-lined pits (Features 8 and 9), and two good white floors (3.13 and 3.16).

Phase 7: A thin brown clay (3.18) separates earlier occupation, including three postholes (Features 11-13), a patch of stone paving (Feature 14), thick occupational layers (3.20/24/26) all upon a hard bricky floor (3.21).

Phase 8: The earliest architectural phase in the sondage is separated from later deposits by a bricky slurry (3.28) and mudbrick debris (3.34). It consists of a well constructed mudbrick platform (Feature 15), built upon a hard bricky surface (3.30), and sealed beneath a series of thick black occupational debris layers (3.29/31/33).

Phase 9: Beneath surface 3.30 lay a series of banded yellow, brown and orangey clay deposits (3.36-40). The latest ash, sand and clay bands (3.35-37) contained a very small amount of pottery, flint and bone, but earlier thick brown clays (3.38-40) were sterile.

Summary

Although final equivalences have not yet been determined, the broad ceramic similarities between Sondage Phase 1-5 deposits and the Classic Ghassulian (Hennessy Phase A-D) assemblages seems assured. It is probable that Sondage Phase 6-8 deposits fall within the latter part of the Early Chalcolithic sequence (Hennessy Phases E-F), although exact equivalences remain elusive. The earliest banded clay Phase 9 deposits resemble the 'pre-Sanctuary' banded layers at the base of the Area E sequence. Finds from Phase 9 are limited, preventing any reliable attribution, although it is probable that they

relate to early (Hennessy Phase F-H) horizons. However, it is unlikely that they relate to occupation in the vicinity of Area H.

Trench H II Locus 50 Area Excavation 1995

In the second half of the 1995 field season, a 4 x 4 m trench (H II Locus 50) was opened 6 m north of the H II Sondage, to investigate a dense collection of stone structures exposed in surface cleaning in 1994. One occupational horizon was fully excavated, and a second partially exposed before excavations ceased. The sequence can be summarised as follows:

Phase A (Stone Bin Phase): A substantial E/W wall (Wall 3) and adjoining N/S wall (Wall 4) form the corner of a well built structure in the northwest of the excavation area. A small curved stone-lined installation or bench (Wall 5) abutts the inner northern face of this corner, and four small mudbrick and stone walls (Walls 6-9) form two small rectangular bins, abutting the outer southern face of Wall 3. Because this phase of architecture is so close to the surface, very few surfaces and associated features were preserved, and contamination remained a possibility. Even so, a patch of paving west of Wall 9 (Feature 15), and a plaster-lined pit north of Wall 3 (Feature 16) are probably related to the latest phase. A hard yellow floor (52.6) north of Wall 3 is probably associated with an interior bin surface (51.6), and an exterior plaster surface (53.2/54.1) to the south.

An earlier sub-phase south of Wall 3 is marked by well preserved white plaster surface (51.3/54.3), which seals a double brick walled installation (Features 17 and 18) in the southwest of the trench, and a probably associated posthole (Feature 19) and yellow plaster floor fragment (54.12) in the east. Occupation and fill levels (52.7-8) below Wall 5 probably relate to this earlier sub-phase north of Wall 3. A series of deep fill layers (52.9-10/55.1-2) pedestal Walls 3 and

4, and mark the division between the two main architectural phases in the trench.

Phase B (Longhouse Phase): Architectural features consist of a double plaster-lined pit and connecting mudplastered channel (Features 20 and 21) in the southeast, a large posthole set within a mudplaster lining (Feature 24) in the southwest, a stone paved doorway with a roughly dressed stone threshold (Feature 22) in the northeast, and a curved stone-lined bin (Feature 23) in the northwest. These are associated together by two thick plaster floors, red in the south (54.13/55.2) and white in the north (55.15), and a series of thick occupational debris layers (55.8-11 and 13). Excavations ceased at this point.

Trench H III 1997

A new 10 x 13 m trench was opened in 1997, over the courtyard area of the longhouse detected in surface scraping in 1995. Immediately upon cleaning the topsoil off the trench, a series of mudbrick and stone wall lines were exposed. These were reasonably well preserved in the northern third of the trench, but became much more fragmented and disturbed by modern pitting in the southern two thirds (Locus 6-7) of the trench. Excavations concentrated on the northern sequence (Locus 1-4), which ultimately exposed three depositional phases. They can be summarised as follows:

Phase 1: Four plaster-lined storage pits (Features 2-4 and 8), three firepits (Features 15-17), and later stone 'cladding' lines (Features 1 and 10) set into the northern and southern faces of main E/W mudbrick wall (Wall 1), dividing the courtyard from a much smaller northern room, all make up the vestigial latest phase. Very few surfaces were reliably associated with this latest phase, but thick ashy occupational debris layers (1.8-10/2.2-3) rest on a decayed orange surface (1.11/

2.5), which divides the latest phase from the first architectural complex.

Phase 2: Five mudbrick walls, in variable states of preservation. Three walls (N/S Wall 2, E/W Wall 1 and N/S Wall 5) define three sides of a well built mudbrick room. Most of this room lies north of trench H III, and was excavated in H IV in 1997. Two further walls (N/S Wall 3 and E/W Wall 4) abut the complex on its southwest corner. Walls 3 and 5 define the two sides of the courtyard, and run south until disrupted by modern disturbances. A series of fragile plaster surfaces (1.20/22) and associated occupational debris layers (1.18/21) within the courtyard, are probably associated with a hard greenish buff plastered surface (Feature 7) and associated collapse (2.6-7) and occupational debris layers (2.10/12) within the northern room.

Phase 3: Beneath the previous phase, but closely associated with it in terms of orientation, three earlier mudbrick walls (N/S Wall 8 E/W Wall 5 and N/S Wall 7) run beside later walls 3, 1 and 5 respectively. They describe what seems very likely to be an earlier version of the Phase 2 longhouse, aligned along a similar orientation. Collapse levels (2.13-14/3.1-2) separate occupation levels (3.3-5/4.1-2) associated with these early phase walls. However, primary surfaces were not reached when excavations ceased.

Trench H IV 1997

A new 10 x 4 m trench was opened in 1997, over the smaller roofed northern room of the longhouse detected during surface scraping (H II Locus 100) in 1995. Once topsoil was removed, a series of mudbrick

and stone wall lines were exposed. These were reasonably well preserved in the western three quarters of the trench, but became much more fragmented and disturbed by a modern gully in the northeastern quarter. Excavations concentrated on deposits within the room, which were well preserved and included many objects resting on hard greenish buff plaster surfaces. The sequence can be summarised as follows:

Phase 1: A series of postholes (Features 2-5 and 7), aligned in a shallow arc, were cut into earlier occupation and surfaces. All traces of upper floors and occupational debris layers had been eroded away. Only the postholes themselves remained. This phase could perhaps be regarded as an ephemeral re-occupation of the destroyed Phase 2 longhouse room.

Phase 2: Three poorly preserved mudbrick walls (Walls 1-3) define three sides of a small rectangular room, with the fourth side excavated as H III Wall 1. A series of sandy debris layers (1.2/5.2-3) seal floor deposits which include a rich harvest of fifteen objects, sitting on top of a good greenish buff floor (1.6/5.4). These include five chisels, three fan scrapers, a mortar and pestle, a ground stone axe, a loomweight, a bead, a worked bone point, and a ceramic cup. Two deep ash pits (Features 6 and 15) are cut into the floor. A series of earlier occupational debris layers (1.9-10/4.9 and 11) rest upon an earlier floor (1.11/4.12). Outside the room, a black ashy exterior surface (2.1/6.2) is probably associated with this phase.

Phase 3: Thick debris layers (1.12/5.5) separate earlier occupational debris (1.14) from later deposits. Along

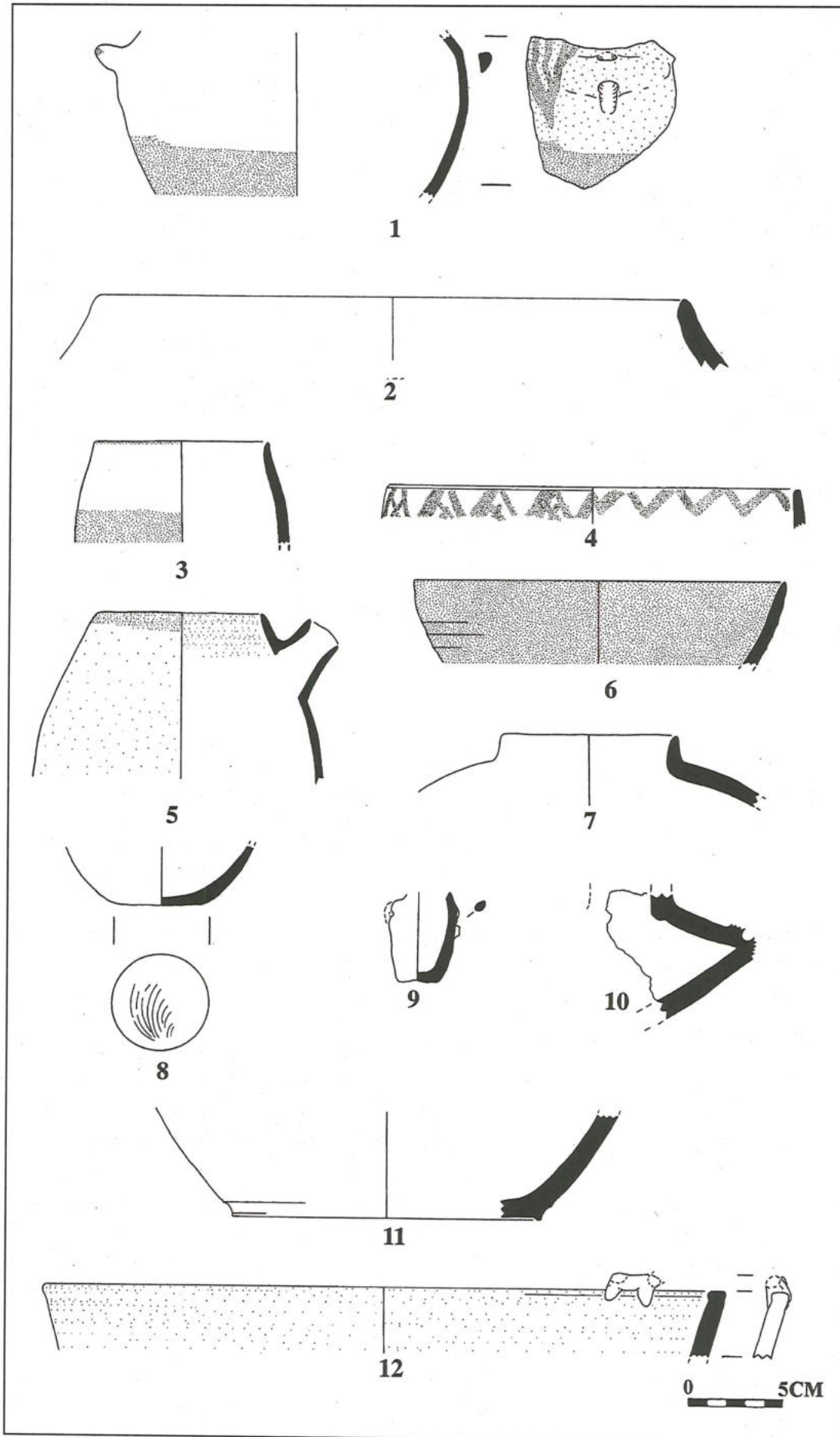
the outside of Phase 2 Walls 1 and 2 are two earlier walls (N/S Wall 4 and E/W Wall 5). Below Phase 2 floor and debris layers, the third early N/S wall (Wall 6), runs along the inner face of Phase 2 Wall 3. Together, they define three sides of an earlier room, set on a similar alignment to the later Phase 2 structure. A small pit (Feature 9), and wall painting fragments (Feature 10) are associated with this earlier room. A creamy buff exterior surface along the outside of Wall 4 (2.4/6.4) was the only surface reached before excavations ceased.

Summary: Longhouse Trenches H III and H IV

The latest Phase 1 deposits in both trenches were largely eroded away. However, the few wall scraps and pits that remain in all probability relate to H II Sondage Phase 1 materials only. Little can be construed from these badly disturbed fragments, but they are not inconsistent with Hennessy's earlier characterisation of the final phase as squatter occupation in the ruins of earlier structures (Hennessy 1977: 16). Phase 2 structures consist of a smaller (7 x 5 m) roofed room and a large (7 x 13 m) walled courtyard, attached in the south side. Deposits within the room were largely undisturbed, and a collection of tools were recovered off final floor surfaces, suggesting a relatively hurried departure. It is probable that the Phase 2 deposits in both trenches relate to H II Sondage Phase 2. It seems likely that Phase 3 structures should be associated with H II Sondage Phase 3-4 materials. The three phased assemblages excavated in H III/IV in 1997 are best associated with late Classic Ghassulian (Hennessy Phase A-B) assemblages (Fig. 13).

AREA N

This new area was laid out approximately

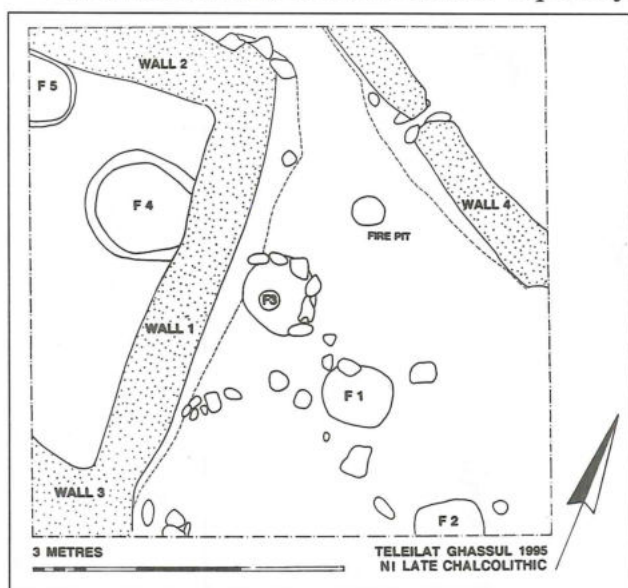


13. Area H. Pottery.
 1. CN 523: H II 4.5; 2. CN 675: H IV 1.6; 3. CN 546: H II 4.5; 4. CN 87: H II 3.9; 5. CN 512: H II 4.3; 6. CN 654: H III 2.6; 7. CN 524: H II 4.5; 8. CN 513: H II 4.3; 9. CN 95: H II 4.3; 10. CN 760: H III 7.1; 11. CN 698: H III 12.4; 12. CN 588: H IV 2.2.

100 m to the north-east of Hennessy Area A in 1995 to examine the hitherto unexplored central east region of the site, initially concentrating on obtaining a relatively broad exposure of latest occupational levels in an area undisturbed by previous excavations. Two 5 x 5 m trenches (N I and N II) were laid out some 12 m apart, to explore what surface indications suggested to be heavy concentrations of storage jar sherds. In 1995, excavations in NI uncovered two clear phases of occupation, both given over to intensive storage, food preparation and cooking activities. Towards the end of the season, a 2.5 x 2.5 m sondage in the north-east corner sampled two earlier phases of activity before excavations ceased. Excavations continued in the sondage in 1997, and another five phases of occupation were uncovered by the end of the season. Excavations in N II in 1995 uncovered one main phase of occupation, also given over to storage and food preparation. Work in the second trench was much slowed by the discovery of a badly shattered wall painting fragment, found among the remains of very large storage jars. Trench N II was not worked in 1997.

Trench N I 1995 (Fig. 14)

Excavations in 5 x 5 m trench N I quickly



14. Trench N I 1995. Plan of Architecture and Pits.

uncovered a series of well preserved yellow mudbrick walls. Three in the west (Walls 1-3) defined a rectangular mudbrick room, containing two well constructed mudbrick-lined pits in its northern half, one likely to have been an oven (Feature 4) and the second a plaster-lined storage pit (Feature 5). Occupation consisted of a series of rich ashy surfaces (3.5 and 3.7) linking walls and features, all sealed by a series of thick debris layers (3.1-4).

An earlier phase within the area bounded by Walls 1 and 2 (Wall 3 belongs exclusively to the later phase) revealed another two mudbrick-lined pits (Features 6 and 7) of a likely similar function to successors F.4 and 5, and an earlier series of surfaces (3.14 and 3.17), all sealed by bricky debris layer 3.13. The central portion of the trench was dominated by three neatly constructed mudbrick and plaster-lined storage pits (Features 1-3), built upon a stone and mudbrick substructure (2.12-15). A series of good surfaces (2.2 and 2.9), associate features with Walls 1 and 4 across the courtyard, and a second series defines occupation within the room (4.1 and 4.3).

Beneath Wall 4, an earlier wall (Wall 5) and inset elaborate stone and mudbrick-lined storage or food preparation facility (Feature 8-9), and a series of good surfaces (4.8, 13 and 17) define an activity area perhaps associated with olive processing. A large pit (Feature 11) within the room, and three small posthole pits (Features 10, 12 and 13) in the courtyard are associated. All structures and occupation levels are built upon a series of thick makeup levels (2.23/4.18/4.20), which pedestal Walls 1 and 2 in the west, and Wall 5 and the storage/food processing facility (F.8-9) in the east. Beneath this phase of occupation, only material from a sondage in the northeast quadrant of the trench was excavated.

Within the sondage, the last element of an earlier phase revealed no defined architecture, being limited to two shallow pits

(Features 14 and 15), associated buff surface 5.2, and mudbrick collapse 5.1. Beneath surface 5.2, thick bricky debris (5.5) sealed an elaborate stone and mudbrick storage installation (Feature 16). A series of grey ashy floor deposits (5.7, 5.10, 5.12 and 5.15) lay on a sequence of hard buff surfaces (5.6, 5.9, 5.11 and 5.14), suggesting a considerable buildup of occupation associated with what was probably a cooking installation.

Beneath the earliest hard buff surfaces, a thick layer of bricky debris (5.16), marks a phase change. The removal of this bricky debris reveals a very large brick-lined pit (Feature 17), a series of parallel subsidence splits and a series of occupation layers (5.17). Below these debris layers, a thick bricky debris layer seals a number of clay-lined postholes, which mark two distinct phases of wooden constructions. Five postholes (Features 18-22) describe a semi-circle around the western perimeter of the sondage. Associated occupational debris layers (5.22 and 5.24) suggest association with cooking activities, perhaps linked with the large brick-lined silo (F.17) in the southeast of the sondage. Here excavations ceased in 1995.

Trench N I 1997

Excavations continued exclusively within the sondage in 1997. Beneath the debris layer 5.24, a thick bricky debris layer (6.2) sealed an earlier posthole construction. Four clay-lined postholes (Features 24-27), defined a slightly curved alignment across the sondage, suggesting either a much larger round structure, or more probably an irregular squarish construction. A fine greenish buff floor (6.6), and two shallow pit-depressions (Features 28 and 29) are associated. It seems likely that this posthole phase (6.1-6) and that succeeding it (5.16-24) should both be considered subphases of the same occupational horizon.

Beneath the posthole phases, a series of very thick bricky debris layers (6.7-9 and

6.12-15) sealed the fragmentary remains of three mudbrick walls (Walls 6, 7 and 8), which define three sides of a small room. An earlier phase of the large mudbrick silo (Feature 31), along with a series of thin laminated surfaces (6.19) is associated. However, this phase is poorly preserved, and the impression is one of severe destruction (perhaps by earthquake), followed by a relatively prolonged period of desertion. It is possible that the succeeding two sub-phases of posthole constructions represent less permanent re-occupation after this destruction. It marks a distinct change in material culture, and is probably to be associated with that break in the A XI Main sequence noted between Main Phases 3 and 4, tentatively associated with that between Hennessy Phases D and E (above).

A thick bricky debris layer (6.21) separates the Wall 6-8 complex from earlier architecture. This consists of an E/W yellow mudbrick wall (Wall 9), and a probable N/S return running parallel with and only slightly out from the west baulk. A fine mudplaster-lined pit (Feature 32) was built into the north face of Wall 9, and in the courtyard to the south a mudplaster-lined fire pit or *tabun* (Feature 33) was placed. Associated with both were a series of thick occupational debris layers (6.24-25 and 7.1). Immediately below these later courtyard features, several features associated with food storage and preparation occurred. A plaster-lined silo with a channel leading from it into the east baulk (Feature 37), a small paved area consisting of eleven flat fieldstones (Feature 36), and two clay lined postholes (Features 34 and 35) occurred. With these went a series of thick occupational debris layers (7.2/8.3).

Another thick debris layer (8.4) separated these deposits from a substantial long-lived mudbrick complex. Final occupation associated with this complex consisted of a massive E/W plaster-faced mudbrick wall (Wall 10) preserved to a height of six-eight

courses, two small clay-lined postholes (Features 38 and 39), and a series of thick occupational layers (8.8-9, 8.11-12 and 8.14). Earlier occupation in the area south of Wall 10 included two shallow pits (Features 40 and 41), and a series of ashy occupational layers (8.17 and 8.19).

A thick bricky debris layer (8.21-23 and 8.26) separated this late phase from an earlier main architectural phase consisting of five walls (Walls 10-14) and associated deposits. Below thick bricky debris layers, two small N/S mudbrick walls (Walls 11 and 12) abutted Wall 10 on its north side. A large stone threshold (Feature 42) and associated doorsocket (Feature 43), separated Wall 10 from its eastern continuation (Wall 14), and a small N/S mudbrick wall (Wall 13) abutted Wall 14 on its southern side. Walls 10-12 form parts of two small rooms north of Wall 10 (Loci 9 and 10). A small bench (Feature 44) is attached to the east side of Wall 12. A larger courtyard to the south is bounded by Walls 10, 13 and 14, with another small bench probably located along the south face of Wall 10. An elaborate paved doorway opens between Locus 10 and 11, and greenish buff surfaces 9.1/10.1/11.4 link the complex together. A series of fine burnt plaster floors (9.4/10.5/11.7) seem to pedestal Walls 11-13, suggesting an earlier sub-phase awaits below. Excavations ceased at this point.

Summary

Ten distinct occupation phases were uncovered in trench N I over the two seasons of work. The first two phases were traced across the entire 5 x 5 m trench. The earlier eight phases were confined to a sondage in the northeast quadrant of the trench. The ten depositional phases may be summarised as follows:

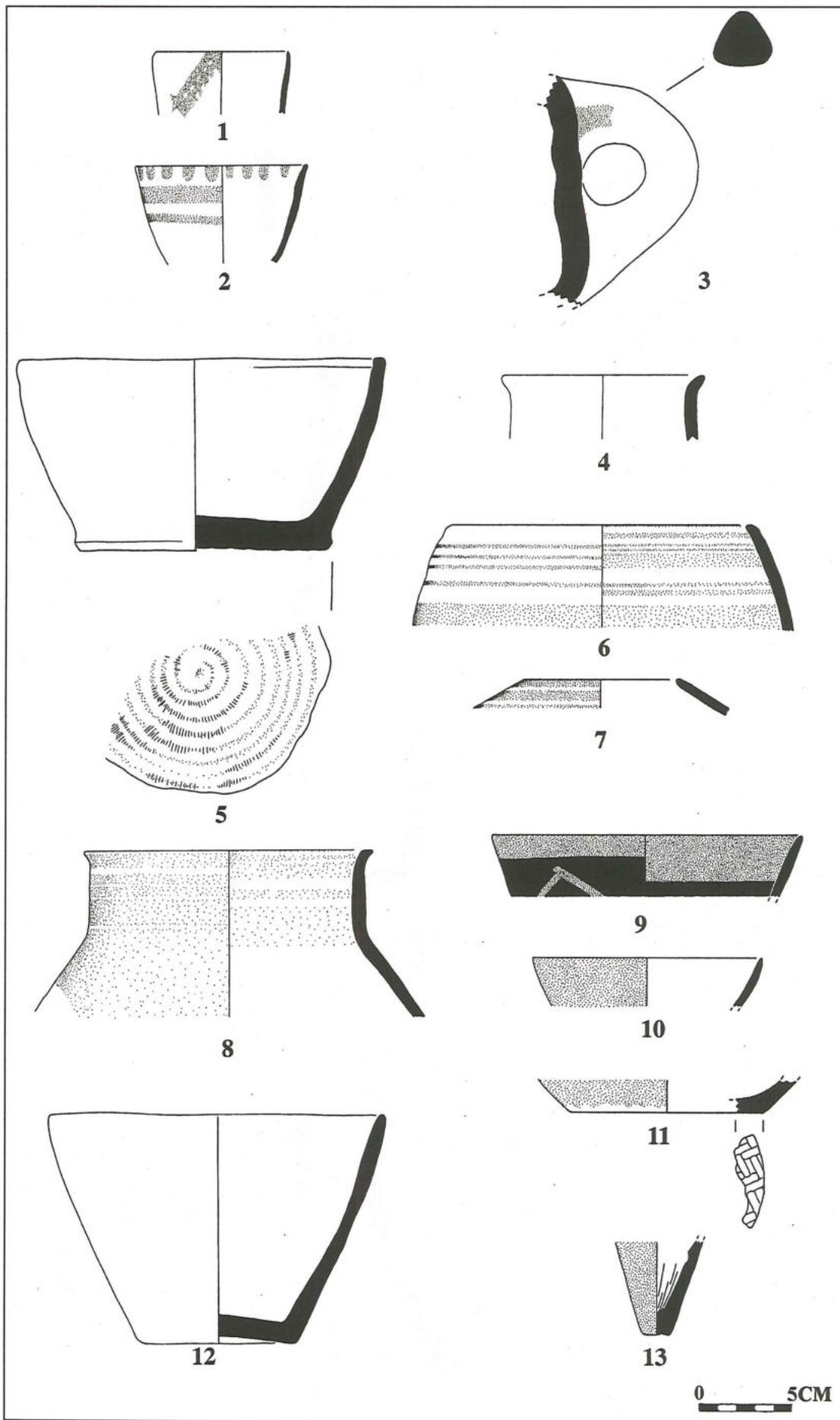
1. Walls 1-4, Features 1-5, Levels 2.1-10, 3.1-13 and 4.1-4.
2. Walls 1-2 and Wall 5, Features 6-13, Levels 2.11-23, 3.14-17, 4.5-20.

3. Features 14-16, Levels 5.1-15.
4. Features 17-23, Levels 5.16-24.
5. Features 24-29, Levels 6.1-6.
6. Walls 6-8, Features 30-31, Levels 6.7-20.
7. Wall 9, Features 32-37, Levels 6.21-29, 7.1-2, 8.1-3.
8. Wall 10, Features 38-41, Levels 8.4-20.
9. Walls 10-14, Features 42-43, Levels 8.21-26, 9.1-3, 10.1-4, 11.1-6.
10. Walls 10 and 14, Levels 9.4, 10.5 and 11.7.

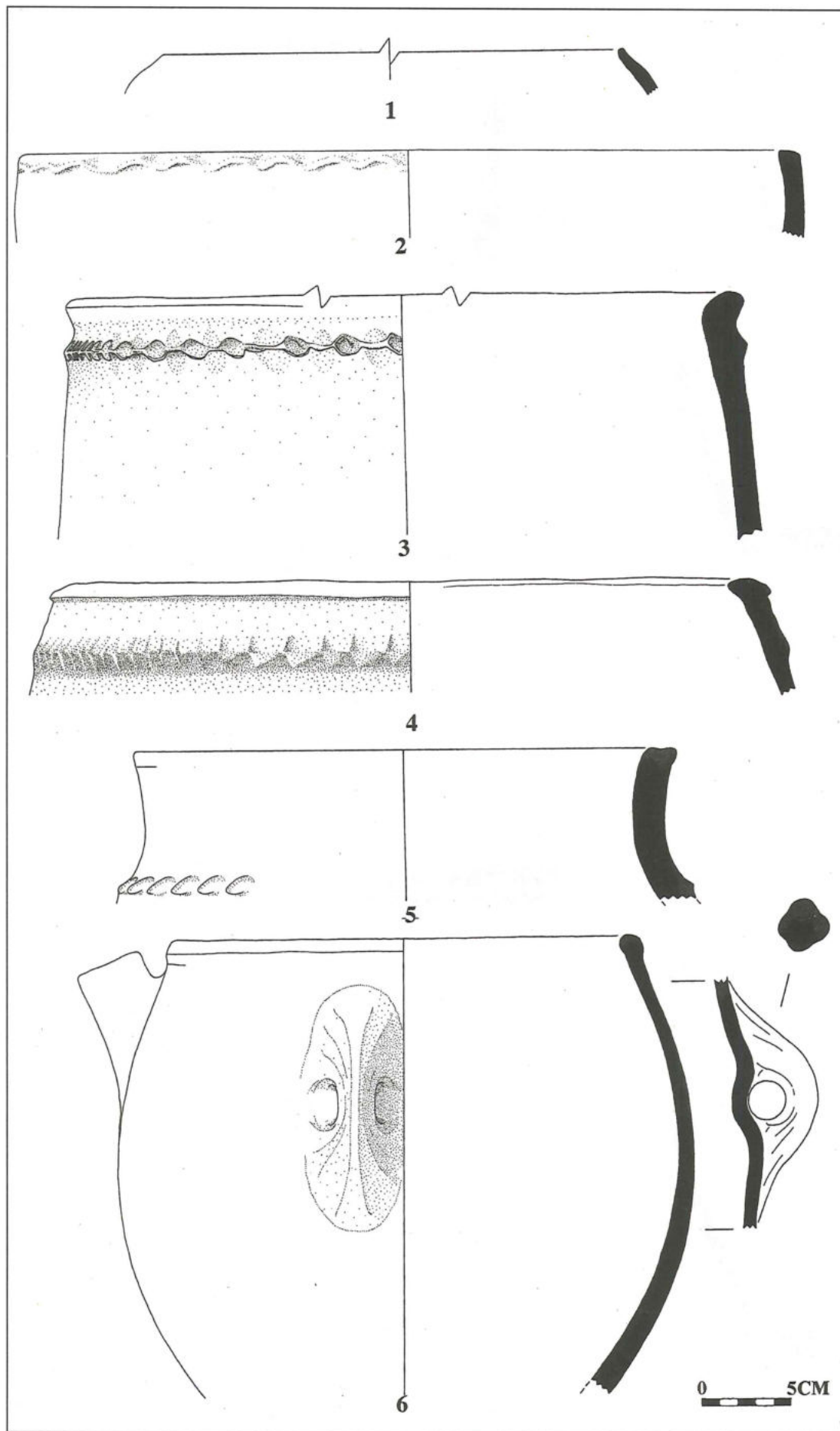
It seems likely that the depositional phases can be grouped further, with an early complex consisting of Phases 8-10, two separate and distinct building horizons in Phases 6 and 7, three relatively impermanent but probably associated horizons in Phases 3-5, separating them from the two associated late complexes in Phases 1-2. It seems probable that the Phase 1-2 materials fall within Hennessy Phase A-D horizons. The ephemeral Phase 3-5 materials are also late, and probably to be associated within Hennessy Phase D-E assemblages. Phase 6-10 assemblages are earlier, but there is no suggestion of any Neolithic (Phase H-I) associations. They fall within the broad band of the Early Chalcolithic Hennessy Phase E-G horizon, probably largely within the second half (Hennessy E-F) of this sequence (Figs. 15-16).

Trench N II 1995 (Fig. 17)

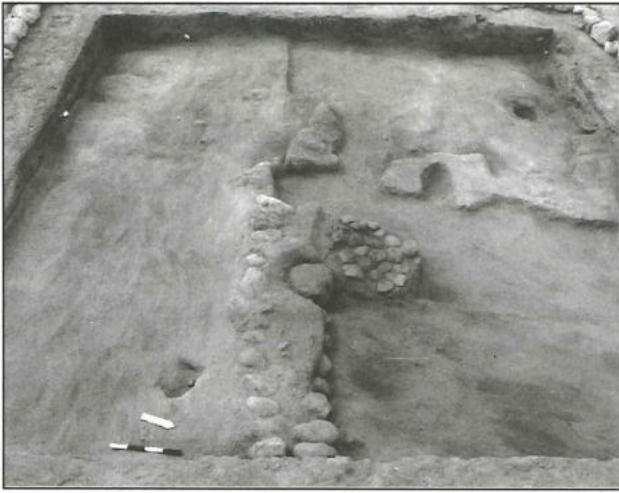
Excavations in 5 x 5 m trench N II (12 m north of N I) quickly uncovered traces of three yellowish mudbrick walls (Walls 1-3) which defined three roughly rectilinear rooms. The room in the northwest (Locus 2) seemed likely to be an interior storage facility, with an outdoor courtyard to the east (Locus 3), and a corridor/pathway to the south (Locus 4). Excavations in Locus 2 had not advanced far when the discovery of several fragments of polychrome wall painting halted excavation. The wall painting appears to have fallen among and shattered upon a series of very large storage vessels (Plob 2).



15. Trench N I. Pottery. 1. CN 699: N I 8.6; 2. CN 218: N I 5.14; 3. CN 683: N I 1.1; 4. CN 704: N I 8.3; 5. CN 106: N I 3.4; 6. CN 70: N I 1.1; 7. CN 222: N I 5.14; 8. CN 63: N I 1.1; 9. CN 664: N I 6.24; 10. CN 617: N I 6.14; 11. CN 661: N I 6.19; 12. CN 558: N I 6.7; 13. CN 660: N I 6.19.



16. Trench N I. Storage Jars. 1. CN 228: N I 5.14; 2. CN 234: N I 5.14; 3. CN 85: N I 2.1; 4. CN 157: N I 3.13; 5. CN 630: N I 1.3; 6. CN 221: N I 5.14.

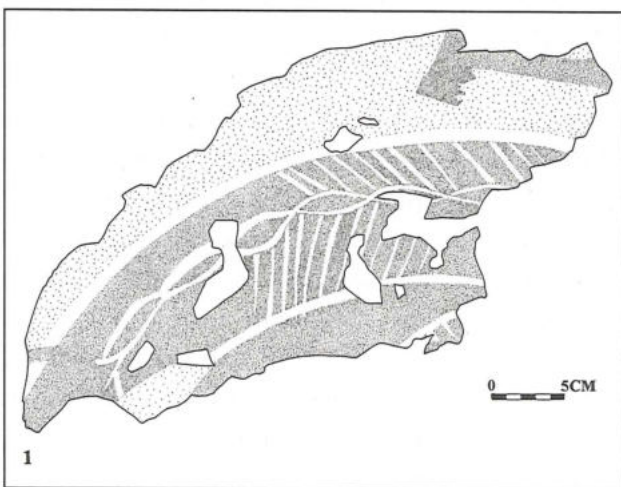


17. Trench N II 1995. General View.

A considerable deposit of brick and painted plaster debris (Levels 1.4/ 2.1) lay upon a clear ashy surface (Level 2.2), which had a large storage pit (Feature 2) cut into it. In the eastern courtyard a fragment of stone paved surface (Feature 1) suggested a food preparation area. Excavations in the southern room (Locus 4) had not reached occupational strata when excavations ceased. All deposits in trench N II are to be associated with latest Phase 1-2 assemblages from trench N I to the south, and as such are dated to the Late Chalcolithic period.

Trench N II Wall Painting (PLS) (Fig. 18)

The fragment was found face down at an angle, still attached to a chunk of the mud brick wall it had faced. The angle of the fragment suggested the wall had fallen in-



18. Trench N II. Wall painting fragment.

wards in a south westerly direction. A small piece of the fragment was successfully lifted, although very fragile and in poor condition. Following initial cleaning it was photographed and drawn. The fragment was 45 x 19 cm in size, and consists of up to eight replasterings. The painter first covered the area with a buff paint, and then applied a curved area of deep red over the lower two thirds of the preserved area. There is an additional single line of red drawn from one edge of this curve into the buff area. The red area was then outlined with a thick line of white paint, and a thinner white line inside the red following the original curve. Inside this curved red area two lines of wavy white paint were added, in a 'chain' pattern. These lines thicken and thin as the brush or applicator runs out of paint and is reloaded. A series of parallel white lines are drawn from the edges of the chain along a section of its length to meet the white border lines, the brush strokes slightly over-reaching the border line in places. In the lower red band is an area of white paint indicating some decoration in that zone, but the preserved fragment is too small to allow any interpretation or detailed description. The patch of red in the upper buff zone belongs to a lower layer of paint.

The design is new to the repertoire of Tulaylāt al-Ghassūl wall paintings, although individual elements can be seen in known examples. The colours (red, buff, white) are normative, and the practice of multiple replastering and repainting is well documented. The use of crossed wavy lines to create a 'chain' pattern is novel. Wavy lines are employed in Mallon's 'Star', where each of the eight points has a zone of parallel wavy line decoration (Cameron 1981). Vertical parallel wavy lines also appear in Hennesy's 'Processional' painting, on the torso of the main figure, and around the rectangular shape to the left. Separate wavy lines can also be found in North's 'Tiger' (Cameron 1981). The motif may be inter-

preted as a red curvilinear object, from which white inter-twined garlands hang. It is vaguely reminiscent of the Nahal Mishmar sickle-shaped Ivory Objects (Bar-Adon 1980: 16-23), which Bar-Adon suggests to be standards.

AREA P

This new area was laid out approximately 150 m northwest of Area N, in what was thought to be the far northeastern reaches of settlement on the site. A single 5 x 5 m trench (P I) was laid out over a concentration of ceramic sherds and ground stone fragments. The initial clearance proved featureless, and a sondage within the southwest quadrant of the trench (Locus 2) commenced to sample deposits to sterile. Seven depositional phases were isolated, along with a few built features. Sterile deposits were reached 3.2 m below topsoil deposits.

Latest deposits consist of a brick-lined pit (Feature 2), associated stone paving (Feature 3), and levels 2.1-5. Bricky debris layer 2.6 separates these deposits from a small pit (Feature 4) and associated levels 2.7-10. An earlier debris layer (2.12) separates these from a series of occupational debris layers (2.13-16), which are in turn separated by a debris layer (2.17), from a rounded mudbrick on stone threshing platform (Feature 5), and associated floor deposits 2.18, 20 and 22). Below these, a bricky debris layer 2.23 seals a small stretch of mudbrick wall (Wall 1), associated posthole (Feature 6) and good floor 2.26/28. Yet another bricky debris layer (2.29) seals a large ash-filled pit (Feature 7), a small posthole (Feature 8), a patch of good ashy surface (2.30) and levels 2.30-37. Another thick collapsed bricky debris layer (2.38) seals what may be a small stretch of a mudbrick wall (2.40-41) running parallel to and barely projecting from the south section. Associated debris layers 2.39 and 2.42/44 rest on sandy sterile levels 2.46-49. These are cut by what seems to be a large E/W gully or streambank (Feature 9),

also full of sterile silt (2.43/45).

Summary

The Area P sondage stands at the edge of occupation on the northeastern margin of the site. Fortuitously, the trench seems to have been placed over the bank of an ancient streambed, which may (in part) explain the settlement limits in this region, if later streams flowed closeby to the north. The upper four depositional phases seem quite late culturally, and should be associated with the Classic Ghassulian (Hennessy Phase A-D) assemblages. The earlier three depositional phases probably relate to later Early Chalcolithic assemblages, and are probably to be associated with Hennessy Phase E-F assemblages. There is no Hennessy Neolithic (Phase H-I) associations, and few links with Early Chalcolithic Phase G assemblages.

Area Q

Area Q was newly opened in 1997 to explore the eastern region of the settlement. No previous expedition had worked this area. Shallow plough-lines and the slight disturbance made by the Sydney University tent camp in 1977 were the only visible marks on what appeared to be an essentially undisturbed region of the site. Initially, two 6 x 6 m trenches (Q I and Q II) separated by a two m baulk were laid out approximately 150 m east of Hennessy's original Area A trenches. It soon became apparent that the eastern third of both trenches was severely disturbed by modern activity. Excavations in southern trench Q II, an open courtyard area dominated by an elaborate double mudbrick-lined bin feature, sampled two phases of very late occupation layers before closing at the end of the season. Work in northern trench Q I was expanded progressively to the north and west over the course of the 1997 season, following increasingly well preserved longhouse architecture, until it covered approximately 8 x 8 m when excavations ceased.

Trench Q I 1997 (Fig. 19)

Excavations in trench Q I began over an area of 6 x 6 m, but expanded in two 2 x 4 m steps over the course of the season, to an ultimate coverage of 52 m². Beneath a series of sandy topsoil layers, parts of eight certain (Walls 1-8) and one probable (Feature 3) wall were uncovered. These form an enclosed courtyard (Walls 1 and 5 and F.3) to the east of a small rectangular mudbrick room (Walls 1-4 and 6). This room has a less substantial exterior wall (Wall 8) attached to the north, and the beginning of a second interior room (Wall 7) attached to the west. After initial wall definition, excavation concentrated on deposits within the small mudbrick room. Three small mudbrick bin features (F. 4, 15 and 18) were located in three corners of the room. Each contained the burial of a small child, storage jar sherd covers and ovicaprine food offerings. The most elaborate (F.4) contained a bone bead necklace and two miniature ceramic vessels. A

second (F.15) contained stone and bone beads. Between the three 'corner-burials', a miniature hematite macehead, a crescent-shaped mother-of-pearl pectoral, and a rectangular cross-hatch incised siltstone stamp seal were found sitting on a floor, perhaps originally contained within a cloth bag, now perished. Earlier occupation deposits within the room were in the process of being uncovered when excavations ceased. Depositional phasing can be summarised as follows:

Phase 1 (Modern): Pit Features 10-11, 21 and 24. Levels 1.1-4 and 1.7-8; 3.1-4 and 3.7-10; 4.1-2; 5.1-5; 6.1; 7.1 and 7.5; 8.1; 9.1; 11.1-2; 12.1-3.

Phase 2 (Latest Building): Walls 1-8, Burial Features 4, 15/16 and 17/18, and Pit Feature 14. Levels 1.6; 2.1-2; 7.2-7 and 7.10-11; 10.1-3; 13.1.

Phase 3 (Earlier Building): Walls 1-7, Wall Feature 3, Mudbrick Silo Features 13 and 22, Posthole Features 19 and 20. Levels 3.5-6; 7.8-9; 13.2-4.



19. Trench Q I 1997. General View of 'Corner Burial' room and associated architecture.

All Phase I deposits are post-Chalcolithic in date and best regarded as modern, although Byzantine ceramics and glass are mixed in with modern debris. Phase 2 deposits represent the latest occupation in the architectural complex. This occupation is contemporaneous with the 'corner-burials', although associated floors and occupational debris did not always seal burial pits. Phase 3 deposits represent earlier occupation within the architectural complex. Phase 2 and Phase 3 deposits are both Late Chalcolithic (Hennessy A-B) in date.

Trench Q II 1997

Excavations in 6 x 6 m trench Q II uncovered two main depositional phases in 1997. The uppermost, lying immediately below topsoil, is disrupted by modern ploughing and heavily eroded. Faint traces of mudbrick architecture were detected immediately below sandy topsoil layers (1.1-4), with fragmentary walls along the southern (Wall 1) and western (Feature 3) baulk lines. A series of small fire-pits (Features 2, 5 and 6) and fragments of burnt surfaces (1.6-9) were isolated within an open courtyard. These were separated from earlier courtyard deposits by a bricky slurry (1.16/4.1). Earlier deposits are dominated by an elaborate plaster-lined mudbrick double bin feature (4.2-7), located in the centre of what is still thought to be an enlarged courtyard area. Fragments of associated greenish-grey floor surfaces (2.1 and 2.5; 3.3 and 3.5; 5.2 and 5.4) were traced for short distances across the trench, but deposits were still somewhat cut about. Excavations ceased with the removal of these surfaces.

Area Q: Summary (Fig. 20)

Excavations in Area Q did not proceed below latest Chalcolithic deposits in 1997. Although the southern trench (Q II) was far more disturbed than initial examination suggested, it still produced evidence of an elaborate storage facility within a spacious

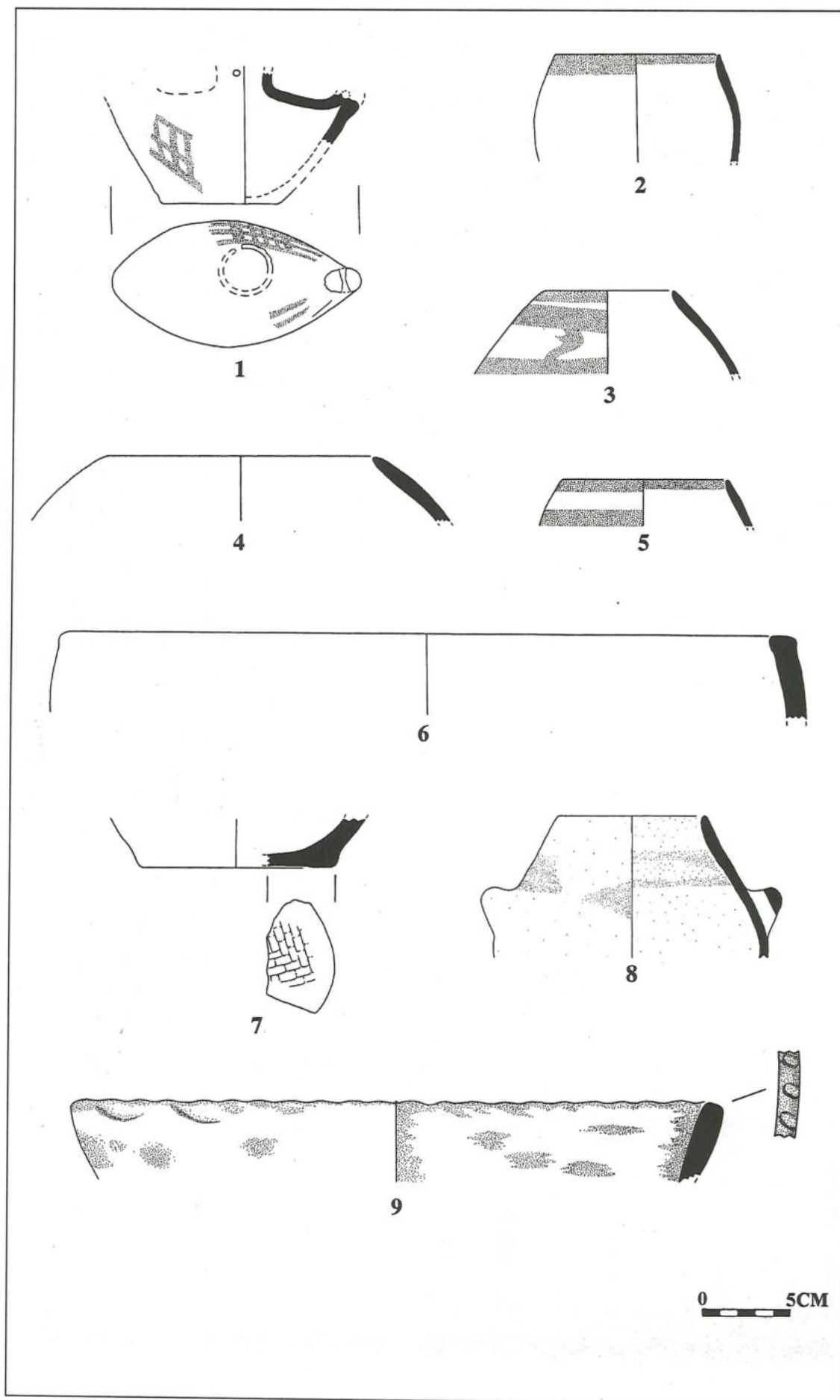
courtyard. Excavations in the northern trench (Q I) uncovered substantial well-preserved mudbrick architecture immediately below the surface. The quality of the preserved architecture, the intriguing association with infant burials and the presence of spectacular finds, all suggest that this area will repay further detailed investigation, particularly as there is little sign of the severe earthquake disruption of the latest stratigraphy so commonly evidenced further to the west in Area A. Future excavations in Area Q will seek to recover a wide sample of latest Chalcolithic occupation, crucial to examining the question of the causes of the final abandonment of the site.

2. The Ceramics (JLL)

Excavations at Tulaylât al-Ghassûl in 1995/7 resulted in a much greater sample of later phase material than had been gained in 1994. The nature of excavation remained similar and the assemblage consists largely of sherds and only limited numbers of complete profiles or whole vessels. While in trenches A XI and G II excavations reached Hennessy's Late Neolithic and Early Chalcolithic levels respectively, the large exposures in trenches H III-IV, Q I-II and to some extent in trench G III, allowed for a more complete study of the Late Chalcolithic ceramics. Whilst the material is not completely processed, a few preliminary remarks can be made.

Form Analysis

The upper phase ceramics are characterised by the introduction of new forms. Whilst the 'V' shaped bowls are not quite the same style as the Safadi assemblage, some parallels can be found there. Small cups (Fig. 15.7) and spouted holemouths (Fig. 4.4) are two examples. The necked jars (Fig. 9.7) and storage jars (Fig. 13.1) reveal forms which are classic Ghassulian types. Handles show interesting developments, with a dominance of 'pushed-up' lugs (Fig. 4.1). The re-



20. Area Q. Pottery.
 1. CN 626: Q I 1.3; 2. CN 679: Q I 1.6; 3. CN 678: Q I 1.6; 4. CN 629: Q I 1.3; 5. CN 682: Q I 1.6; 6. CN 628: Q I 1.3; 7. CN 684: Q I 2.4; 8. CN 706: Q II 4.1; 9. CN 207: P I 2.42.

appearance of ledge handles can also be dated to this phase.

Some of the new vessel types tend to show a slightly different manufacturing technique, with smoother walls with more balanced shapes in evidence (Fig. 4.6). In some examples there is some evidence of a tool being used to smooth the walls towards the base (Fig. 4.7). This group has been termed the 'specialised streaky wash' group because it almost always bears the streaky wash decoration. This decoration is characteristic of the upper phases at Tulaylāt al-Ghassūl. It appears only at a few other sites in the southern Levant. De Contenson terms it 'reserve engobé' when he identified it at Beersheva (de Contenson 1956), and it is also known from the Halif Terrace (Kansa pers. comm.). At al-Ghassūl it does not always appear on the 'specialised' ware (Fig. 4.4) and appears to be used as a general decorative treatment, although always confined to one fabric group. Wheel-turned vessels are very rare, and string-cut bases occur in small numbers (Fig 4.2).

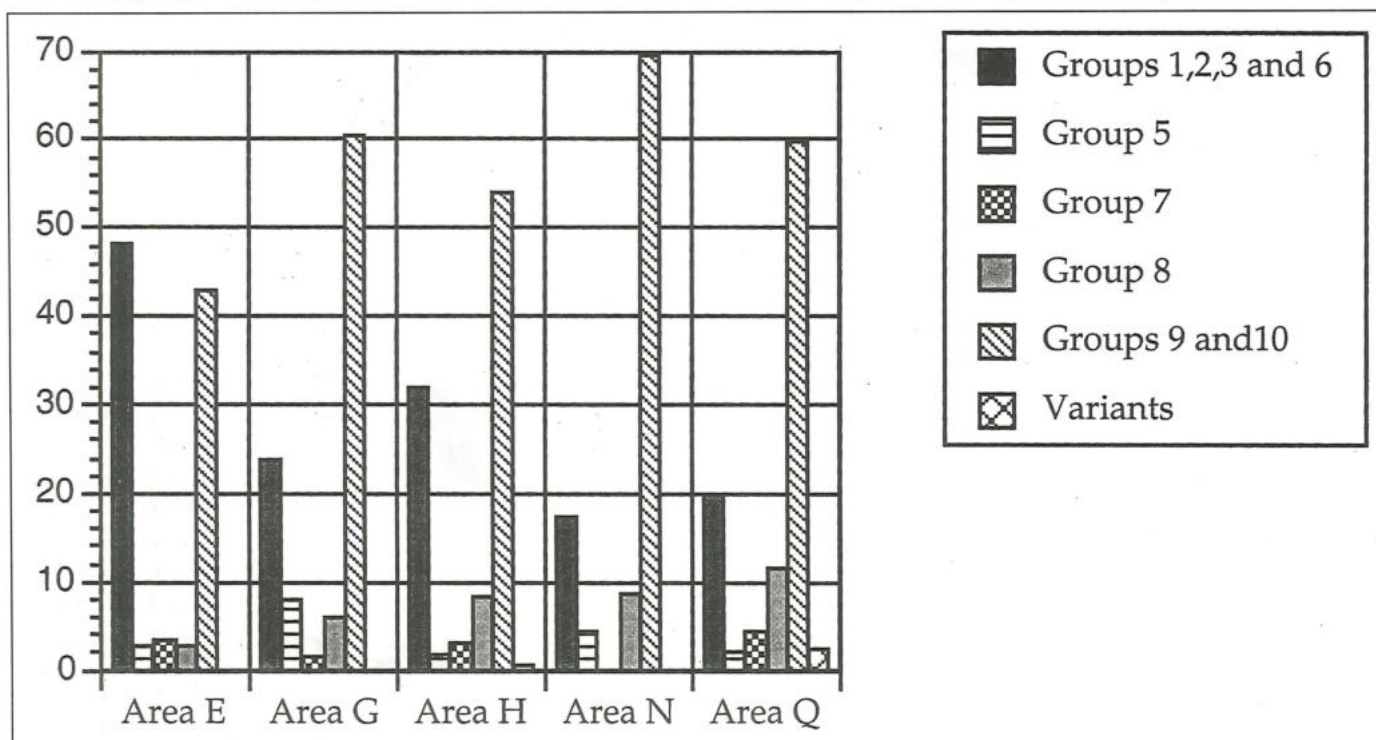
The high frequency of decorative sherds in the upper phases is paralleled with materi-

al from Hennessy's excavations (Lovell 1999). In addition to 'streaky wash', painted squiggly lines (Fig. 13.4-5) and red painted decoration on white slip (Fig. 9.2) were popular. Material which resembles the Tel Tsaf linear painted style does occur (Figs. 4.1, 11.5 and 13.2; see also 12.2) although this begins in the middle levels.

Fabric Analysis (Fig. 21)

It will be noted that all of the areas on the site show a dominance of the buff (1, 2, 3 and 6) and hard fired (9 and 10) groups. All except Area E show groups 9 and 10 at over 50 percent. Area E has a larger percentage of buff fabrics than this group, although it also appears to show less variants. The highest variance is found in Area Q, as is the highest percentage of group 8. Fabric 8 is a dark fabric with large amounts of coarse angular white crystalline material (probably calcite) which is employed for a high ratio of holemouth jars. These are traditionally interpreted as cooking pots (Fig. 13.3).

The early to middle phases were further explored in trenches G II and in N I, the findings there largely corresponded with the



21. Pottery. Fabric Groups by area.

ceramic repertoire in the A X and A XI sondages (Lovell 1999), although the exact correlation is yet to be confirmed. It is clear that there are major fabric changes from the basal levels to the upper levels. The most marked change is the eventual increase in the proportion of the hard red (Group 10 as well as related Groups 5 and 9) fabrics to the Buff fabrics (Groups 1, 2, 3 and 6). There are more subtle changes, with some evidence for the gradual selection of particular temper for certain vessels as is the case with Groups 7 and 8. Earlier phases show larger proportion of chaff tempered fabrics, and a particular fabric which contains very few inclusions (Group 4).

It appears that Hennessy's Phase G includes a high proportion of red slipped material, and it is possible that this phase is to be correlated with the Wadi Rabah horizon elsewhere. Burnished material is found at Tulaylāt al-Ghassūl, but in such small numbers that it is difficult to allocate it to a particular phase. The example given here belongs to the early to middle phases (G-E). More extensive commentary on this material and the earliest phases at the site in general can be found in Lovell (1999).

3. Small Finds 1-2 (SJB) and 3-8 (RTS) (Figs. 22-23)

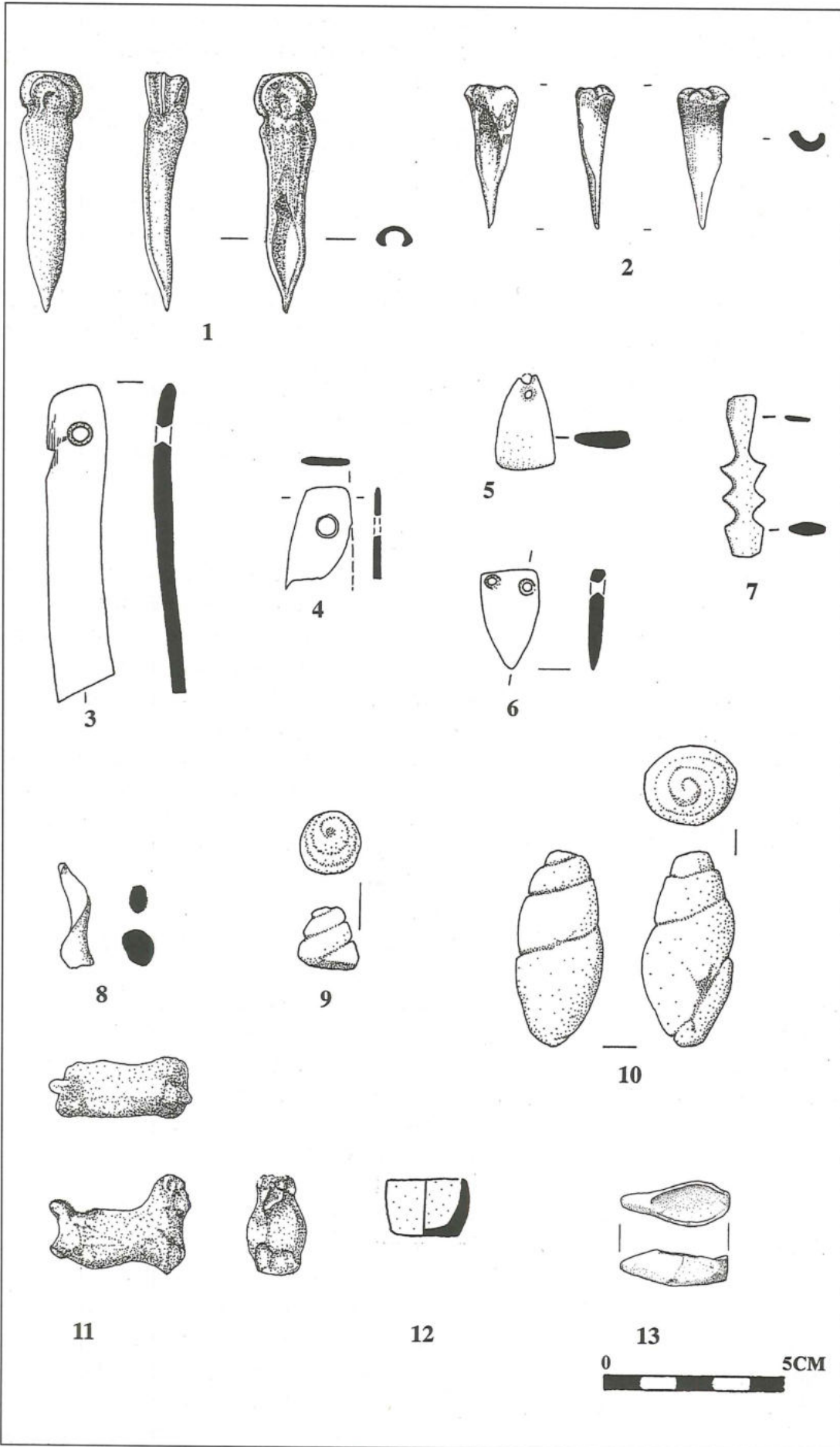
Siltstone Seal

A siltstone stamp seal was found in trench Q I 2.1 (RN 30012; Fig. 33.1), in association with the haematite macehead (Fig. 33.2) and mother-of-pearl jewellery. The stamp seal features a flat face, sub-rectangular in plan view, with flattened sides tapering in to a slightly rounded apex. It is pierced near the apex, and polished. The stamp face is decorated with an incised cross-hatched design. The present seal is quite unlike the small conical circle-incised stamp seals found in Mallon's excavations (Mallon *et al.* 1934), but is very close to the seal fragment found at Saḥāb (Ibrahim 1983: 44). Helms' (1991: 113-117) synthesis of

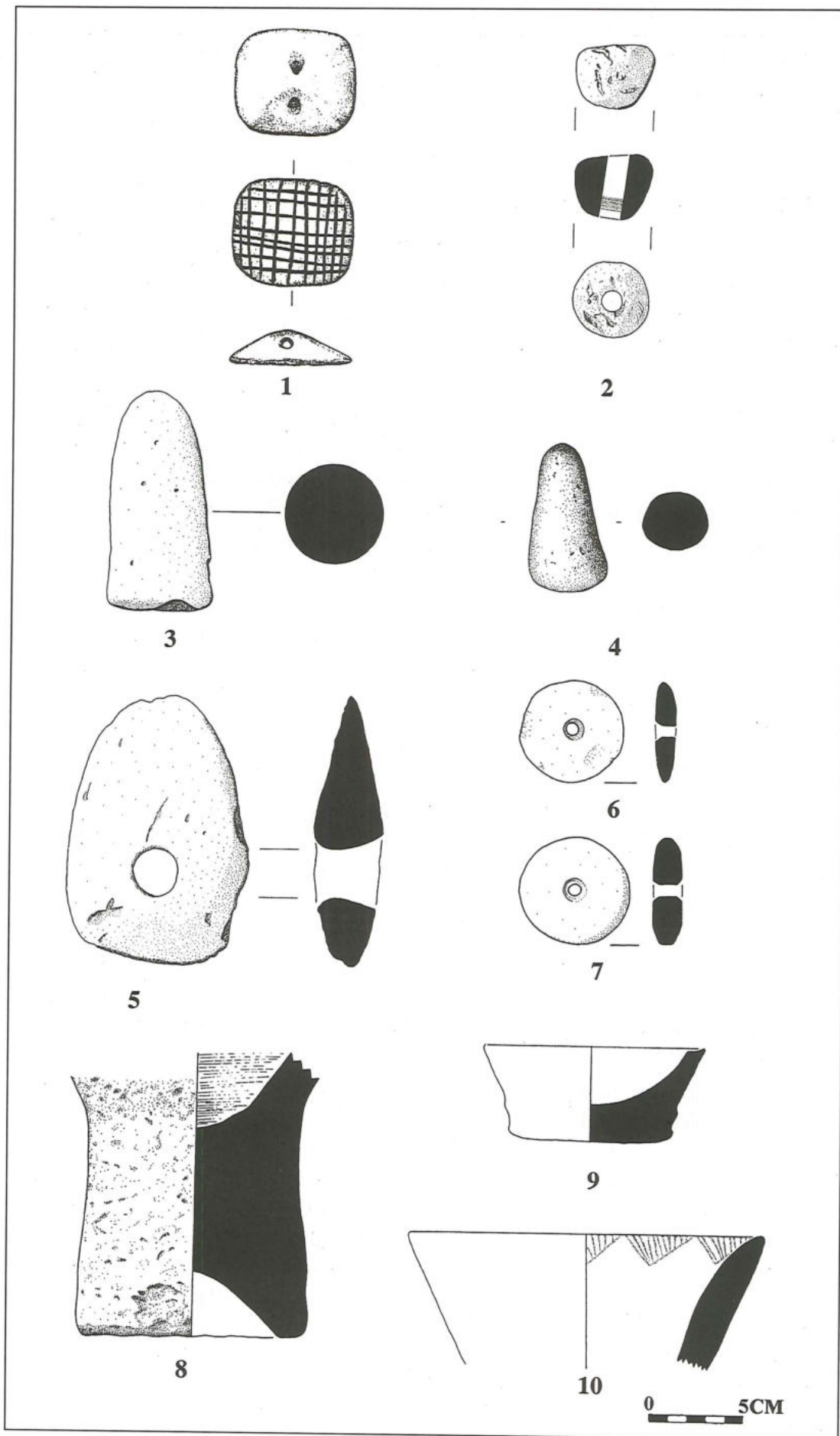
the early Jordan glyptic evidence would suggest that cross-hatch seal findspots are concentrated in the south Jordan Valley, as products of that region. The cross-hatch motif on the Saḥāb seal might link adjacent eastern upland regions with the south Jordan Valley. Stamp seals are very rare elements in Late Chalcolithic assemblages (Ben-Tor 1995: 365-366), and their significance in a south Levantine context remains unclear (Hanbury-Tenison 1986: 100). In Syro-Mesopotamia similar seals are viewed as unambiguous indicators of centralising tendencies in the economic sphere and growing complexity in the social sphere (Schmandt-Besserat 1992).

Haematite Macehead

A haematite macehead was found in trench Q I 7.9 in association with the stamp seal (Fig. 23.1) and mother of pearl jewellery. The small macehead features a slightly irregular, squat piriform body with very clear circular drill marks visible inside the central hole (RN 30013; Fig. 23.2). Ground and polished stone maceheads are a characteristic feature of the Chalcolithic ground stone assemblage (Hanbury-Tenison 1986: 164). They have been found at al-Ghassūl (Mallon *et al.* 1934: 71; Lee 1973: 276-7), Abū Ḥāmid (Dollfus and Kafafi 1989: 107 and Fig. 9), Pella (Bourke *et al.* 1994: 91-93) and Tubna (Banning *et al.* 1998: 153). Most maceheads are either spherical or pear-shaped, with drilled central perforations. A variety of stones are employed in their manufacture, although limestone, calcite and haematite are the most common. Whilst the limestone is likely to derive from local sources (Bender 1974), and the haematite may be sourced to the 'Ajlūn region (Hauptmann, pers. comm.), the calcite is probably imported from the Eastern Desert of Egypt (Lucas and Harris 1962). The majority of Chalcolithic maceheads are made from high prestige (copper), rare (haematite) or imported (calcite) materials, making them far



22. Small Finds. 1. RN 20025, H II 55.1: Worked bone point. 2. RN 20073, N I 5.16: Worked bone point. 3. RN 20002, N I 2.5: Upper part of shuttle needle. 4. RN 20010, H II 3.13: Upper part of shuttle needle. 5. RN 30011, A XI 55.11: Greenstone pendant. 6. RN 20003, N I 3.8: Calcite pendant. 7. RN 30044, G II 66.28: Worked bone pendant. 8. RN 20022, G II 51.6: Animal figurine fragment. 9. RN 20029, E XXV 7.3: Trochiform fossilised shell. 10. RN 20030, E XXV 7.3: Fusiform fossilised shell. 11. RN 20046, G II 64.2: Animal figurine. 12. RN 30022, Q I 1.6: Ceramic miniature bowl. 13. RN 30035, Q I 2.4: Ceramic miniature spoon or ladle.



23. Small Finds 1. RN 30012, Q I 2.1: Limestone stamp seal. 2. RN 30013, Q I 7.9: Haematite mace-head. 3. RN 20050, E XXV 7.5: Basalt pestle. 4. RN 20052, E XXV 7.7: Basalt pestle. 5. RN 30015, H IV 2.3: Basalt axehead. 6. RN 30014, G III 1.2: Pierced limestone disc. 7. RN 30028, G III 10.1: Pierced siltstone disc. 8. RN 20015, G II 55.7: Basalt pedestal bowl. 9. RN 20053, TG +. Unstratified: Basalt bowl base. 10. RN 30019, H IV 4.3: Decorated basalt V-shaped bowl.

more likely to be markers of status (Blackham 1999: 62) than simple weapons of war. Their presence in assemblages need not imply militarisation of society (Levy 1995: 243), but probably serves as further evidence for social stratification (Cialowicz 1989).

Bone Tools

Worked bone points or awls were common, usually made from ovicaprine metatarsals or metapodials. Around thirty examples have been recovered over the last two seasons. While scattered throughout the site, they were most frequent in Areas H, A and N. There is a considerable variation in tool length, reflecting various stages in the reduction process (RN 20025, H II 55.1; RN 20073, N I 5.16; Fig 22.1-2). The upper parts of two shuttle needles were also recovered from trenches N I and H II, made from bovine or ovicaprid rib bones (RN 20002, N I 2.5; RN 20010, H II 3.13; Fig 22.3-4).

Groundstone Tools

The groundstone repertoire includes two small basalt pestles, associated with the altar in the sanctuary enclosure (RN 20050, EXXV 7.5; RN 20052, EXXV 7.7; Fig 23.3-4). Several basalt axes were recovered from trench H IV. One is illustrated here (RN 30015, H IV 2.3; Fig 23.5). Pierced groundstone discs were found in some quantity throughout the site, with a range of materials used. Here, two examples from trench G III are illustrated, the first limestone and the second a fine-grained siltstone (RN 30014, G III 1.2; RN 30028, G III 10.1; Fig 23.6-7). Small examples may have functioned as spindle whorls, although a range of functions is likely for the group as a whole.

Groundstone Vessels

A number of additional stone bowl fragments were recovered, including the usual range of V-shaped bowls, both decorated

(RN 30019, HIV 4.3; Fig 23.10) and plain. One example, missing the rim featured a thick raised cordon above the base (RN 20053, TG+; Fig. 23.9). Several fenestrated bowl fragments were also recovered from trenches P I and Q II. A tall, solid pedestal bowl fragment from trench G II has very clear circular drill marks visible on the bowl interior (RN 20015, GII 55.7; Fig. 23.8). This shape is known from earlier excavations at the site (Mallon *et al.* 1934: Fig. 24).

Beads and Pendants

Numerous beads were recovered, generally from the sieve residues. Disc beads were the most popular form, appearing in a variety of materials including calcite, faience, 'greenstone', smoky quartz, ceramic, bone and possibly ostrich eggshell. They range in diameter from 7-15 mm, often with tiny thread holes of only 1-2 mm. Other shapes were less common, and included cylindrical and barrel-shaped beads in calcite, and a long biconical bead in serpentinite. Most finds of beads were sporadic, with the exception of a group of six bone/ostrich eggshell beads from the trench Q I 2.4 infant burial, which probably belonged to a single necklace.

Pendants were less common, although two 'greenstone' pendants were recovered from trench A XI. The illustrated example is triangular in shape, pierced twice at the apex (RN 30011, A XI 55.11; Fig 22.5). A calcite pendant from trench N I features the same shape in reverse, pierced through the broad end (RN 20003, N I 3.8; Fig. 22.6). This top-heavy shape is less common, although examples are known from earlier excavations at al-Ghassul (Mallon *et al.* 1934: Pl. 37.5). Another possible pendant or amulet may be seen in the small decorated bone object from trench G II (RN 30044, GII 66.28; Fig 22.7). Although the object is unperforated, it probably was suspended by string around the neck. It may be an early form of the later violin figurine type.

The presence of imported materials such as faience, calcite and serpentinite points to trade with Egypt, although the simplicity of the forms involved makes it difficult to determine whether these objects were imported as raw materials or finished products. That calcite was sometimes imported in unworked form is suggested by a possible unfinished calcite macehead uncovered during the 1995 season (BN 950207, EXXIV 4.7) and the discovery of a slab of unworked calcite at Beersheba (Dothan 1959: 30). The 'greenstone' used is probably some form of malachite or apatite, discovered as a by-product of copper exploitation in the Faynān region of southern Jordan. The 'bone' beads are more enigmatic; some have an unusual yellow patina on one face, and need further analysis to determine if they are bone, or perhaps ivory or ostrich eggshell.

Zoomorphic Figurines

Several low fired clay fragments were found, mostly belonging to zoomorphic figurines. The distribution of these were limited to a few areas on the site. Three tapering animal leg fragments were found in Areas A and H. Figurine fragments were more numerous in Area G, which produced a possible bird's head, a twisted horn (RN 20022, GII 51.6; Fig. 22.8), an animal head with two upright pointed ears and short snout, and the body of a small four footed animal with short, stubby, upright tail (RN 20046, GII 64.2; Fig 22.11. Similar figurines with upturned tails are known from earlier excavations at Tulaylāt al-Ghassūl (Mallon *et al.* 1934: Fig. 35.1-4; Hennessy 1969: Fig. 11.4, Pl. XVIb left), and at Tall Abū Ḥāmid (Dollfus and Kafafi 1993, 250, Fig 4.7-10). Mallon identified these as dogs, while Dollfus and Kafafi suggested that they might be intended to represent goats.

Fossil Counters or Votives

Two fossilised gastropod shells were discovered in trench EXXV, one fusiform and

the other trochiform in shape (RN 20029, EXXV 7.3; RN 20030, EXXV 7.3; Fig. 22.9-10). These objects are naturally occurring fossils, and although none appear to have been modified, their contexts suggest that they had been brought to the site deliberately rather than appearing there by accident. Possible functions include use as counters, gaming pieces, curios or small votive items. This last role was suggested for similar fossils found at the mining temple at Timna (Reese 1988: 267, Pl. 154.7-8). Although there can be no chronological link, it is possible that this represents a similar phenomenon of items being given special status because of their unusual nature. This interpretation gains some support from the appearance of these two examples together within the sanctuary enclosure.

4. Archaeozoological Report (LDM)

Introduction

This archaeozoological report covers the 1995 and 1997 seasons of excavation at Tulaylāt al-Ghassūl. The total bone count for the two seasons was well over 15,000 with the number of identifiable fragments or specimens (NISP) reaching 3,771 (Table 1). This translated into a minimum number of individuals (MNI) of 1,084 (Table 2) and meat equivalent numbers based on the MNI of 2,787.5. The MNI values were calculated using the maximum distinction method of the number of individual animals in any given level in any given trench. The meat equivalent values were calculated according to a formula that is discussed below.

The manner of analysis equates with earlier practice (Mairs, in Bourke *et al.* 1994: 122-123). It is pleasing to note that other authors (Grigson 1995: 252-255) are now considering meat equivalent ratios when determining the relative importance of meat-producing species. This has the effect of shifting absolute NISP (number of identified specimens) values into a more meaningful

framework. No longer does an absolute bone count stand purely on its own merits. This enables a more accurate estimation of meat protein potential by species. This has altered our preconceptions of a sheep and goat dominated economy (Table 1), to one where cattle predominate, or are at least are of equal importance (Table 3). However the weights of the various domesticates as presented by Grigson (Grigson 1995: 248, Fig.4) whilst possible, are not the usual slaughter-weights today. Indeed, sheep are usually slaughtered between 27 and 32 kg (Hammond 1974: 121), cattle between 460 and 510 kg (Hammond 1974: 93), porkers between 45 and 90 kg and baconers around 90 kg (Hammond 1974: 156). If the weights were presented by Grigson in pounds rather than kilograms, this would be more acceptable. In this analysis, meat equivalent ratios count sheep and goats as 'one sheep-goat equivalent' (i.e.1 SGE) and all other species as multiples of this value. In this regard, cattle represent approximately 12 SGE and pigs 1.5 SGE. These estimates, however, are not direct ratios derived from the above slaughter-weights. If they had been, then cattle would represent approximately 16 SGE and pigs about 2.25 SGE, raising the profile of both these species even higher. The reasons behind current approximations are based on the fact that many ovicaprines are mature, most of the pigs are immature, and the cattle tend to be rather small. This means that the ovicaprines may well have been slaughtered above 30 kg bodyweight, the pigs probably at the lower range of 45-90 kg and cattle at around 360-400 kg. Whatever the approximate ratios, it is obvious that cattle played a major role in the diet of the Ghassulians, pigs a relatively minor role, and sheep and goats intermediate between the two.

3,771 bone fragments could be identified to species level, and these have been analysed by MNI (minimum number of individuals), using the maximum distinction

method, and their meat equivalents (sheep/goat equivalents or SGE). Four domestic ungulate species (sheep, goat, cattle and pig), two to three wild ungulates (gazelle and deer) as well as equids (donkeys and onagers), canids (dogs), felids (cats), fish and birds have been identified. As well, one very small mature artiodactyl has been found that requires further identification.

Table 1. NISP values.

	Neo	EChal	MChal	L Chal	VLChal	Total
Ovicaprine	215	209	597	840	1040	2901
Bos	20	34	52	120	109	335
Cervid	1	4	2	3	4	14
Sus	10	27	67	119	99	322
Gazella	2	4	7	19	159	191
Equid				7	1	8
Total	248	278	725	1108	1412	3771

Table 2. MNI values.

	Neo	EChal	MChal	L Chal	VLChal	Total
Ovicaprine	74	72	169	216	176	707
Bos	8	22	32	45	38	145
Cervid	1	1	2	3	3	10
Sus	7	14	35	44	37	137
Gazella	6	3	6	13	32	60
Equid				2	1	3
Total	96	112	244	323	287	1062

The domestic economy of al-Ghassul was based primarily on the utilisation of four species: sheep (Ovines), goats (Caprines), cattle (Bos) and pigs (Sus). That these were domesticated by the Fifth Millennium has been attested by a number of authors (Clutton-Brock 1981; Flannery 1983; Grigson 1989). The marginality of the site is reflected in the lower cattle and higher ovicaprine numbers than at Pella (Mairs, in Bourke *et al.* 1998: 201-205). Animal husbandry practices at al-Ghassul changed over the period from the Neolithic through the Very Late Chalcolithic (Table 3). It is uncertain whether the variation over time reflects changes in environmental, economic or socio-political conditions, but the probability is that all three played a role. The faunal sample reflects purely local consumption and gives us no indication of trade, with

surplus stock being simply transported 'on the hoof' (Redding 1992). The age at death ratios indicate that secondary products were becoming increasingly important over the course of the Chalcolithic.

Table 3. SGE (Meat Equivalent) Percentages.

	Neo	EChal	MChal	L Chal	VLChal	Total
Ovicaprine	39.2	19.8	27.2	25.3	25.0	27.3
Bos	50.8	72.7	62.2	62.9	61.4	62.0
Cervid	2.1	1.1	1.3	1.4	1.7	1.5
Sus	5.6	5.8	8.4	8.0	7.9	7.1
Gazella	2.4	0.6	1.0	1.2	3.4	1.7
Equid				1.3	0.6	0.4

Unlike Grigson (1995), who has drawn by necessity on NISP figures to calculate the relative meat values of the main food-producing animals, here meat values are based on the MNI of each species at al-Ghassul. This is a more accurate representation of the relative importance of each species, although our results correspond well with Grigson's conclusions (1995: Fig.8). Cattle predominate from Neolithic times with sheep and goats also important, never getting above 40% of the meat consumed. Pig numbers hover around 5-8%, an indication of sedentism and ruralism (Dever 1995; Prag 1974). Interestingly enough, pig and cattle numbers were still high in the latest Chalcolithic levels, suggesting climatic conditions remained static. Indeed, the age at death ratios for all species indicate that they were all kept longer in the Very Late as opposed to the Late Chalcolithic indicating that breeding programmes were maintained and intensified.

Sheep and Goat Husbandry

The importance of sheep and goats varies considerably from the Neolithic to the Chalcolithic (see Table 3). The decline from nearly 40% of the total meat equivalent in the Neolithic to less than 20% in the Early Chalcolithic represents a dramatic turnaround in significance of the sheep and goats in the Ghassulian diet. The flock management practices do not seem to alter rad-

ically at this time. During the Neolithic and Early Chalcolithic, ovicaprines were killed at all ages, with very little change in the age class ratios. These ratios do change markedly in the later Chalcolithic phases, with neonatal and aged deaths declining from the Middle Chalcolithic onwards.

Deliberate flock control measures indicate more than dietary preference, although this cannot be ruled out entirely. It is possible that milking was established in the Neolithic. Wool as a commodity may have been utilised from the Neolithic, but did not become important until the Middle Chalcolithic. Neonatal deaths were at their peak during the Neolithic, decreasing slightly in the Early Chalcolithic, and almost negligible by the Middle Chalcolithic. Sexing of neonatal bones is impossible without DNA analysis, but it would seem that in all probability the very young males were being culled. This may be a flock management practice, unnecessary in older age brackets if milk production is a main aim. If, on the other hand, wool becomes a valuable commodity, then keeping males alive longer whilst increasing their manageability becomes advantageous. Two possible explanations are suggested for the decline in neonatal deaths in the Middle Chalcolithic. First, it could be that culling extra males in the population commenced. Secondly, if the neonatal bones represent foetuses, perhaps a greater understanding of breeding and pregnancy was developing and pregnant females were no longer being slaughtered. Males not required for reproductive purposes could have been either rigidly separated from the rest of the flock, or possibly castrated. The decline in neonatal deaths coincided with a resurgence in the relative importance of sheep and goats in the Ghassulian diet (see Table 3), with more animals kept to maturity, but not so many kept into a relatively unproductive old age.

Cattle Husbandry

Whilst sheep and goat numbers plummet

in the Early Chalcolithic, cattle numbers rise just as dramatically (see Table 3), with a definite trend towards keeping animals into old age, a major shift in husbandry preferences. As with sheep and goat husbandry, immature and mature percentages vary slightly over time, indicative of refinement in husbandry practices. However, there is a huge shift in emphasis towards cattle production with a concomitant rise in aged cattle in the Early Chalcolithic.

Cattle mature later and have a lower reproductive rate than sheep or goats (Hammond 1974: 51 and 100). Even in early agricultural communities this would have been fairly obvious, so that maximising production from cattle would have been a priority. Killing cattle as neonates would have set serious limits on this production strategy. Indeed cattle maximise their protein and energy conversion efficiencies from birth to 350 kg, with both decreasing up to 630 kg (Hammond 1974: 92). Consequently, whilst many cattle would have been kept for breeding purposes, a fair proportion would have been slaughtered whilst relatively young, but not neonatal. At al-Ghassūl, this percentage is anything up 38%.

Older cattle can be used for breeding, draught purposes and for milking. We have no direct evidence that any of the cattle at Ghassul were used for draught purposes, but breeding programmes were probably well established in the Neolithic, given the number of mature animals slaughtered during this period. The dramatic increase in aged cattle from the Early Chalcolithic onwards indicates more than just a subtle change in breeding patterns. The only reason for keeping animals beyond the age at which they are most productive is if their productivity is not simply age-dependent. The protein and energy conversion efficiencies of milk production far outweigh those of beef production (Hammond 1974: 92). Consequently, it is in a herder's best interest to keep a 'good milker' alive as long as possible. This ra-

tionale could explain the sudden rise in aged cattle in the Early Chalcolithic, and as such is possibly the best indirect data we have for milking in the Chalcolithic. It could also help explain why there are no neonatal remains on the site. In unimproved breeds today, and presumably in the early days of domestication, milk 'let down' (which is stimulated by release of the hormone oxytocin) will only occur in the presence of the calf (Hammond 1974: 270-271). Oxytocin release can be stimulated by suckling, stroking the teats or by vaginal distension (Hammond 1974: 76). In the mosaic stone frieze from the facade of the ED III shrine at Tall 'Ubaid, near Ur (Postgate 1994: 163), the earliest direct evidence for dairy farming, these factors are amply illustrated. The calves are tethered to their mothers, and the milkers are blowing into the vaginas of the cows whilst they milk. If it was still necessary to carry out these procedures to encourage milk 'let down' in the Third Millennium BC, then all the more reason for not slaughtering the calves too young in the late Fifth Millennium if you desired the same result.

Pig Husbandry

Pigs never become a major contributor to the diet of the Ghassulians. Pig utilisation increases during the Middle Chalcolithic (see Table 3), but never beyond eight percent. Zeder's excellent critique of the role of pigs in Near Eastern economies and her subsequent deductions (Zeder 1995: 297-312), fit well with her analysis of Tall Halif. Even so, no one theory explains the general paucity of pig in Near Eastern faunal assemblages, when it is arguably the greatest meat production machine of any of the domestic creatures. Pigs produce ten or more young in a litter and farrow two and a half times a year. Their growth rate and energy conversion efficiency are well ahead of any other domestic animal. One sow can produce 25 offspring each year, each growing faster than any sheep, goat or head of cattle.

Cattle only produce one young a year, and sheep or goats on average only slightly more, due to a low percentage of twinning.

Pig production techniques alter from the Neolithic to the Early Chalcolithic, with older animals predominating in the earlier, and immature in the latter period. The percentages actually reverse and remain that way throughout the Chalcolithic. The production strategy altered at the start of the Chalcolithic, so that the consumption, in the main, of immature individuals reflects the realisation that only animals with a secondary product potential need be kept into older age brackets. Indeed, from the Neolithic to the Early Chalcolithic, the shift in the age at death patterns for pigs are broadly the reverse of those for cattle and ovicaprines. Interestingly, very few aged pig specimens were found. It would seem that pig breeding programmes aimed at maximising meat production. This can only serve to highlight the variation in kill patterns for the other species which do have secondary product potential.

Even so, additional factors limiting pig production can be listed that prevented pigs from gaining generally in popularity as a meat source. Climate, economic strategies and social structures all played a role. Other factors include the smell associated with pig rearing, and the intelligence of the animal. Early animal producers would have been well aware that pigs can only be coerced with extreme difficulty. Under appropriate circumstances, pigs are exceptionally clean and display intelligence in the most surprising ways. Indeed, the ancient Greeks regarded the pig as *synanthropuomenos*, meaning 'living together with humans', like the dog (Isager and Skydsgaard 1995: 93). In earlier agricultural communities, this close co-habiting would have allowed a fairly detailed understanding of the pig's abilities and intelligence.

Wild Species

Deer do not figure highly at any stage of

occupation, but their presence in all periods indicates that the foothill region was probably more heavily forested during the Chalcolithic. The hunting of gazelle is not of importance until the Very Late Chalcolithic. Whilst climatic and economic scenarios could be made to account for increased gazelle numbers, an alternative scenario might posit recreational hunting by the higher-ranking members of society. There seems to be no common thread to the gazelle kill pattern, suggesting that opportunism played a large role in the hunting of gazelle.

Very occasionally, a large fish vertebra finds its way into a deposit, but on the whole fish remains are rarely found. Birds are rare and most bones are undiagnostic. Interestingly, a tibiotarsus was recovered from the altar installation in Area E. Ghassulian iconography regularly includes birds, often in association with the ibex, and both have been designated as cultic creatures (Elliott 1977: 7-9; Bar-Adon 1977: 683-691).

Equids are very rare, only appearing in the Late and Very Late Chalcolithic. It is possible that the onager was being used for its hide and as a meat source. The other equid remains came from donkeys that were most likely domesticated.

The reliance on domestic animals was almost total.

5. Archaeobotanical Report (JM)

Important archaeobotanical material from Tulaylāt al-Ghassūl has previously been published (Zohary and Spiegel-Roy 1975; Neef 1990), but systematic sampling for plant remains only began in 1994. This paper deals with the plant remains from 98 bulk sediment samples taken during the 1994-97 excavation seasons, and processed by machine flotation. Only the 'coarse flots' (light fractions from a 1mm sieve) have so far been analysed. Coarse flots were initially sorted into 'identifiable' and other material under good light but without magnification (Stage 1). Wood charcoal has not yet been

identified, nor have wood: seed ratios been determined (Miller 1984). The 'identifiables' were then sorted under a microscope (X 7-45 magnification) into broad categories (Stage 2). These were then sorted into the final categories (taxa) and counted (Stage 3).

All secure occupation deposits were sampled, with a notional standard sample volume of fifty litres wherever possible. Most samples in 1994-95, and some in 1997 were dry-sieved prior to flotation. All samples were processed by flotation, and about a third were analysed in some detail. These were chosen after a preliminary scan of the coarse flots. Small and poorly preserved samples were generally excluded. Samples from the 1994-95 seasons were first studied by Chantelle Hoppé (Sheffield), and the 1997 samples by John Meadows (La Trobe).

All statistical analyses of the combined data set and further commentary was the work of Meadows.

General Overview (Tables 4 and 5)

Only carbonised plant remains were considered to be archaeological. No mineralised, waterlogged or desiccated remains were recovered. All samples came from secondary contexts (*sensu* Miksicek, 1987). The quality of the material was therefore very mixed. Most seeds and fruitstones were fragmented, distorted or blown during charring, redeposition or recovery.

Nevertheless, in such a large assemblage (over 40,000 identifications), there was also a good number of well-preserved seeds. Economic plants included hulled barley (both 2-row and 6-row varieties), emmer wheat, a

Table 4. Plant Macrofossil Identifications 1994-97. Some categories have been combined in this table to compensate for procedural differences between analysts.

	Neo	EC	MC	LC	VLC	Total
Samples Analysed	8	19	29	27	15	98
Cereal culm nodes	6	25	306	766	226	1329
Cereal culm bases	2	3	49	84	136	274
Free-threshing wheat grains	14	45	55	11	9	134
Glume wheat grains	96	221	913	292	251	1773
Indeterminate wheat grains	22	60	159	74	79	394
Glume wheat glume bases	160	2039	5968	1822	3322	13311
Wheat rachis internodes	0	7	34	16	26	83
Twisted barley grains	10	36	110	16	30	202
Straight barley grains	5	37	128	108	20	298
Indeterminate barley grains	253	806	2184	1374	887	5504
6-row barley rachis internodes	0	34	135	64	184	417
2-row barley rachis internodes	0	56	182	84	142	464
Indet. barley rachis internodes	0	61	121	147	321	650
Indet. cereal grains	37	220	621	566	277	1721
Fig nutlets	0	17	50	100	222	389
Olive stones (est.)	15	172	84	404	144	819
Lentil	42	145	277	455	175	1094
Bean	0	2	5	4	2	13
Vetch	0	1	7	15	6	29
Pea	0	2	27	19	18	66
Indet. large-seeded legume	0	10	30	134	33	207
Chenopodiaceae	0	1	10	2	10	23
Fumaria	1	7	21	3	10	42
Malva	3	18	22	14	31	88
Small-seeded legume	191	626	2328	2007	2323	7475
Flax	0	10	192	40	32	274
Galium	1	9	66	163	13	252
Polygonaceae	2	6	5	2	15	30
Grass seeds	193	1359	2807	700	552	5611
Total	1053	6035	16896	9486	9496	42966

Table 5. Number of samples from each area and phase, classified by sample composition. Mixed samples are dominated by cereal grains, cultivated legumes and large weed types. Legume samples are dominated by small-seeded legumes (mainly *Scorpiurus sp.*). Olive samples are dominated by olive stone fragments. Sieving samples are dominated by grass seeds (mainly *Lolium sp.*), wheat glume bases and spikelet forks. Threshing samples are dominated by culm nodes, culm bases and barley *rachis internodes*.

Excavation Areas	A	E	G	H	N	P	Q
Terminal Chalcolithic		2 Mixed 1 Legume	3 Mixed 2 Legume 1 Olive 1 Sieving 5 Threshing				
Late Chalcolithic	5 Mixed 1 Legume		2 Mixed 1 Olive 4 Threshing	7 Mixed 1 Legume /Olive	2 Mixed	1 Legume	1 Mixed 1 Legume 1 Olive
Middle Chalcolithic	3 Mixed 1 Legume 1 Olive	1 Sieving	7 Mixed 4 Sieving 3 Threshing	1 Legume /Sieving	4 Mixed 2 Legume 2 Sieving	1 Mixed	
Early Chalcolithic	6 Mixed 3 Legume 1 Olive 1 Sieving		1 Mixed 7 Sieving				
Neolithic	5 Mixed 2 Sieving						

compact naked wheat, lentils, peas, beans, chickpeas, bitter vetch, flax (all domesticates), olives (wild and cultivated [Meadows, in press]), almond, pistachio, figs and dates (probably all wild). Einkorn wheat may or may not have been present. As van Zeist and Waterbolk-van Rooijen (1996: 526) note, it is difficult to positively identify einkorn when it occurs as a minor component of emmer. Small numbers of grains in a few samples appeared to have most of the features of einkorn, but all of these samples were dominated by emmer. No samples were dominated by einkorn-like grains. It is entirely possible that the einkorn-like grains were unusual emmer grains. The naked, or free-threshing wheat, is identical to that found at Shiqmim by Kislev (1979), who has argued that it is an extinct compact *tetraploid* variety, not the *hexaploid Triticum compactum*.

Most of the wild plants were potentially weeds of cultivation. These included several genera of grasses (*Avena*, *Bromus*, *Lolium* and *Phalaris*) and small-seeded legumes (*Medicago*, *Scorpiurus*, *Astragalus*), as well as small numbers of seeds belonging to typically synanthropic genera such as *Chenopodium* (*Chenopodiaceae*), *Malva* (*Malvaceae*) and *Fumaria* (*Fumariaceae*). Seeds of various other families (*Polygonaceae*, *Asteraceae*, *Brassicaceae*, *Boraginaceae*, *Solanaceae*, *Liliaceae*, *Asteraceae* and *Cyperaceae*) were occasionally recorded, as well as a few types which have until now defied identification.

Sources of Variation

Within the broad picture outlined above, there was meaningful variation between samples. The combined data set (ninety-eight samples, thirty categories of plant re-

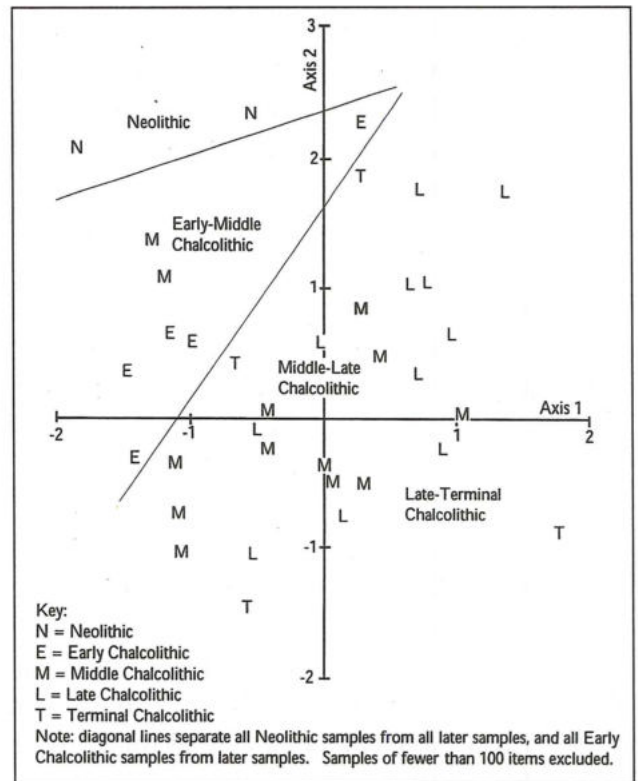
small legume type samples were almost as ubiquitous. What stands out is that only Area G produced samples that were rich in straw and chaff. The inescapable conclusion is that Area G was not purely a domestic area; rather, it appears that threshing and winnowing took place nearby, and that some of the straw and chaff were burned there. This pattern persists from the later Middle Chalcolithic onwards, and it is found in both the 1994-95 and 1997 samples.

Chronological Patterning

There are a greater variety of sample types from the later Middle Chalcolithic onwards, suggesting that activity areas become more defined at about this point. The timing of this transition is reflected in several other changes, both in the plant assemblage and the wider economy. Specialised activity areas may reflect the expansion of the settlement and presumably population growth, which probably drove the economic changes that took place during the Middle Chalcolithic.

Excluding the more differentiated samples from the correspondence analysis limits the importance of sample selection, recovery bias, crop processing and spatial patterning as sources of variation within the assemblage. A graph of 'core' samples (Fig. 26) shows that statistically, the relatively undifferentiated samples are still sorted chronologically. The distributions of Neolithic and Early Chalcolithic samples overlap somewhat, but there is practically no overlap between these and the distributions of Late and Terminal Chalcolithic samples. The distribution of Middle Chalcolithic samples overlaps with both groups, but later samples from within the Middle Chalcolithic tend to fall with the Late Chalcolithic samples, and earlier Middle Chalcolithic samples with the Early Chalcolithic and Neolithic group.

A transition takes place during the Middle Chalcolithic. It is marked archaeobotanically by:



26. Correspondence Analysis scatter plot of 'core' samples by phase.

- the disappearance of free-threshing wheat
- a sharp decrease in the abundance of wild grass seeds
- a sharp increase in the abundance of small-seeded legumes
- an apparent increase in the ratio of 6-row to 2-row barley rachis
- a possible increase in wheat yields
- a possible increase in the diversity of pulses
- probable domestication of olives, and possible increase in figs and dates

Most of these changes should be seen in the context of population growth and settlement expansion creating increasing demands for agricultural land. The possible change from intensive on-site pastoralism to seasonal transhumance at this time seems to be reflected in the plant remains; the absence of ovicaprines in the first half of the year probably reduced the number of grass seeds reaching the site in dung, since these are shed by the plant soon after maturity, around April (Neef, pers comm.).

Olive domestication (Meadows, in press)

followed a long period in which wild olive trees, which must have grown in the hills behind Ghassul, were heavily exploited, as olive remains are far more abundant than any other wild fruit. The number of fig and date seeds is too small to speculate on possible domestication. Flax seeds occur in too few samples to produce a temporal pattern, but their relative scarcity in the Late and Terminal Chalcolithic may reflect increasing olive cultivation (oil) and wool production (fibre).

Summary of Archaeobotanical Results.

Sampling during the 1994-97 seasons has provided a reasonably comprehensive picture of the prevailing plant economy at Ghassul. Environmentally-sensitive wild species were extremely rare, making it more difficult to attempt an environmental reconstruction. Most, if not all crops were cultivated locally. During the Neolithic and Early Chalcolithic, the main cereals were emmer wheat and 2-row hulled barley, with free-threshing wheat and 6-row hulled barley as minor crops. Pulses other than lentils were rare. Wild olives were heavily exploited. Samples reflecting this type of economy continue to occur in the Middle Chalcolithic, and more rarely in the later stages. During the Middle Chalcolithic, another type of economy appears, in which the main cereals are emmer wheat and 6-row barley, with 2-

row barley as a minor crop. Numerically, lentils remain the most common pulse crop, but larger legumes, particularly peas, are found more frequently than before. Olives appear to have been domesticated during the Middle Chalcolithic. By the Late and Terminal Chalcolithic, most samples reflect the new type of economy.

6. Radiocarbon Dating (SJB)⁴

The Jordan Valley Chalcolithic is generally thought to span the late Seventh and Sixth millennia bp, or the Fifth and early Fourth millennia BC (Joffe and Dessel 1995). The major anomaly was Hennessy's five (SUA 732-739) very early determinations from Tulaylāt al-Ghassul (Weinstein 1984). Joffe and Dessel noted the anomalous position of Hennessy's Ghassul dates. Recent stratigraphic analysis (Bourke 1997b) suggested that none of Hennessy's SUA samples came from his earliest strata, making the SUA determinations impossible to integrate with current thinking.

New excavations at al-Ghassul (1994-97) obtained short life samples to explore this problem. Ten new AMS determinations (Table 6) derive from two well separated but broadly equivalent sequences (Areas A and G) and both returned equivalent results. These suggest that Hennessy's SUA dates were as much as ± 500 years too early. The

Table 6. Ten Short-life AMS Radiocarbon determinations.

ANSTO CODE	Submitter ID	d(13C) per mil	percent Modern Carbon		Conventional C14 Age		Calibrated Age	
			pMC	1 σ error	Age (BP) yrs	1 σ error	1 σ range	
OZD024	97/10	-22.2	48.63	0.52	5791	86	4723 BC	4559 BC
OZD025	97/11	-20.4	47.96	0.42	5902	71	4845 BC	4726 BC
OZD026	97/12	-22.4	48.27	0.70	5851	117	4794 BC	4600 BC
OZD028	97/14	-23.8	49.92	0.41	5581	67	4461 BC	4370 BC
OZD029	97/15	-21.3	50.27	0.55	5524	88	4435 BC	4290 BC
OZD030	97/16	-23.2	50.10	1.01	5552	163	4496 BC	4295 BC
OZD031	97/17	-24.7	49.77	0.49	5605	80	4490 BC	4376 BC
OZD032	97/18	-22.7	49.94	0.44	5577	71	4461 BC	4368 BC
OZD033	97/19	-24.8	50.72	0.36	5454	58	4338 BC	4262 BC
OZD034	97/20	-23.8	51.43	0.45	5342	71	4274 BC	4085 BC

4. The new radiocarbon dates were supplied by the AMS dating unit of ANSTO, Lucas Heights Australia. I (SJB) would like to thank Drs. Ewan Law-

son, Quan Hua and Ugo Zoppi for their particular assistance in providing the new dates.

new AMS dates bring the Early/Middle Chalcolithic phases at al-Ghassūl into line with likely cultural contemporaries at Abū Ḥāmid/Tall Tsaf in adjacent regions (Lovell 1999), and solves the inter-related problem of the absence of 'Ghassulian' remains at Jericho (North 1982). It raises the very real possibility that significant occupation at Ghassul had ended by the floruit of the Beersheban Chalcolithic (Levy 1992; Gilead 1994).

7. General Conclusion (SJB)

Over the course of the two field seasons reported on herein, we have sought to balance two basic desires. The first aimed to recover complete stratigraphic profiles across the settled area and intensively sample deposits for cultural, microenvironmental and radiometric data. The second aim was to investigate the latest phases of occupation extensively, to investigate the reasons for the final and precipitate abandonment of the site.

The first aim is well on the way to being met. Two complete sequences (A X and XI Sondages) through Area A (Tulayl 2), and one each in Areas E (E XXIV Locus 1), G (G II Sondage), H (H II Sondage) and P (P I Locus 2) have given a reasonably coherent picture of the central, western and north-eastern regions of the site. Another (N I) nears completion in the north-central region, and further sondages in the east (Area Q) and south are planned. Already it is possible to sketch out the stratigraphic history of the site and relate older stratigraphic formulations to more recently recovered as-

semblages.

The second aim of exploring substantial areas of Late Chalcolithic architecture is less advanced, but progressing well. Investigations in Areas A (trench A XII) and G (trench G III) were more disrupted by modern pitting than first hoped, but recovery of extensive well preserved architecture in Areas E (E XXV Altar Installation), H (H III-IV Longhouse), N (N I Storage Complex) and Q (Q I Corner-Burial Room) promises much for the future. There is also the promise of investigating earlier Chalcolithic settlement layout in the base of the PBI Tulayl 3 exposure. The well preserved trench G II Locus 50 Storage Complex and the first indications from the trench G II Locus 200 Surface Clearance suggests that such investigations are both practical and likely to be fruitful.

In situ remains of latest Chalcolithic living/work floors (Area H), storage facilities (Area N), cultic deposits (Area E) and funerary offerings (Area Q) show promise of providing insights into the nature and position of differential function zones across the site, whilst reinforcing the impression of a hasty or unplanned final abandonment of the site. Intensive sampling strategies have provided rich collections of cultural, archaeobotanical and microfaunal material, and comprehensive multi-period cultural and environmental profiles have been created for a variety of areas across the site. Finds emphasise both the longevity and rich variety of occupation across much of the site, and capture some of its fluctuating intensity.

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